

The Business Process Model for IT Service Management

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Abstract: - The article primary deals with IT Service Management (ITSM) and IT Infrastructure Library (ITIL), as a process based method. Providing IT services with better, guaranteed quality has been the aim of many diverse efforts, undertaken under the common denominator ITSM. To develop an architecture for information technology service management and design integrated solutions, it is necessary to establish a common framework for delivering IT services. The model is a framework for organizing the assets that constitute an ITSM design. Using this framework, an organization can document the available set of IT services offered and understand how they are composed from finer-grained services delivered by internal or external providers. This processing model can be used by management software vendors to describe the capabilities of their ITSM offerings and to align those with the needs of different customers. An introduction to the terminology and icons used in the Business Process Model are applied in Enterprise Architect's Business Process Model.

Key-Words: - ITSM, Process Model, Framework, ITIL, UML

1 Introduction

In today's on demand world IT plays a pivotal role in creating new opportunity and delivering competitive advantage. As your reliance on technology increases, your IT infrastructure becomes ever more crucial to delivering business critical services. In information technology service management (ITSM) [1], there are many models and frameworks created in face of the challenge.

The IT Infrastructure Library (ITIL) is a collection of books in which best practices in IT Service Management are described. ITIL follows the principle of process-oriented (IT Service-) Management and groups management activities into defined management processes. Incident Management, Problem Management, Change Management, Release Management and Configuration Management are five operative ITIL Service Management processes described in [2].

This paper addresses basic issues of supporting ITIL with process oriented tools, introduce process improvement model, which can be used by an organization as the framework for process improvement. The article provides information about using process models and definitions to complement a process led approach to implementing IT Infrastructure Library guidance in a programme of continuous improvement. Process improvement model result from the generic process model, where data enters the process, is processed, data comes

out, the outcome is measured and reviewed. Through the use of process improvement model is possible to define measures of how demonstrate improvements and achievements that are truly useful.

This paper proposes a processing model for designing, developing, and deploying ITSM products and solutions. Its aim is to facilitate collaboration among the many individuals and roles involved in creating and supporting these complex systems [3]. The unique value of this model is that it offers leaders and managers of an ITSM organization a holistic model that covers the entire ITSM space. A key attribute of the model is that it supports the end-to-end specification of ITSM solutions, encompassing both product and service engineering.

The processing model is grounded in the realities of running an ITSM organization and was developed to meet real-world needs. It is not, therefore, a formal model, but a pragmatic framework for use by practitioners in the documentation and communication of ITSM solutions. The model includes constructs that are specifically of value to commercial service providers, such as the sales and marketing aspects of services. The people who can benefit the most from using the model are those who lead enterprise IT service provision, either as executives or as IT architect [4].

2 The ITIL Process Approach

ITIL promotes the introduction of 10 different processes (Figure 1). They are grouped into "Service Support" and "Service Delivery". These two components are linked together through the Service Desk – a function that provides a single point of contact that focuses on rapid restoration of normal service operations to users.

