A framework for analysing, modelling, and designing business processes

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Processes and operations occur in different contexts. We shall focus on business processes and operations. However, the term “business” will be used in a broad sense, including not only businesses focusing on economic goals and profits for the owners, but including also non-profit organisations, for example organisations based on membership and voicing certain interests of its members, for example political opinions or the rights of consumers, employees, handicapped people, women. Such so-called voice organisations work for both material and immaterial interests of their members. For example, a trade union may work for higher salaries, more secure jobs, and better working conditions, and against discrimination.

This document presents a conceptual framework for analysing, modelling, and designing/redesigning business processes. Part I of the document focuses on concepts that have turned out to be useful in the analysis and design/redesign of business processes. Part II summarises modelling methods that may be used as instruments for visualising processes in the context of analysis and design.

Sundgren et al (2005), including Steneskog (2005a) and Steneskog (2005b), are major sources of the contents of this document, as regards both texts and figures.

PART 1: A CONCEPTUAL FRAMEWORK FOR BUSINESS PROCESSES

Chapter 1: Basic concepts

Systems, processes, and operations

Systems, processes, and operations have many characteristics in common. All of them typically transform some kind of inputs to some kind of outputs, and they interact with other systems, processes, and operations in a certain context or environment. The interactions may concern communication and/or exchange of messages (information) and/or goods and/or services. Systems, processes, and operations are often parts of bigger systems, processes, and operations, and on the other hand they often themselves consist of smaller parts, which are also systems, processes, and operations.

There are also differences in how the terms “system”, “process”, and “operation” are used, but these differences are not so easy to catch and define. A bit vaguely, one may say that a system is typically more comprehensive and complete than a process, and a process is typically more comprehensive and complete than an operation. There may be a hierarchical relationship between systems, processes, and operations: a system consisting of processes, and a process consisting of operations. But the usage of the three terms are overlapping to some extent.
The concepts of processes and operations are often used in descriptions and analyses of businesses and organisations. The term “operations” is also used to distinguish between those parts of an organisation which are directly involved in the production of products and services for external customer, and those functions which have more indirect roles, like managing, controlling, coordinating, and providing internal services to operations and other parts of the organisation, for example information system services.

Processes vs functions

The traditional way to view and organise an enterprise is the functional organisation by structuring responsibilities and resources into functional units such as Sales, Manufacturing and Delivery. The process approach is different. It focuses upon the tasks to be done. Business tasks are defined as the transformation of input to output and thereby creating value for the customer.

Operative and directive processes

The processes performed by an organisation may be operative or directive. Operative processes are directly concerned with the operations of the organisation, as just explained, whereas directive processes are concerned with tasks of a more managerial, analytical, or supportive nature.

What is a business process?

A better way of formulating this question is:

- What do we mean by calling something a business process?

Thus a business process is a mental construction by human beings. It is not a real-world object in the sense of a building or a transportation vehicle. To look upon something from a process perspective is to organise the description of the reality in a process-oriented way.

Elaboration of a definition by Davenport

There is no generally agreed-upon definition of “process” or “process-orientation”. However, we shall start our exploration of business processes from a definition given by Davenport (1993):

- “… a process is simply a structured, measured set of activities designed to produce a specific output for a particular customer or market.”

This definition, like many others, focuses on a process as a set of activities, the activity view of a process. However, there is a complementary view, the object transformation view, focusing on the objects that are transformed by the processes. Figure 1.1 combines both views. (Both the input and the output of the transformation activities could actually consist of more than one object.)

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![Figure 1.1: A business process.](image-url)
Furthermore, there is a third view of a process, the value creation view: the process should not only transform an input object to an output object, it should do this in such a way that the output object has a value (as judged by the customer) that is higher than the costs of the objects and resources needed by the process.

Let us add the following features to the definition of a process:

- The structured set of activities in a process perform a transformation task, transforming input object to output objects. (Neither the input objects, nor the output objects need be physical objects – they may be for example data objects as well.)
- The transformation performed by a business process should create some kind of value for the customers of the business.
- The set of activities associated with a business process is “designed “, that is, there is some kind of planned structure in the execution of these activities.
- The transforming and value-creating process is controlled by a responsible task unit. The task unit could be the business organisation as a whole, or some part of it.

After these modifications, a revised and elaborated version of Davenport’s definition could be:

- A business process is a designed, structured set of activities, performing a measurable, value-creating transformation task of a set of input objects into a specified set of output objects for a particular customer or market. The process is controlled by a responsible task unit.

