

# A Product-based Information Management Approach

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## Abstract

*The paper presents a product-based information management approach that promises a more efficient and effective delivery of IT services. Within a product-based information management, service providers and customers cooperate on the basis of a set of defined IT products. Instead of managing joint IT projects, customers purchase IT products offered and delivered by an IT service provider. The cooperation is based solely on business-oriented requirements and managed through transparent, market-like mechanisms. The approach presented in this paper defines various levels of IT products, describes the central tasks within a product-based information management and introduces an institutional model, which focuses on the structural and organizational requirements. It also discusses the practical consequences of introducing a product-based information management for the service provider and the customers. The results are part of a two-year research project on integrated information management concepts, developed together with a number of European companies.*

## Keywords

Information Management, IT Management, IT Product, IT Service.

## 1. Introduction

### 1.1. From IT department to IT service provider

Information Technology (IT) increasingly contributes to the successful operation of companies. Today, total IT expenditure amounts in some fields to up to 7% of total turnover and 15% of total cost (Weill & Broadbent 1998). Many business functions cannot be carried out without IT support or are even entirely IT-based. At the same time, businesses demand a more efficient and effective IT service. Traditional problems between IT departments and business units, such as a low service transparency, lack of customer orientation and poor quality of IT support (Holst & Holst 1998), are

no longer accepted, a fact which is demonstrated by the growing demand for outsourcing services (Ploentzke 2001) and the tendency to build up independent IT resources within business units. Increasingly, IT departments are under pressure to justify their existence and to increase their efficiency and effectiveness.

In reaction to this development many companies today are in a process of transforming their IT departments from simple technology providers into service providers for the entire company. This transformation process has far-reaching consequences. Business units hereby become customers who cooperate with the IT service provider on the basis of transparent service level agreements and market-like mechanisms. Focus is now cast on customer's demands and business requirements. The IT service provider takes over part of the business risk by calculating market prices and by advertising and selling his services.

A prerequisite for the implementation of a service-oriented IT approach is the definition of IT products by the service provider. The conventional project-oriented cooperation between business units and IT department is replaced by a product-based cooperation. The IT service provider defines his services in the form of specific IT products. The customer purchases the required products from the service provider. Product availability and quality are controlled on the basis of specific and transparent service level agreements. On the one hand, the implementation of such a product-based mechanism gives a new quality to the relationship between business unit and IT service provider; on the other hand, however, it imposes strong demands on both sides. Many companies are faced with questions as to which is the smoothest way to implement this transformation process, which preconditions have to be met and what the resulting impacts on organizational structures and processes are. As a consequence, these questions increasingly come into the focus of information management, which as a management function deals with the identification and implementation of IT potentials into business solutions (Brenner 1994).

## **1.2 Structure of the paper**

The paper introduces a product-based approach to information management and discusses its effects on organizational structures and processes. Chapter 2 examines the preconditions for a product-based information management. Its basic principles are explained, differences between project-based and product-based information management analyzed and requirements for the definition of a product-based information management model detailed. Chapter 3 describes a specific approach to a product-based information management. It covers three different perspectives. From a product perspective various levels of IT products are defined, from a task perspective the major tasks within a product-based information management are described and from an institutional perspective structures and organization of a product-based information management are outlined. Chapter 4 will conclude with a short summary.

The presented approach is part of the results of a two-year research project on integrated information management concepts. It has been developed together with a number of European corporations and evaluated for its practical implications. Central aspects of the approach are currently being implemented and tested in selected participating companies in the form of pilot projects.

## 2. Basic principles of a product-based information management

### 2.1 Basic Model

Increasingly, companies demand an improved effectiveness, higher efficiency and better transparency of their IT function. The transformation of IT departments into IT service providers represents one approach to achieve this goal. Within a service-oriented approach, an IT department acts as a service provider, whereas the business units act as customers (see Figure 1).