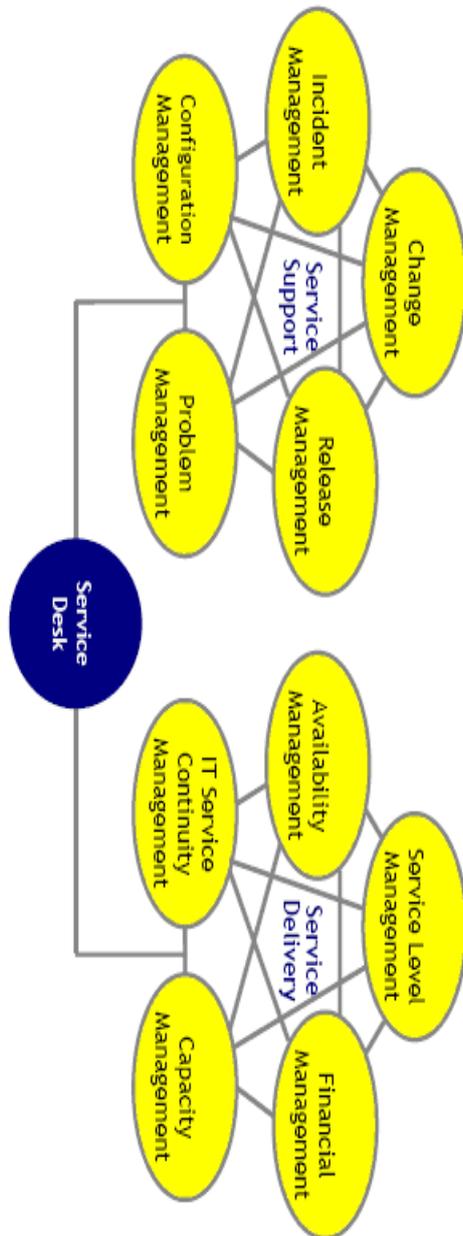


Fig.1 ITIL Service Management process

In addition to providing definitions of terms like "Incident", "Service Request" or "Escalation", ITIL delivers high-level descriptions of the core processes to be managed by an IT organization – without going into the "how to". It also gives examples of "Critical Success Factors" (CSF) for

process implementation and "Key Performance Indicators" (KPI) for process inputs and outputs. The "Key Performance Indicators" are metrics for measuring the effectiveness and efficiency of the process [5]. In the case of Problem Management, for example, this could be the ratio of reactive to proactive support.

In short, if it is possible to draw up a process model of best practice – or any practice in fact that is more effective than current way of doing things – then that model with a description of organization current practice can be compared and used to define improvements. If this is done in the light of organization business direction or critical success factors, measures of how an organization demonstrate improvements and achievements that are truly useful can be defined. As a process based method, the IT Infrastructure Library is particularly suited to use in this way.

Working with defined processes is a novelty for many organizations. By defining what an activities are, which inputs are necessary and which outputs will result from the process, organization will be able to work in a more efficient and effective manner. Measuring and steering activities increases this efficacy. Finally, by adding norms to the process, organization can add quality measures to its output.

3 The Process Model

The ITSM processing model provides an overall framework that allows models from many domains to be cross-referenced and their relationships understood. The model shows how to develop and describe IT solutions, especially ITSM solutions that use structured design methodology and deliverables. It does not prescribe a specific solution or technology. The process and data/information domains are defined to a higher degree of detail in the model due to how critical they are to ensuring the success of ITSM.

In this paper, we present the model as a series of informal entity-relationship diagrams. These entities can be thought of as work products or assets, and their connections are dependencies or inputs and outputs between those work products. In the simplest terms, an entity in this model is an asset needed to deliver an IT infrastructure service. The asset could be of any nature: In the application and product realm, these artifacts are code, software modules, and even hardware; in the services realm they consist of documents and specifications, such as requirements statements, designs, and service flow definitions. In developing the model we

adopted several other key principles: simplicity, elaboration, and depth of model.

The ITSM processing model that we propose starts with the premise that ITSM should be understood in terms of the services that are delivered. First we present the entire model in the same manner that present it to practitioners—as a simple diagram of boxes (entities) and lines (relationships). In the detailed descriptions of each domain, we provide more detail on the cardinality of the relationships, and in the supporting text we describe the nature of key relationships in more detail. The cardinalities of the relationships then indicate how asset types relate to each other. For example, the many-to-many relationship between technical component and deployment unit indicates simply that one technical component may be implemented by one or more deployment units, and one deployment unit may implement one or more technical components.