Three complementary views of a business process

In practice, it is important to consider all three views, or aspects, of a business process:

- The object transformation task: WHAT is it that the process does?
- The structured activities: HOW is it done?
- Creating value for the customers: WHY do we do this?

Business processes are the core of value creation. They are the raison d’être for the task units. The business process in itself is both the successive transformation of input to output and the necessary activities to achieve that transformation.

In the literature on business processes, we may identify two schools:

- One school has focus on transformation and value creation.
- The other school has focus on activities and resource usage/cost.

The two schools should be seen as complementary, not contradictory. Figure 1.2 illustrates this.
From factory processes to more general business processes: service processes, information/data processes, creative processes, etc

Davenport’s definition is very relevant for what we call factory processes with physical objects, that is, the traditional manufacturing business with pre-defined output and a very repetitive, structured set of activities.

But in general there are other aspects that we have to consider for business processes:

- Repetitiveness: how pre-defined and repetitive is the process/sequence of activities and the result/the object out? For many development processes neither the output nor the activities are possible to define in advance.

- Object types: physical, digitised data, people. These different types of objects do have different attributes leading up to very different processes.

- Degree of interaction between customer and service provider

- Value created: economic and/or experiential – profit and/or pleasure

- Type of value delivery/customer support: product delivery (selling clogs), enabling services (hire out video cassettes) and/or relieving services (perform a customer process).

Thus there are many aspects that we need to address when we consider other types of business processes than the traditional factory process. What was developed during the first generation in order to improve manufacturing processes with physical objects is still valid for many other types of processes and tasks. However, those principles have to be modified in order to be of value for the other types of business processes and objects. It has been ineffective or even disastrous to use the methods for analysis and improvement of industrial mass-producing processes in a fundamentalist way for trying to model and improve the other types of processes, for example service processes, information/data processes, and creative processes.
Chapter 2: Value-creating tasks of a processes performed by task units

A business process or operation is associated with a task to be performed by process or operation. The organisational entity responsible for performing a certain task is called a task unit.

Figure 2.1 illustrates the task of a production process at a clog factory. The clog factory is a relatively traditional small industrial undertaking. It manufactures high-quality clogs. It is located in a rural area in south Sweden and has around 20 employees.

Resource transformations

As illustrated by the upper part of Figure 2.1, the clog factory transforms input resources – raw materials in the form of wooden blocks and leather sheets – into outputs: well-packaged clogs. The input resources are transformed by means of in step-by-step activities. During this work-in-progress stage, intermediary objects are produced and further transformed, until the final outputs are ready.

In general, the task of a production process is to transform inputs to outputs by executing intermediary, work-in-progress activities, step by step.

Instrumental resources

The lower part of Figure 2.1 illustrates instrumental resources, also called transforming resources, resources that are needed by the transformation process. Organised and structured resources, such as people, equipment, and information resources, constitute the base for performing these activities.

Value creation

It is not enough for a business process to perform its task of transforming inputs to outputs. The transformation must create value for the customers and stakeholders of the business. Moreover, the value of the outputs (as judged by the customers and stakeholders) must be larger than the costs of the inputs plus the costs of using the instrumental, transforming resources, such as buildings, equipment, and the work done by employees and consultants.
Note that what has just been said about value creation is valid even for non-profit organisations. For example, an organisation based on membership must create value of some kind, material or immaterial for its members in order to motivate its existence.

How value has been created in businesses has changed over time as a consequence technological and other developments. The society has changed from being based on agriculture, via manufacturing, big industries mass-producing physical products, to a society which is to a large extent based on services and information. For each step in this evolution new forms of outputs, inputs, and instrumental resources have been added, but many of the old forms have remained in parallel. The methods and models for industrial production are not replaced by the ones for service and information societies, they co-exist.

**Customers and stakeholders**

The term “customer” is used here in a generic sense, meaning ”the people and/or businesses” for whom the outputs of the business are produced”. Depending on which type of business (in a broad sense) that we are talking about, the customers may be called different things, for example “clients”, ”patients”, ”guests”, ”users”, etc.

A business often has to create value for other stakeholders than the customers. For example, an institution for convicted criminals must create value not only for the inmates (in the form of rehabilitation, for example), but also for crime victims and the public at large.

**A generic model**

*Figure 2.2* illustrates a more generic version of the task unit framework than the specific case of a clog factory, illustrated by *Figure 2.1* above. (*Figure 2.2* is a repetition of *Figure 1.1*.)