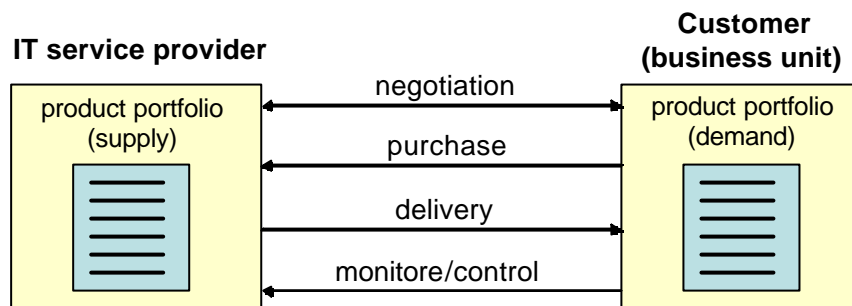


Figure 1: Basic model of a product-based information management

Both parties define their respective product portfolio. Within the supply product portfolio the service provider defines the services he delivers in the form of specific products. Based on his demands for the IT support of his business processes the customer defines his demand product portfolio. A sales department e.g. has a demand for the IT support of central sales processes, such as customer management, billing or marketing. If the IT service provider is able to supply the necessary IT products, e.g. support for billing or customer data processing, then the service provider and the customer enter into negotiations regarding the specific terms and conditions of sale. Negotiations focus on product characteristics, quantities, delivery time, quality and consequences resulting from a potential breach of terms and conditions of sale. Once an agreement has been reached, the customer purchases the IT products and the service provider delivers them. The customer constantly monitors and controls whether the delivered products are in accordance with the negotiated terms and conditions.

### 2.2 Project-based vs. product-based information management

The impact of a product-based information management becomes clear if one analyses its distinctive elements in comparison to the conventional project-oriented management approach. The main differences are as follows (see Figure 2):

- The *role of IT* changes from a mere project manager to a service provider.
- The *cooperation* between IT service provider and business units is no longer founded on the joint management of IT projects, but rather on the sale and the purchase of products.

- In consequence, the *formal framework of cooperation* is no longer based on project contracts but on competitive market mechanisms.
- Project management is replaced by product management as a *management instrument*.
- *Accounting* is no longer based on pre-defined IT development and operations costs but on product prices. This allows for direct cost allocation, as the customer of an IT service directly pays for it by purchasing IT products. The IT service provider needs to know his true product costs in order to be able to calculate his prices.
- The *IT perspective* changes. IT no longer focuses on technology, but rather on the customer's demands. The reactive character of IT departments, which react on specific business demands by initiating IT projects, is replaced by a proactive definition of a customer-oriented product portfolio, which promises a high sales volume.
- The basic *IT reference object* is no longer an application system or an IT solution, but a product. This brings about a change in the basic IT operating model. The phase-oriented, system-based approach, which e.g. differentiates a plan, build and run phase, is replaced by an integrated product approach, which focuses on delivering complete customer solutions.
- Currently *the main task of business units* lies in specifying functional system requirements; in the future they will concentrate on negotiating the business-oriented product requirements with the IT service provider.

	Project-based information management	Product-based information management
Role of IT	Project manager	Service provider
Basis of cooperation between IT	Joint project management	Product sale and purchase
Formal cooperation framework		
Management instrument	Project management	Product management
Basis for accounting	Development and operation costs	
Perspective of IT		
	Application system, solution	
Basic model of IT	Phase-oriented system view (plan, build and run)	Integrated product view (engineering and production)
Task of business units	requirements specification	negotiation of product

Figure 2: Distinctions between project-based and product-based information management

### 2.3 Prerequisites for a product-based information management

The large amount of research relating to information management makes it difficult to give an exact definition. Definitions of information management reach from concepts focusing on the management of large amounts of information (e.g. in library systems), to highly technical approaches which deal with the development of IT-based information and communication systems, as well as to approaches, which explicitly define information management as a management task (Teubner & Klein 2002). The definition of information management used in this paper is based on the latter approach.

A product-based cooperation between service provider and customer puts a number of specific demands on the information management approach it is based upon:

- In addition to the static perspective, which concentrates on levels, tasks and structures of information management, a dynamic perspective, which focuses on procedures and processes between the parties involved, must be given. Currently, such dynamic approaches can mainly be found in the concepts of consultancies and commercial IT service providers.
- Phase-oriented information management models, e.g. the widely used plan, build, run approach, must be replaced by integrated approaches. Phase-orientation leads to tasks and methods that are focused on reaching the highest possible efficiency within a single phase. As a result, inefficiencies between phases are inevitable. E.g. software engineering methods rarely take into account operational requirements, which might lead to software solutions that although efficiently developed are very inefficient to operate. This stands in contrast to concepts from industrial production management (e.g. Eversheim & Schuh 1999), which focus on integrated life-cycle approaches and especially on the interfaces between product engineering and production.
- IT operations are of central importance. Various studies show that if the entire life-cycle of an application system is analyzed, far more than 50% of the total costs occur within IT operations (Keen 1991, Strassmann 1997, Thiel 2002). This fact is further reflected in the typical structure of company IT budgets. A survey of IT budgets of insurance companies in German-speaking countries showed that 55% of the IT costs are spent on maintenance and operations and only 35% are spent on innovative, new projects (Accenture 2002). Nonetheless, research on information management mostly concentrates on IT planning and development, e.g. on IT strategies, architectures, project management and software engineering. IT operations are only taken into consideration on a very basic and abstract level – if at all. Once again, there is a noticeable difference to industrial product and production management, which has always had a strong focus on production.

### **3. A product-based information management approach**

The presented approach to a product-based information management considers three different perspectives. From a product perspective it defines various levels of IT products (chapter 3.1). From a task perspective it describes the tasks and processes which are relevant for the implementation of a product-based information management (chapter 3.2.). Finally, from an institutional perspective, it focuses on the demands imposed on the structures and the organization of a product-based information management (chapter 3.3).

#### **3.1 Product perspective: Levels of IT products**

The basic service model as described in chapter 2.1 leads to the question of what exactly the products of an IT service provider could be. A product is defined as a service which satisfies a specific need and results in a specific benefit (Kotler 2001). From a business perspective, the primary benefit of IT is the support of a company's business processes and business products. Thus, IT products are either integrated into business processes, as set forth in Figure 3, or constitute an integral part of a business product. A business process or product might even consist entirely of IT products, as e.g. in online banking or electronic procurement processes.

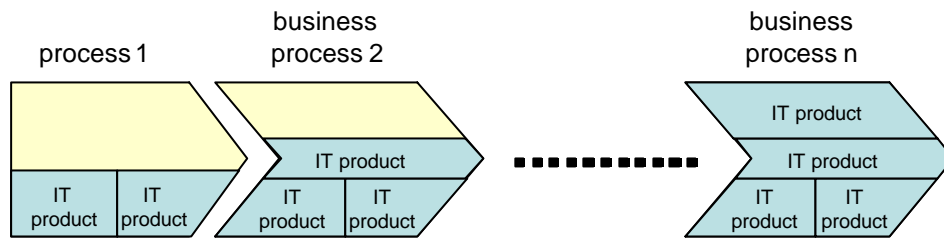


Figure 3: IT products as integral parts of business processes

IT products can be defined on different levels, which vary in their extent of business orientation and complexity. Higher level products demonstrate a stronger business orientation, i.e. technical aspects are encapsulated within the product and hidden from the customer. However, they also show an increased complexity, i.e. their definition and delivery requires a higher degree of sophistication from the service provider. More specifically, the four following levels of IT products can be defined (see Figure 4):

- Level 1 ‘resource-oriented IT products’:** At this level the resources which have traditionally been provided by IT departments are simply redefined as IT products. Typical examples are IT products such as ‘1 GB memory’, ‘1 MIPS computing power’ or ‘1 man-day software development’. Although even the definition of such simple products represents a huge step for many IT departments, they are not true products from a customer’s perspective. Business orientation is completely lacking and the customer is forced to deal with technical figures, which from a business perspective have no value of their own. The customer has to satisfy his IT demand by purchasing a variety of individual products which leads to an increased complexity and a decreased transparency.