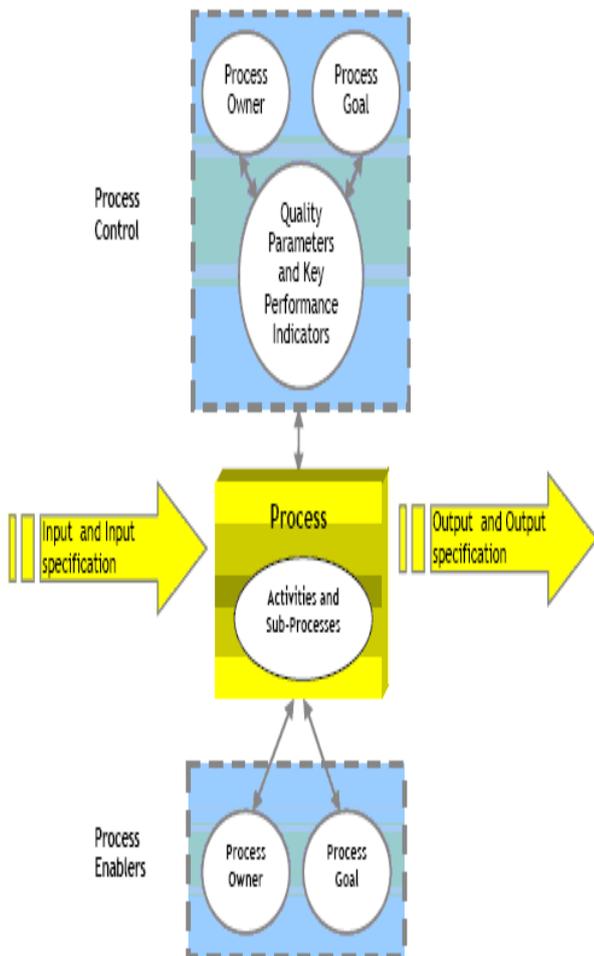


Fig.2 ITSM process model

The processing model is centered on the concept of services. ITSM is about the definition and delivery of IT services and the management of the organization that provides the services. The model provides a structure that allows us to describe what the services are (the service definition aspect), and it links the service definition information to how the service is delivered (the service delivery aspect). These two aspects are further broken down into a total of several domains, shown by the legend of Figure 1.

The service definition aspect contains two domains that describe what the services are: the service offering domain is for the purpose of marketing and selling the services; the service provision domain identifies the base set of services and groups them into a hierarchical structure.

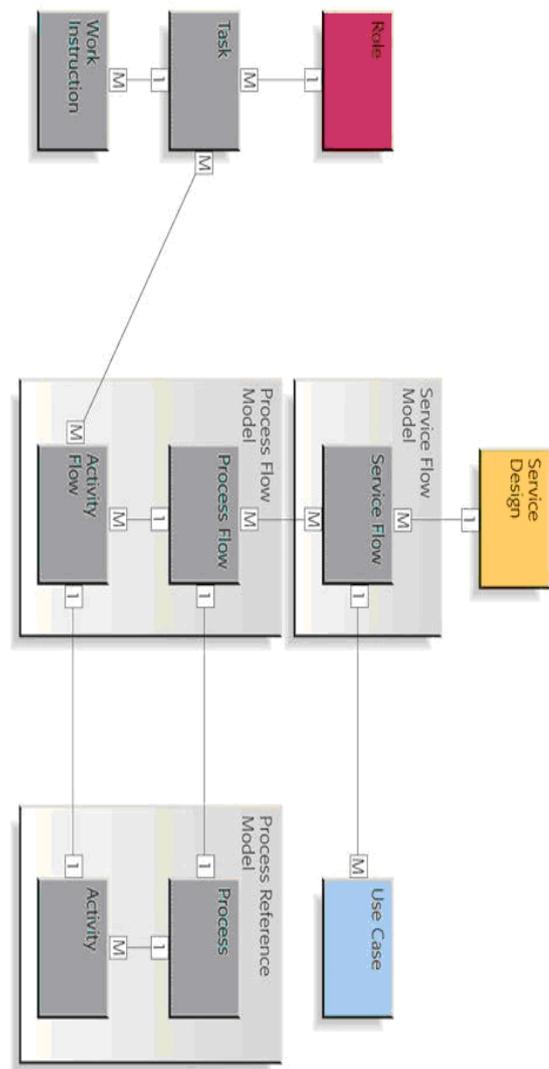


Fig.3 The Process Domain

The model shown in Figure 2 is a generic process model. Data enters the process, is processed, data comes out, the outcome is measured and reviewed. This very basic description underpins any process description. A process is always organized around a goal. The main output of that process is the result of that goal.

The model is represented as an informal entity-relationship diagram. Figure 1 identifies all the entities proposed for the model and shows how they relate to each other. At this overview level, cardinalities are not shown, but these are included in the detailed descriptions of the Process and Data/Information domains that follow.

3.1 Process Domain

The process domain is key within the ITSM processing model (Figure 3). Too often new service management tools and automation technologies receive insufficient focus and management attention. Yet typically, 50 to 70 percent of total budget spent on ITSM is on people, and the consistency and reliability of processes is critical in making IT delivery as efficient as possible.

Three basic concepts underpin the process domain [6]. A process reference model defines the complete set of processes that are needed for ITSM by providing a hierarchical, nonoverlapping breakdown of the activities required. Within the process reference model, the processes are organized into disciplines, such as problem management and systems management. The principal use for the process reference model is as a reference point or checklist, enabling IT managers to confirm that they understand all the necessary process disciplines and have implemented them appropriately. The IT Infrastructure Library (ITIL) framework is perhaps the most common industry-standard process reference model, and ITSM conforms to ITIL structures and terminology.