We use the triangle to represent task units, that is, business entities adding value to input by transforming it to output.

*Figure 2.2. Generic task unit framework. From Steneskog (2005a).*
Sometimes one may represent a whole company as a task unit (Wood Supplier); sometimes one must break it down into sub-tasks (Clog Production, Clog Marketing) in order to better understand the business.

The value creation chain

As illustrated by Figure 2.3, the clog production task in the Clog Factory does not operate in a vacuum. Upstream there are suppliers who create input for the Clog Factory and downstream there are customers and also customers’ customers etc. Value is created step-by-step in a number of task units in a number of different organisations before the results reach its final destination: the end-user, the consumer.

The Production Unit of the Clog Factory is only one – but important – link in this chain of task units – the so-called value creation chain. Each task unit does its work in the chain to add value for the final end-user. Here we have a model of this chain from the Clog Factory’s point of view – from the Clog Factory’s perspective and the Factory is broken down into three subunits: Management, Sales, and Production.

During the 1980’s the value chain concept was established as a main way to understand and describe how value was created and distributed. The value chain concept became a dominant theme, was described by Porter (1985) and is still useful for industries producing physical products but is also relevant to apply for new types of value creation.

Also, our map may have more nodes – there are task units upstream on the left (supplier’s supplier) and a number of transportation units operating between many nodes in the value chain.

![Value Chain Diagram](image)

*Figure 2.3. Value chain in a business landscape. From Steneskog (2005a).*

Example: The Bookstore

*Figure 2.4 shows another example: a traditional Bookstore and the value creation occurring there.*
The content of the book is created by an author, edited, printed and published by the publishing company. Now we have the physical product. The distribution is taken care of by distributors all over the world and distributed to the bookshops. The bookshops sell the books to the customers. This value chain is similar to the clog one but the bookshop – the task unit in focus – is in another place in the chain. As we take another perspective we get another picture – a picture similar to what a shoe retail shop would get in the clog case. (There are also other bookshops around – competitors. They are not part of the bookshops value chain, but important for the understanding of the bookshop’s business.)

The value chain is the backbone of a business. To understand a business, the understanding of the value chain is important.

Chapter 3: Process types and design patterns

The concept of a business concept is general and rather abstract. We may make it more concrete by identifying different types of processes. The descriptions of more concrete process types may serve as patterns for the design and analysis of real-world business processes. Sometimes real-world processes may contain features from several process types.

Factory type processes

Process modelling is nothing new in the manufacturing area. Already Taylor and Ford had processes in mind when they designed operational flows in manufacturing, although they did not use that term.

How do we describe and model a factory type of business process?

Its main characteristic is the creation and gradual change of an object: object in – change – same object out in a new state. This change is achieved by performing intentional and well-organised activities over and over again in order to transform the input and create the wanted output. See Figure 3.1.
There is an incoming object, e.g. an unpainted clog (state A) in the Clog Factory, a set of activities – painting, and finally an object out – the painted clog (state B). The object has been transformed; customer value has been added, loaded into the object. This process is enacted over and over again. For industrial processes it is an objective to have no unwanted variations in the objects out – all clogs have to be well painted in the same way. Unwanted variations in output are “quality problems”. The design of the object out and of the process is done in advance – when the factory process is executed it is pure production.

For factory type processes (e.g. car manufacturing) it is relatively easy to study the operational flows by tracking the objects and describe how they are transformed step-by-step in order to create value to the customer. But, there are other types of processes, which are not so easy to identify and, which are not so structured and repetitive.

Since Taylor there has been an ambition to structure and automate all kinds of business processes to become factory processes. Remaining manual work is treated as just “not-yet-automated” and still performed by “not-so-reliable” human beings. However, this ambition is not constructive for all types of processes as will be described below. Attempts to “automate” creative processes tend to be very unsuccessful, if not counter-productive.

**Workshop type processes**

The activities in a workshop type process (e.g. car repair) are not executed in the same rigorous, repetitive way as in normal factory type processes. Every execution is here unique, although you will find reoccurring structures of activities and transformations. The execution is more controlled by rules (of thumb) than by rigid process scripts. The skills and the creativity of the human actors as individuals is an important asset for the process.

When working in workshop mode – where the incoming object is e.g. a customer problem or a customer need – the individual execution of the process is adapted to the situation and the result/object out is more or less unique. In a workshop process the sequence of activities as well as the object out is designed and performed/produced concurrently within the limits of the workshop’s resources and rules.