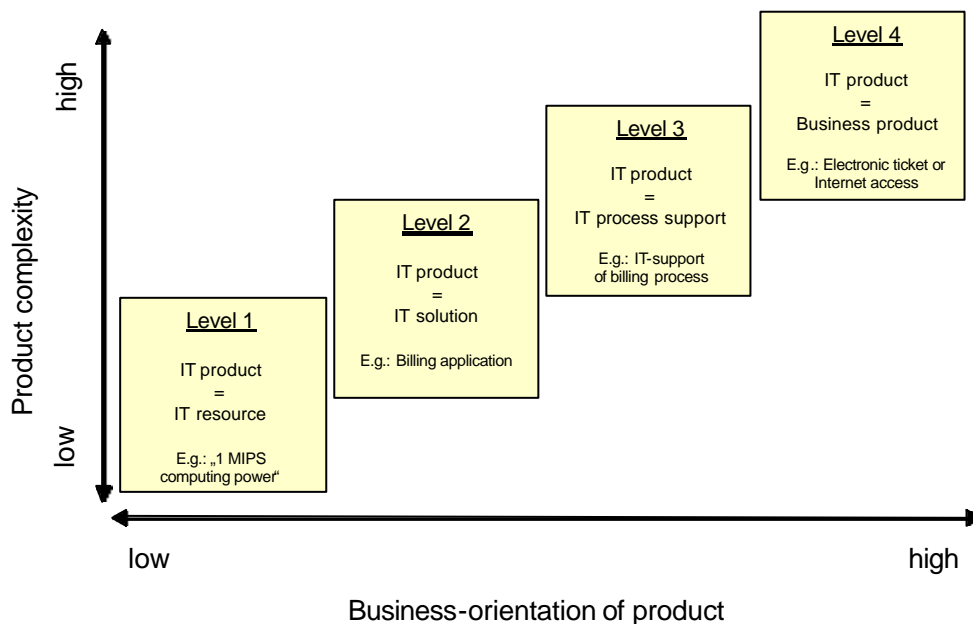


Figure 4: Levels of IT products

- *Level 2 'solution-oriented IT products'*: In a second step the delivery of individual IT solutions, e.g. the delivery of an application system, can be defined as a product by an IT service provider. This product perspective is often found within software development. In this case, a product might be the delivery of a CRM, billing or CAD application. As a rule, such IT products are 'tailor-made' for and developed in close cooperation with individual customers. In analogy to industrial production they represent custom-build products. Only in rare cases an IT service provider is able to sell a generic solution more than once within a company as a standard software product. From a customer's perspective solution-oriented IT products represent a first step towards a more business-oriented cooperation with a service provider. A number of IT services, such as development, operation and support of IT solutions, are integrated by the service provider into one IT product. However, such IT products only partially meet the customer's demands from a business-oriented perspective. The customer is not interested in the IT solutions themselves, but rather in the output they produce in the form of additional business value within his business processes and products. E.g. from a customer's perspective a billing application itself does not possess any real business value. Only its output, i.e. its support of the billing process or the management of billing data, generates the business value.
- *Level 3 'process-oriented IT products'*: The definition of business process support as the main benefit of IT leads to a third level of IT products which show an even higher business orientation. The customer purchases IT products to support his business processes. Therefore the benefit and the true IT product is a business process support service. The following example describes this perspective. For a human resources department one of the IT benefits lies in the support of the salary process. It is therefore interested in purchasing this process support service as an IT product from the service provider. More specifically, this means that the service provider must deliver a product 'IT support of salary process' to the customer. Such a product consists of a variety of individual services, e.g. delivery of the necessary infrastructure, development of application systems and provision of support services. The human resources department negotiates with the service provider the exact terms and conditions regarding the product functionality (i.e. which extend of IT support does the product offer), the product quantity to be delivered (e.g. number of salary statements per month), the product price (e.g. per salary statement), the delivery date (e.g. date on which salary statements are generated) or the quality (e.g. number of errors admissible). The service provider provides the necessary production capacity and produces the IT products requested by the customer. In this context, production means that each time a salary statement is generated an IT product in the sense of a process support service is produced. In analogy to industrial production this represents a mass-production process.

Process-oriented IT products allow the customer to communicate and negotiate with the service provider solely on the basis of business-oriented quantities and characteristics. Quantities such as 'order processing', 'invoicing', 'order confirmation' or 'payment reminders' are at the core of the product definition (Britzelmaier 1999). The technical aspects of the product and its individual components are the sole responsibility of the service provider as long as they are in accordance with the agreed upon terms and conditions. The customer is completely unaware of the technical complexity behind the products. For example, the distinction of a development and an operations process is irrelevant for the customer, as it only refers to the internal processes of the service provider.

- Level 4 ‘business product-oriented IT products’*: In addition to the mostly internal use of IT products as business process support services, IT products often also represent an integral part of a companies business products. A distinction must be made between business products that contain a certain amount of IT products and business products that consist entirely of IT products, in which case the business product is equal to the IT product. Among the first case are business products such as mobile phones, consumer electronics or automobiles which contain IT products to a varying degree. Business products which consist entirely of IT products are e.g. electronic tickets, net-based answering machines or internet access services. Entirely IT-based business products in general contain additional process services that are also supported by IT products. E.g. the sale of an electronic ticket requires an electronic ordering process and the provision of an internet access requires processes for user data management and user billing.