A process flow model follows the same hierarchical structure as the reference model, but develops the processes further, breaking activities down into tasks linked together by activity flows, and specifying the process flows that link together activities. A task is defined as the smallest unit of work that can be assigned to a role; that is, the entire task would be assigned to a single person for execution. Each task may be supported by work instructions that guide the user on how to perform the task. The process and activity flows can be used as the basis of actual process design.

A series of service flows define the processes to be implemented in practice. Each service flow is

created in response to a specific event or trigger, for example, a system condition such as "disk full" or a user event such as a help desk call. A service flow must cover all of the activities required to handle an event and may span several disciplines in the process reference model. Service flows can only be designed by considering the events or triggers that need to be handled.

The key to using these various process artifacts effectively is to focus on the service events or triggers that need to be managed. Process design starts from understanding the complete set of events and using the scenarios (service flows) to identify the actual work that must be done to handle each of them. As process definitions mature, the process reference model and the service flows need to be maintained and updated. Some industry assets (such as PRM-IT, the IBM Tivoli Unified Process (ITUP), and ITIL) form useful starting points and provide much useful reference material for this task, but all organizations need to tailor the service and process flows to their own specific circumstances.

3.2 Data and Information Domain

The data-and-information domain describes the key data model elements that represent managed entities in a comprehensive ITSM solution. It also describes how this information is used by the key service management entities and how the data-and-information domain contributes to the other domains. Data and information represented in the process model are described by five entities as shown in Figure 4:

It is obviously highly desirable to have a single information model and an associated logical data model from an overall service management perspective. However, it requires a governance structure and design authority for its maintenance, and any overall data model is likely to be at odds with the physical database designs for individual solutions. This is because the systems used in ITSM for such functions as configuration, change, problem, and systems management are predominantly commercial packages rather than custom applications. It is therefore unrealistic to expect that the information model and logical data model will do more than map the various physical database designs and support identification of gaps and overlaps. Nevertheless, such mappings are important in order to retain the best possible control of the multiple data repositories in the ITSM organization.

Given the level of complexity of integration projects, especially with multiple developers and

teams collaborating on the development of services, data models should be explicitly visible to all architects, developers, and project managers as a coherent set of XML schemas, in a Commonwealth Registry, and service development should be driven by those schemas.

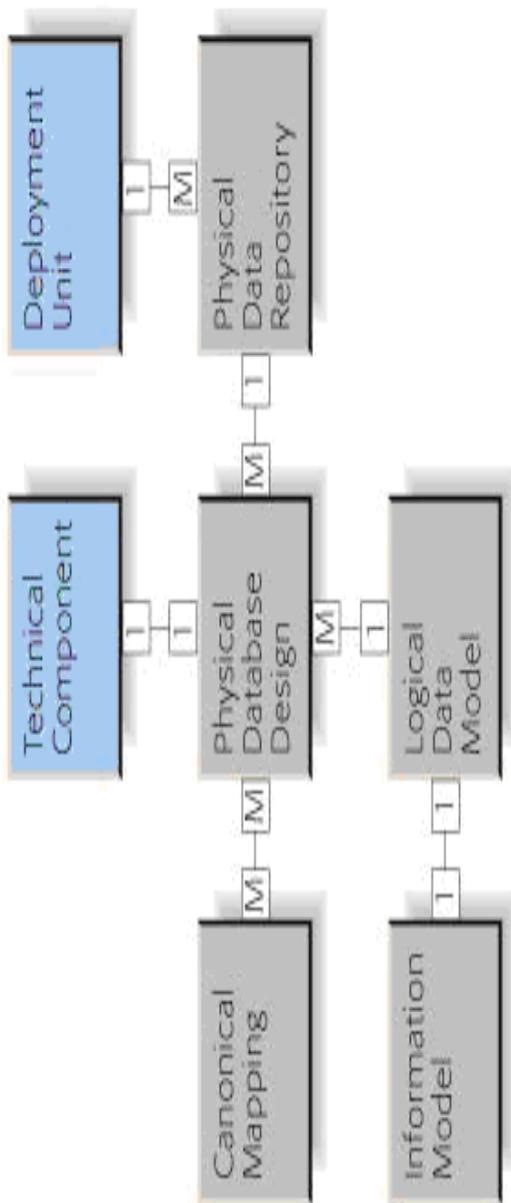


Fig.4 The Data-and-Information Domain

The Data-and-Information Domain addresses specifications for Data Interoperability, Data Management, Data Formats, and Records Management. Inclusion of these specifications in the development of service oriented applications is addressed in the Application Domain in Fig 5.