Part of management work could be looked upon as some sort of information workshop. Reoccurring problem are solved in similar but not identical ways.

To represent this workshop mode, we use another symbol for the process. In contrast to the arrow-formed symbol used to represent a fixed factory process, where variances, design, and creativity are undesirable, we use a rounded rectangle symbol for a workshop type process, where creativity is wanted, and unique top-notch objects out are aimed at. See *Figure 3.2*. 

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*Figure 3.1. A generic model of a factory type business process.*
Figure 3.2. Symbols for Factory and Workshop type processes.

In reality many factory/workshop business processes are a mix of both types, and may be put on a scale between inflexible routine, and complete chaos. No factory/workshop process is at either extreme end of the scale, but the scale is useful for analytical purposes.

We also use different symbols for physical objects, which are difficult to change, reproduce and transport, and data objects, which are easier to change, very easy to reproduce (copy) and transport (if in electronic form). See Figure 3.3.

Figure 3.3. Symbols for physical object and digital data objects.

Some examples of object types in factory type workshop type business processes:

<table>
<thead>
<tr>
<th>Objects Process structure</th>
<th>Physical</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory type</td>
<td>Traditional manufacturing e.g. cars, furniture</td>
<td>Billing, book-keeping</td>
</tr>
<tr>
<td>Workshop type</td>
<td>Sculpturing, Product development (parts of)</td>
<td>Sales Product development Management</td>
</tr>
</tbody>
</table>

Ad hoc/studio processes

Many research and development processes and managerial processes are not routine at all. It is not possible to define the outcome of such processes in advance, since this is often done as part of the execution of the process itself, and these processes have indeed a very sketchy and often iterative structure. There may be some rules of thumb for them, but they do need a lot of creativity and experience. Not even the necessary transforming resources may be defined when processes of this type are started.

To prepare for efficient and effective execution of this type of processes, focus should not be on defining objects and describing processes in advance, but to collect resources and build a platform of people with knowledge and creative characteristics. The design of the process and the objects is then
done real-time during the execution of the process, and here the creativity, knowledge, and experiences of the human beings are assets of immense importance.

For these type of processes there is an eternal fight between management that wants to have control – since these processes are risky, they may end up in nothing – and the creative people who want as much freedom as possible.

IT development started as ad hoc, creative processes. During the decades they have got more and more structure and control – moved into the workshop type. Sometimes this has led to a lack of creativity and has produced mediocre IT applications but avoiding total disasters. Initiatives to move those processes all the way to the factory type have not proven to be successful. One objective for the design and development of factory-type processes is to create fixed routines and avoid risky creativity, but it is counter-productive to enforce this thinking on creative processes. A reaction has now been the school for so-called agile development of IT solutions.

**Order fulfilment processes and subprocesses**

Customer order fulfilment is another important view or metaphor of many business organisations. In a manufacturing industry, the flow of material and products along the value creation chain is driven by orders in each one of the participating units. *Figure 3.4* illustrates typical order fulfilment processes between a business unit and its direct customers.

![Diagram of order fulfilment](image)

*Figure 3.4. The exchanges during order fulfilment.*

We have to consider:

- How the order is received and how products are created and provided.
- How the customer uses or consumes what is delivered in order to achieve value (profit) and experiences (pleasure) out of it.

**Order fulfilment in the Clog Factory example**

*Figure 3.5* illustrates order fulfilment in the Clog Factory example by means of a simple process model:

- The customer order arrives and is taken care of by *Sales* in a planning process. Lane 1 in the process model.
- If the corresponding clogs are in stock the *Stock&Delivery* process is simple: just pick and pack and deliver. Lane 2 in the process model.

- Sometimes the right clogs are not in stock, so they have to be produced, and an internal manufacturing order is issued to trigger a manufacturing process in order to provide the clogs for order fulfilment. Lane 3 in the process model.

- Things could be worse than that – there may be a stock shortage for the some necessary material that has to be purchased. Leather is here a key issue due to its relatively high cost. Nails, glue and paint are cheaper to stock. Lane 5 in the process model.

- The Clog Factory produces the wood bottoms themselves and if they need more bottoms of some size or fashion an internal production order starts that process. Lane 4 in the process model.