At this level, IT products are bound to be highly business-oriented, as they are an integral component of the business product. The product price agreed upon by the service provider and the customer, the functionality of the IT product and its quality are decisive factors for the business product’s competitiveness. Thus the IT products’ significance for the business is much higher than it is the case with level 1-3 IT products.

Regardless of their level, IT products represent typical service products. A service product is defined as a benefit producing service which is provided for humans or objects without transformation of goods (Bieger 1998). Service products have a number of specific characteristics: they are intangible, production and use coincide and personal contact is of special importance. Thus provider and customer of a service product face different consequences, which are set forth in Figure 5. Relevant for IT is especially the danger of intransparency (the very problem product-based information management is supposed to eliminate), the lack of storage capacity (causing specific problems for the adjustment of supply and demand) and the necessity to integrate the customer (requiring a strong customer interaction from the IT service provider).

Service characteristics	Consequences for service provider and customer
Intangibility	- intransparency - no transfer of property
Simultaneous production and use	- no possibility of storage; transient nature - interaction with customer - not tied to any location - time of production tied to time of use
Importance of personal contact	- individual, unforeseeable quality

Figure 5: Characteristics of service products and their consequences (based on Bieger 1998)

The suitability of a certain product level for a specific business situation depends on the one hand on the maturity of a company and on the other hand on the business processes and products involved. Level 1 IT products mostly qualify as a first step towards a service-oriented reorganization of the cooperation between IT departments and business units. They can also be used within a conventional project-oriented approach in order to obtain higher transparency regarding the range of services supplied. Level 2 and 3 IT products allow a genuinely product-based cooperation. The process support perspective taken in level 3 is mostly suited for commercial and administrative business processes with a high degree of standardization and a considerable transaction volume.

Business processes which mostly require individual IT products, such as product development or marketing, are scenarios for the use of level 2 solution-based IT products.

### 3.2 Task perspective: Tasks within a product-based information management

Traditional information management tasks are only partly suitable for a product-based approach, as they are based on a project- or application-oriented perspective. E.g. the task description is based on the steps of an IT project, the roles of the IT department and business units within individual project stages or on the life cycle of an application system (e.g. plan, build, run).

The tasks within a product-based information management should instead be based on the individual steps necessary for the planning, engineering, production and support of a product. These tasks can be found e.g. within industrial production management (Eversheim 1990) or product management (Matys 2002) concepts. Figure 6 shows the major tasks of the service provider and the customer within a product-based information management, divided into an operational, tactical and strategic time-frame. From the service provider's perspective one has to differentiate between three functions, namely engineering, production and product management. From a customer's perspective there also exists the function of product management, which assumes all tasks regarding the cooperation with the service provider. The figure does not reflect further functions and tasks of the customer, as they do not have any immediate impact on the product-based information management.