XML is a self-describing, extensible markup language that encodes the description of a document's storage layout and logical structure. XML provides a mechanism to impose constraints on this logical structure. XML is text-based, so XML fragments are easily created, edited, and managed using common utilities. Originally designed to meet the challenges of large-scale electronic publishing, XML is playing an increasingly important role in the exchange of a wide variety of data on the Web and elsewhere. XML is a meta-language, which enables interchange of information with any kind of application, in various presentations, for different target groups and different purposes.

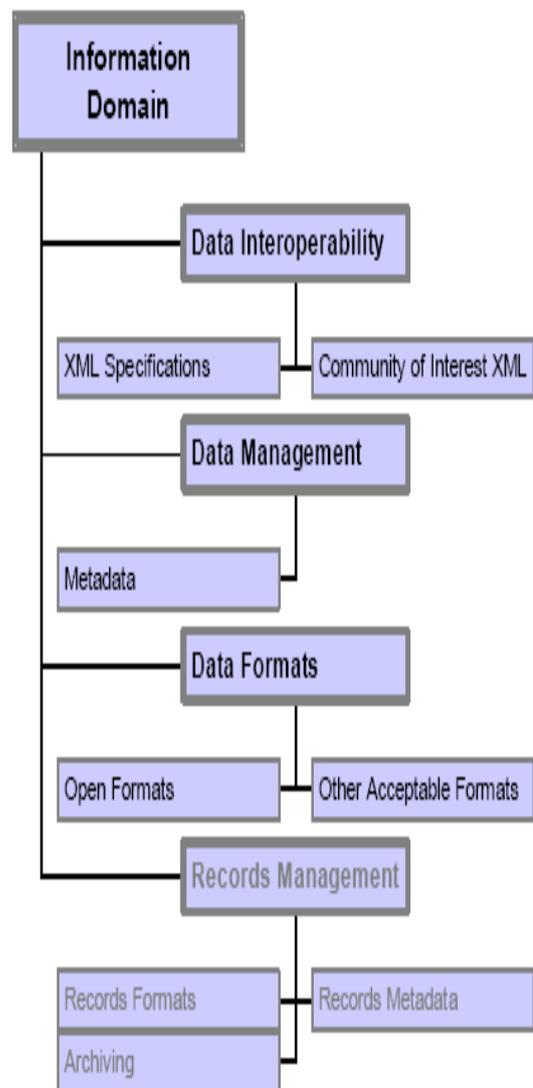


Fig.5 Enterprise Data Architecture

One of the most critical SOA decisions for the Commonwealth is the adoption of XML as the primary standard for Data Interoperability. XML has become the lingua franca of application integration, facilitating application interoperability, regardless of platform or programming language. The adoption of XML is the cornerstone of the Commonwealth's Service Oriented Architecture (SOA) vision of unified enterprise information environment.

Agencies should consider the use of XML for all projects, and should implement XML, unless there are compelling business reasons not to do so. XML should always be considered when undertaking new work or when beginning a major overhaul of an existing system. Agencies should always consider the fact that an XML solution will result in greater long-term benefits for the agency and the enterprise as a whole.

Data Management standards for the Commonwealth are intended to improve data:

- Conformity - What data is stored in a non-standard format?
- Consistency - What data values give conflicting information?
- Accuracy - Does the data accurately represent reality or a verifiable source?
- Duplication - What data records are duplicated?
- Integrity - What data is missing important relationship linkages?

Data Management problems can occur in many different ways. The most common include:

- A lack of enterprise standards and policies
- Inadequate data entry procedures
- Errors in the migration process from one system
- Data coming from outside may not adhere to standards
- Data received may be of dubious quality

Agencies need to share information visibility across the Commonwealth, regardless of how far along they are in their plans to implement a Service-Oriented Architecture (SOA).

Without visibility into the workings of the systems, applications, and other elements of their IT infrastructure, agencies are unable to manage or improve their IT environment, eliminate stove pipes, and most importantly, meet their business requirements.

A key to the enterprise visibility issue is metadata: information about shared services. To provide adequate IT visibility, agencies must follow basic metadata best practices for discovering and organizing metadata, encapsulating business logic in

metadata, managing with metadata, and modeling with metadata.