<table>
<thead>
<tr>
<th>Clog Factory: Order Fulfilment Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Stock &amp; Delivery</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Clog Manufacturing</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Bottoms Manufacturing</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Purchase</td>
</tr>
</tbody>
</table>

*Figure 3.5. Clog Factory order fulfilment.*

The Clog Factory is mixing two common manufacturing strategies:

- **Build to order.** The manufacturing process is started by an incoming order.
• **Build/provide to plan.** For manufacturing of the bottoms and for purchasing of leather etc. These processes are normally run according to plans built on forecasts and more seldom started by an incoming customer order.

The build to order strategy gives long lead-times and not-so-good delivery service but also low stocking costs.

Build to plan results in short order lead-times but high stocking costs as it may lead to a surplus of material and processed items in stock.

Thus, in order to be good in fulfilling customer orders it is not enough to be able to pick and pack or manufacture clogs or manufacture bottoms in efficiently, it is also necessary to control the quality and the inflow of necessary material to get it “just-in-time”. This is a delicate balance because if it is coming too late the production line will get stuck – which costs a lot of money, if it is coming too early the stocking costs are rising.

These problems force companies to understand and to try to control the value creation chain upstream and cooperate efficiently with its suppliers.

There is also a need to control the value chain downstream in order to get early warnings when the demand is falling or rising to be able to foresee the coming the orders and plan production and purchasing accordingly. If the end-user demand suddenly is rising e.g. clogs become high fashion for some reason, the retailers will raise their orders to the wholesalers, the wholesalers will raise their orders to the Clog Factory, and the Clog Factory has to order from its suppliers. If e.g. there is a shortage of the special nail used for the clog manufacturing the whole chain will have to wait.

One way to avoid such shortage problems all units in the chain would be to increase the stocks to have a buffer against the variations in demand. But stocking is expensive, and today every unit is trying to minimise its stocks. In chains with this traditional step-by-step structure the delicate balance of how to have the right stocking levels vs. order service is a major problem. This is a difficult and important issue for all units operating in such an environment.

An emerging solution to this problem is to have a shared information system in order to be well informed about the stock situation in the whole chain as well as the variations in demands down to the retail level. Large chains, such as Procter & Gamble, IKEA, H&M, and Benetton have developed information systems to be able to track what happens down-stream – “which models sell where” – and, the car industry uses information systems to control what happens upstream – “what is the status of production and delivery from our suppliers”. The Internet has made it very much easier to build very efficient and useful information networks for these purposes.

**Complete business transactions**

Understanding the overall value-creation chain and one’s own order fulfilment process is fine but not enough. They are both driven by the incoming orders. Where do these orders come from? We have to look at the entire business transaction consisting of offerings, orders, fulfilment and payment. This is sometimes called the marketing process where order fulfilment is a part. But the word marketing is more often used for the activities leading to an order, and we will use the term in that slightly limited way.

To run a business three main tasks are needed:

• Develop offerings (new products and services)
- Market these offerings (of existing products and services) and create orders
- Fulfil these orders and provide products and services to the customers.

Marketing and order fulfilment are the core of the on-going business. Development of new offerings and the development/change of the business are issues not specifically covered here.

**The business transaction framework**

A complete business transaction could be modelled in accordance with the framework in *Figure 3.6*.

There is interplay between a producer/provider and a customer and how the different objects go back and forth.

Another way to model the same interplay for the Clog Factory is the following simplified process model, based on a model in Grönroos, 2002. *See Figure 3.7.*

![Figure 3.6. The exchanges during a business transaction process.](image)

![Figure 3.7. The Clog Factory business transaction process.](image)
The Clog Factory business transaction

Clog Marketing gives an offering to the Wholesaler, who accepts it and returns an order. The order is taken care of by Clog Manufacturing and the clogs are delivered. Finally, the Wholesaler pays for the delivery. This is a classical business transaction in its simplest form.

In our model of the Business Landscape we could extend the Value Creation Chain by adding the Business Transaction. Offerings and goods are going forward and orders and payment the other way. See Figure 3.8.

So what? There seems to be no major difference between the pictures of the Value Chain and the chain of exchanges except the two-way arrows. No, not in this case, but one still needs to understand the issue of foreseeable and unforeseeable variations in demand, as explained earlier. Shared information between all units may help to cope with such problems. Furthermore, information technology and the Internet has tremendously improved the possibilities to create powerful information systems, which again open radically new possibilities to restructure the business transaction chains more independently from the value chains. We shall look at an Internet Bookshop to illustrate these possibilities.

Figure 3.8. Landscape with Business Transactions.