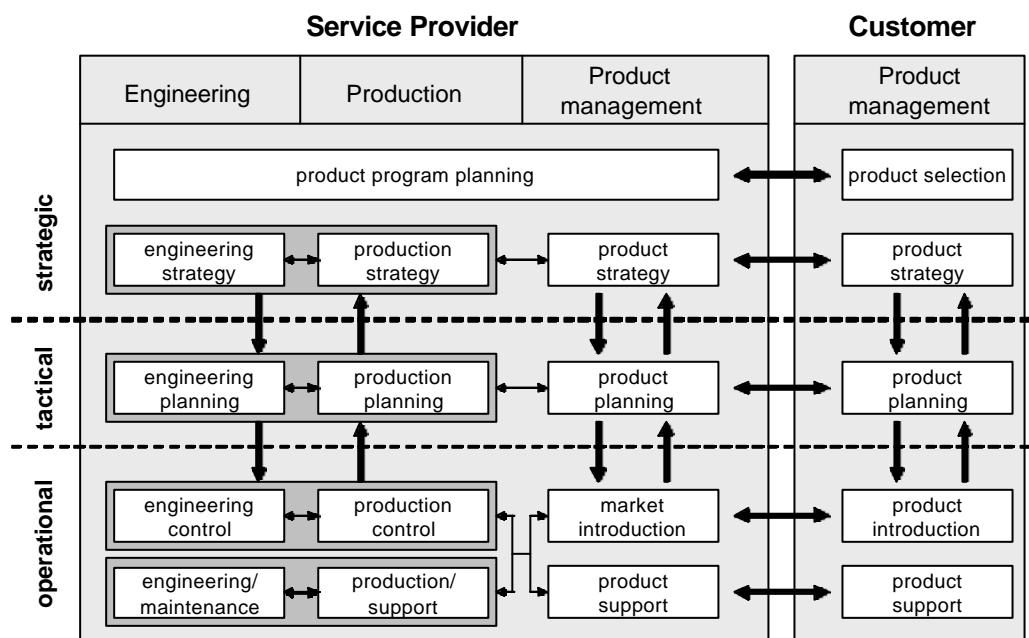


Figure 6: Tasks of the service provider and the customer

On a strategic level, the product program planning by the service provider (i.e. the definition of the supply product portfolio) and the product selection by the customer (i.e. the definition of the demand product portfolio) are put into effect. These two tasks require a close interaction between

the involved parties. The service provider has to ensure that his product program satisfies the customer's demands and that a sufficient sales potential exists. The customer, on the other hand, has to ensure that he can satisfy his IT demands, i.e. that the product program of the service provider includes all the required IT products. This is of special importance if both parties are part of the same company and thus directly depended on each other. The product selection of the customer is based on a given business strategy and its resulting demands on IT support for the company's business processes and products.

Also on a strategic level, the engineering, production and product strategy are defined. The engineering strategy defines the basic engineering procedures and principles, as well as the engineering methods and tools. The primary production strategy task is the plant engineering. In analogy to industrial plant engineering, this includes the planning of the required production plants and platforms (i.e. hardware, software, infrastructure). Engineering and production strategy must be closely coordinated, since they directly influence each other. E.g. an engineering strategy based on a Microsoft .NET architecture is only useful, if the production strategy also includes the strategic use of Microsoft-based platforms in the open-systems environment. The product strategy task has the goal to create long-term and stable business relationships between service provider and customer. From the service provider's perspective this is achieved by the strategic positioning of products, the development of a sales and marketing strategy and the coordination of the service provider's and the customer's strategic goals. In the latter case, this includes e.g. the process of IT-Business alignment, the agreement on joint quality and cost targets as well as the definition of basic rules and conditions for the cooperation.

The tactical level includes the tasks of engineering, production and product planning. Engineering planning focuses on the detailed resource planning and prioritization of the various engineering tasks. Production planning is in charge of the development of specific production programs for a given time-frame, i.e. the planning of quantities, deadlines and capacities. Product planning focuses on the definition and negotiation of service level agreements (SLA) between service provider and customer. SLAs include e.g. quantity projections, price models, calculation models and quality requirements. Based on the sales and marketing strategies which have been defined within the product strategy, specific sales and marketing plans must be developed. Also on the tactical level, the operational market introduction of a product is prepared.

On an operational level, the engineering and production management tasks focus on implementing a satisfactory engineering and production environment. Targets defined in the SLAs must be converted into specific engineering and production guides, controlled and, in case of problems or inconsistencies, revised. The operational key tasks are the actual engineering/maintenance and production/support tasks. Operational product management on the side of the service provider is in charge of the product's operational market introduction and its subsequent support. On the one hand, product support includes a constant interaction with the customer's product management; on the other hand it focuses on supporting functions such as the constant revision of marketing parameters, the conception of new marketing plans and the initiation of product improvements (Mathys 2002). Within the product introduction task the customer's product management acts as an interface between the business units which introduce the product and the service provider. Therefore the product management's supporting role works in two-way.

The implementation of the tasks set forth requires the definition of specific processes. These can e.g. be found in service-oriented process reference models such as the IT Infrastructure Library (ITIL)

maintained by the British Office of Government Commerce (ITIL 2002). However, most of the existing models only cover some of the tasks described above; in particular, they do not consequently follow a strict product-based view. The definition of a reference model for a product-based information management therefore remains a task to be completed.