A significantly underused mechanism for working with Web services is the services metadata repository. At present, these repositories primarily store only the interfaces for services. However, for Web services to be supportive of fusion, additional metadata is necessary. Service metadata includes sequencing information to properly order service execution, parameters and exception handling information for the process model, and data to manage services into usable assemblies. Content metadata, such as user interface elements, and the connection of Web services to multiple portlets must be stored in metadata to allow modification of the system without code changes. For Services to be searchable across applications they must be versioned and represent processes that are independent of a single-application model.

4 Using the Mode in Business

Effective, reliable and flexible technology infrastructure services are critical to the success of business initiatives today. That's why many enterprises are transforming IT organizations, moving away from being a traditional technology provider to become a provider of reliable, low-cost technology services.

The purpose for publishing and maintaining a business process reference model is to serve as a relevant source of vocabulary and concepts to support collaborative work in the industry.

Here we describe how to model business processes in the UML using a custom extension to UML. It explains both the notation and the process of using that notation to capture and refine business process models.

Modeling the business process is an essential part of any software development process. It allows the analyst to capture the broad outline and procedures that govern what it is a business does. This model provides an overview of where the proposed software system being considered will fit into the organizational structure and daily activities. It may also provide the justification for building the system by capturing the current manual and automated procedures that will be rolled up into a new system, and the associated cost benefit.

As an early model of business activity, it allows the analyst to capture the significant events, inputs, resources and outputs associated with business process. By connecting later design elements (such as Use Cases) back to the business process model through implementation links, it is possible to build

up a fully traceable model from the broad process outlines to the functional requirements and eventually to the software artifacts actually being constructed.

As the Business Process Model typically has a broader and more inclusive range than just the software system being considered, it also allows the analyst to clearly map what is in the scope of the proposed system and what will be implemented in other ways (e.g. a manual process).

A business process is a collection of activities designed to produce a specific output for a particular customer or market. It implies a strong emphasis on how the work is done within an organisation, in contrast to a product's focus on what. A process is thus a specific ordering of work activities across time and place, with a beginning, an end, and clearly defined inputs and outputs: a structure for action.

The Figure 6 diagram below illustrates how the various model elements may be grouped together to produce a coherent picture of a named business process. Included are the inputs, outputs, events, goals and other resources which are of significance.

A business process model describes the workflow of the business processes that are performed by an organization. The most important elements of Business Process Model are business processes that are defined by [7]:

- Goals – why to perform this particular process (added value),
- Activities and subprocesses – how to transform inputs into outputs,
- Resources – inputs of the process that are consumed during transformation,
- Information – inputs that are used to modify the transformations in the process, but are not consumed (e.g. the color of a product),
- Owner – the person responsible for performance of the process,
- Trigger – an event that sets the process in motion.

Here we assumed the procedures for making a contract.

- Step 1: Identify the need for workflow improvement.
- Business process management involves activities that should identify problems (or just a need for improvement) in the workflow of processes. For example slow or non-effective marketing research. Based on this finding managers can decide to find a partner company that will take care of this particular group of problematic processes.

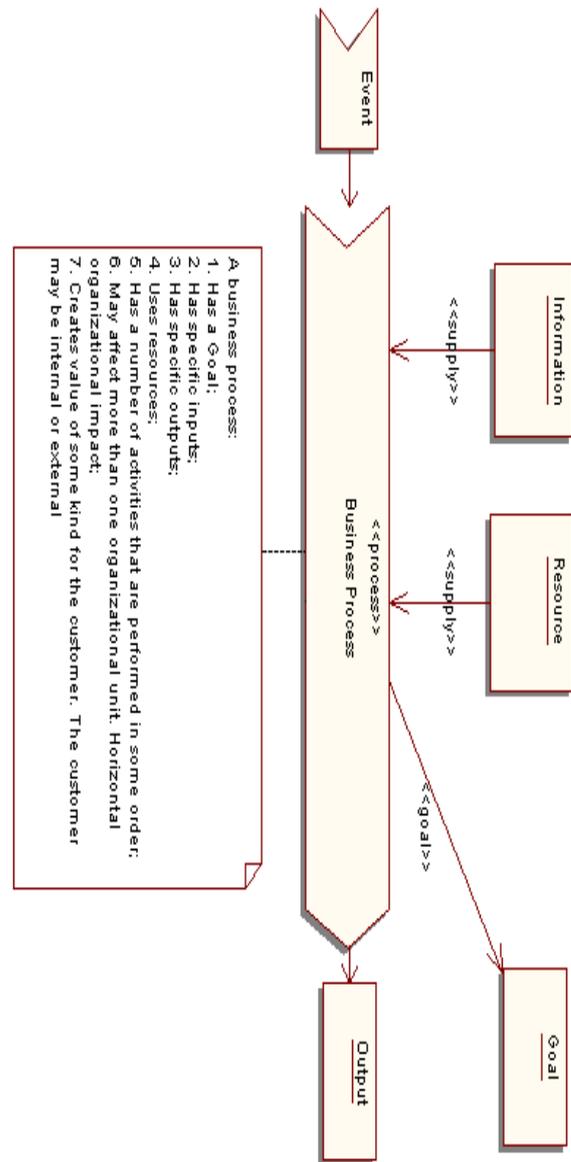


Fig.6 The Business Process

Step 2: Identify the group of all processes to be outsourced.

A very important step is to select processes to be handed over to a new partner. It is sometimes appropriate to outsource even non-problematic processes linked with the problematic process in order to gain other benefits (to reduce the amount and frequency of information or material exchange, to cut the need to employ staff, etc.)

Step 3: Specify the interface for the cooperation. The goal of this step is to identify inputs for the processes that follow the processes that are to be outsourced, and also the outputs of processes that

precede the outsourced processes. The first part is more important, because the inputs of subsequent processes form the requirements for the cooperating company. Based on this data, the search for a cooperating partner should begin. The outputs of the preceding processes may not be enough for the partner company, and a change in close areas of Business Process Model can be triggered (or a new search for a cooperating company that will be able to transform the available inputs to the required outputs).

Step 4: Integration of a new partner into the workflow.

After a successful search for a cooperating partner, it is essential to integrate its processes tightly into the company's Business Process Models. The possibility of integration (and maximum automation of information exchange) should also be one of the criteria in the selection process.

Step 5: Evaluation of effectiveness.

It is important to evaluate the effectiveness of outsourced processes. This has to be carried out continuously for the whole period of cooperation.

A business process is a collection of activities designed to produce a specific output for a particular customer or market. It implies a strong emphasis on how the work is done within and organization, in contrast to a product's focus on what. A process is thus a specific ordering of work activities across time and place, with a beginning, an end, and clearly defined inputs and outputs: a structure for action.

- Supply link from object Information. A supply link indicates that the information or object linked to the process is not used up in the processing phase. For example, order templates may be used over and over to provide new orders of a certain style - the templates are not altered or exhausted as part of this activity.
- Supply link from object Resource. An input link indicates that the attached object or resource is consumed in the processing procedure. As an example, as customer orders are processed they are completed and signed off, and typically are used only once per unique resource (order).
- Goal link to object Goal. A goal link indicates the attached object to the business process describes the goal of the process. A goal is the business justification for performing the activity.
- Stateflow link to object Output
- Stateflow link from event Event. A stateflow link indicates some object is passed into a business process. It captures the passing of control to another entity or process, with the

implied passing of state or information from activity to activity.

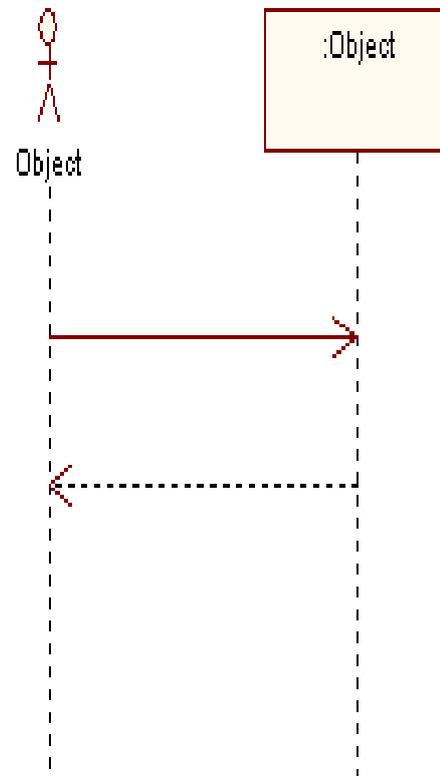


Fig.7 The WorkFlow UML

Goal

A business process has some well defined goal. This is the reason the organization does this work, and should be defined in terms of the benefits this process has for the organization as a whole and in satisfying the business needs. Goal link from activity Business Process. A goal link indicates the attached object to the business process describes the goal of the process. A goal is the business justification for performing the activity.