### 3.3 Institutional perspective: structures and organization of a product-based information management

The institutional implementation of a product-based information management can be based on various scenarios. In particular, the role of the service provider either as a profit or cost center plays an important role. Figure 7 shows a model which is based on a profit center scenario of the service provider. At its core the model consists of four elements: service provider, customer, internal or external market and IT governance.

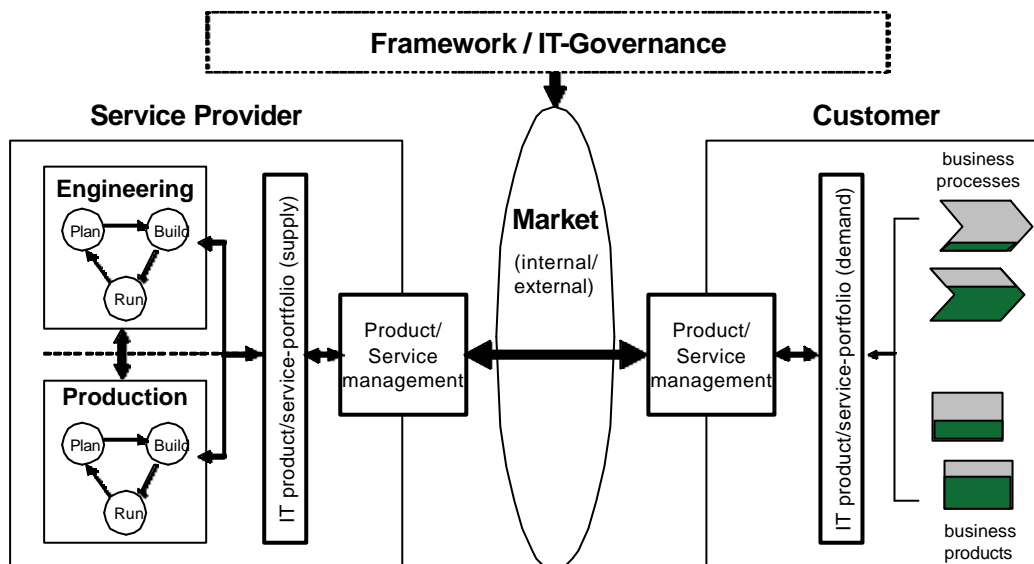


Figure 7: Institutions of a product-based information management

The customer's demand for IT business process and product support determines his demand product portfolio. Product management is responsible for the negotiations with the service provider and for the purchase of the required IT products. The product manager's role may be assumed by the business process/product managers, as they are responsible for the business processes/products and, as a result, for the IT products required within.

As set forth in chapter 3.2 above, a service provider also possesses a product management, which represents the interface to the customers. The creation of the supply product portfolio requires the cooperation between engineering and production, as each product must be developed (i.e. engineered) and manufactured (i.e. produced). In order to create a supply product portfolio that meets customer demands, an intensive communication process with the customer is necessary.

Between service provider and customer an internal or external market exist, depending on whether they are part of the same company or not. The market's task is to match supply and demand in an efficient way. Cooperation and negotiation processes have to run within a specified framework. The framework differs depending on whether it applies to an internal or external market. Within an internal market the definition of a framework is part of the IT governance function (Brenner, Zarnekow & Poertig 2003). It includes the definition of the formal relationship between service provider and customer, their tasks and responsibilities, legal and competitive aspects and the process of service settlement. In the case of an external market the legal aspects which are generally valid for business transactions are applicable.

One of many possible variations of the model set forth in Figure 7 is a market-like cooperation between engineering and production within the service provider. In this case, the same rules as for the market between service provider and customer are applicable. However, under these circumstances the definition of an integrated product portfolio is much more time consuming.

## 4. Summary

The paper describes a product-based information management approach, which represents the basis for a service-oriented IT organization. Its impact on tasks, relationships and processes of the business parties involved, as well as the key questions relating to the practical implementation were set forth. It becomes apparent that both from the IT service provider's and the business units' perspective great efforts are necessary for the implementation of a product-based information management. In particular, the concept of products as the new basis for cooperation between IT service provider and business units requires a strong shift away from the conventional project-oriented relationship. However, the growing demand for outsourcing shows that for an increasing number of companies a service-oriented redefinition of their IT is the only possible way to improve efficiency and effectiveness. Therefore, it is to be expected that the significance of product-based information management concepts will steadily increase in the future.

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