Information

Business processes use information to tailor or complete their activities. Information, unlike resources, is not consumed in the process - rather it is used as part of the transformation process.

Information may come from external sources, from customers, from internal organizational units and may even be the product of other processes. Supply link to activity Business Process. A supply link indicates that the information or object linked to the process is not used up in the processing phase. For example, order templates may be used over and

over to provide new orders of a certain style - the templates are not altered or exhausted as part of this activity.

Output

A business process will typically produce one or more outputs of value to the business, either for internal use of to satisfy external requirements. An output may be a physical object (such as a report or invoice), a transformation of raw resources into a new arrangement (a daily schedule or roster) or an overall business result such as completing a customer order.

An output of one business process may feed into another process, either as a requested item or a trigger to initiate new activities.

Resource

A resource is an input to a business process, and, unlike information, is typically consumed during the processing. For example, as each daily train service is run and actuals recorded, the service resource is 'used up' as far as the process of recording actual train times is concerned. Supply link to activity Business Process. An input link indicates that the attached object or resource is consumed in the processing procedure. As an example, as customer orders are processed they are completed and signed off, and typically are used only once per unique resource (order).

5 Conclusion and Future Work

The ITSM business process model provides a coherent, holistic analysis of the ITSM space. It is firmly grounded in the reality of ITSM organizations. Therefore, in places it does not rigorously follow ideal modeling practice because our guiding principle was to produce a model that our users could relate to and use.

One of the major benefits of implementing business process management and thus creating the business process model of a company is that Business Process Model is a good starting point for setting up cooperation with other companies. The model clearly describes the requirements of each individual process, the added value for the customers (and implicitly for the company itself). Based on this information, it is easier to hand a particular part of the business process workflow over to another company. Further very important benefits of introducing business process management to a company structure can be found in literature [7, 8].

Business process management and the linked business process model are interesting starting points formaking decisions about handing over

certain internal business processes to external subjects. The process of identifying the need to establish cooperation, identifying processes that should be handed over, etc., is very complex, and many factors have to be taken into account at all stages in the process.

We have shown examples of the value of the business process model. We have based our repository of standards on the model, and this has driven integration among several different disciplines within the organization and forced us to describe our services in a consistent and comprehensive way. It is a key tool for the integration of our work. We have also shown how the model can be used to position and rationalize overlapping change initiatives within an ITSM organization. We believe that any ITSM service-provider organization could use the model in a similar way, as a valuable management tool to organize a program of change and improvement.

The use of UML for enterprise modelling is an emerging field. The techniques described here are new, and this is the first time they have been described publicly. However, we have found the following very useful introductions to the wider problem of modelling with UML at an architectural or business level.

6 Acknowledgements

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References

- [1] J. van Bon, *IT Service Management: An Introduction*, Van Haren Publishing, Zaltbommel, Netherlands (2005).
- [2] Office of Government Commerce (OGC), editor. *Best Practice for Service Support*. IT Infrastructure Library (ITIL). The Stationary Office, Norwich, UK, 2000.
- [3] ISO/IEC 20000-1:2005, *Information Technology—Service Management Specification*, International Organization for Standardization and the International Electrotechnical Commission (2005).
- [4] H. Ludwig, J. Hogan, R. Jaluka, D. Lowenstern, S. Kumaran, A. Gilbert, A. Roy, T. R. Nellutla, and M. Surendra, "Catalog-Based Service Request Management," *IBM Systems Journal* 46, No. 3, 531–548 2007.
- [5] Catlin, J., Silkey, S., & Simons, T. (2005). *ITIL Process Management*. University of Kansas.

Retrieved October, 14, 2007,
from: <http://www2.ku.edu/~psmo/itil/index.shtml>.

- [6] Black, J., Draper, C. An integration model for organizing IT service management. IBM Systems Journal, VOL 46, NO3, 2007.
- [7] UML Tutorials: The Business Process Model. Sparx Systems, 2004,
from: http://www.sparxsystems.com.au/downloads/whitepapers/The_Business_Process_Model.pdb.
- [8] Smith, H., Fingar, P. Business Process Management: The Third Wave. 1st edition, Meghan-Kiffer Press, 2003.