The Internet Bookshop business transaction

Let us analyse the business transaction chain in our second example – the traditional bookshop (cf Figure 15). Here we find something very similar to the Clog Factory case. However, information technology and especially Internet is providing new possibilities not only to improve existing chains but also to build new ones to meet the same customer needs. We use an Internet Bookshop as an example. Here the business transactions and the physical value creation chain do no coincide.

Let us trace order fulfilment for the Internet Bookshop; cf Figure 3.9:
1. The customer is ordering books on the bookshop’s Internet site.

2. *Order Management* processes the order automatically or manually and transmits it to the relevant publishers.

3. Each publisher picks the books from his stock.

4. A transportation company takes them to the cross-docking centre.

5. This centre is a separate company performing cross docking for all types of virtual stores. They unpack the deliveries from the publishers and match the deliveries with the customer orders. When an order is complete, the books are packaged together with the invoice. The Factoring Company is informed.

6. The package is delivered to the customer using another transportation company.

7. The customer pays to the Factoring Company.

![Diagram of order fulfilment process](image)

*Figure 3.9. The business exchange transaction process for a traditional bookshop (above the line in the figure) and for an Internet bookshop (below the line in the figure).*

Here, the different tasks in the order fulfilment process are clearly separated, well defined and performed by a number of different task units in different companies. Each task unit is specialised and for example transportation and cross-docking may in addition perform the same tasks in other order fulfilment processes, belonging to other Internet-based enterprises.

The tasks are performed in a network of task units. In order to build such a network one has to identify the tasks to be performed, identify (and maybe build) the task units to perform these tasks, and finally organise the network. This whole set-up is designed, contracted and monitored by, in our example, the Internet Bookshop.

The organisation of the responsibilities for the different tasks can be done in a number of ways. Which company (network node) should perform which task? The Internet Bookshop has e.g. to decide if they need to own the cross-docking task unit in order to secure the quality of the delivery or if this is done better by a separate company specialised on cross docking.
Transportation is another task that could be considered in the same way but here separate transportation companies did already exist to fulfil that task. However one of the problems in e-Business proved to be in the delivery area. The traditional transportation companies were good at container delivery but not at “small packages to consumer” delivery. This has shown to be to a different task and requires different set-ups i.e. new types of task units.

Also the other parts of the exchange, i.e. offering, billing and payment may be split up in different tasks handled by different task units in different companies. A model of the complete business exchange transaction could look like in Figure 3.10.

Figure 3.10. Business transaction in a network mode.

Our previous industrial example with offerings, orders, products, payments in a step-by-step mode between the producer and customer is still valid for many businesses, but in others we find this network-organised separation of the business transaction chain from the value chain and the flow of products. From a customer point of view it looks the same. The Internet Bookshop is a virtual organisation and for the customer it looks like one unit but behind the curtain the Bookshop has organised a well-controlled system of tasks performed by a number of different companies. They constitute a value-creating network of units that work together to produce value to the customer and fulfil the business transaction. We are still able to identify the flow of books as a value chain of steps but the business transaction chain is not a straight chain any more but a network.

Chapter 4: Analysing a business process in parts or as a whole

To understand a business we may follow these three partly overlapping tracks in order to understand how value is created for the customer:

- The order fulfilment track by following how a customer order is transformed into the required deliverable. This view focuses usually on one company’s processes. However, in order to combine high short delivery times with low stock levels the view has to be widened to cover more of the other units and companies upstream in the value chain.
- The value chain or product track by following the finally delivered product (clogs, books) upstream to its sources (wood, author’s idea) and downstream to the customer. Here we get a wide view over the whole value chain usually covering a number of companies. This logistics chain approach still holds in these cases.

- The business transaction track by following the complete process covering offering, order, delivery and payment (cf Figure 4.1).

The value creation chain looks like a relay where we may look at each actor at a time, and also study the change-overs. The traditional business transaction process is something done in interplay between two nodes: customer and producer. This process has to be understood from both the customer’s as well as the producer’s perspective.

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**Figure 4.1. Business Transaction Process as an interaction between provider and customer.**

It is one process viewed from two different perspectives.

**The business landscape and business networks**

All these three processes: order fulfilment, value creation chain and business transaction chain may be modelled on a network of task units or nodes participating in these processes. This map of the overall business network is a useful background to create models in order to describe and understand the on-going business. Also other stakeholders such as those units participating in the development of the business may be added, as well as other influential business actors such as competitors and potential customers. Finally, important social, political and technological facts and infrastructures may be added when trying to understand what may happen in the future.

This landscape is also named the ecosystem of the enterprise.

Basically, the entities in the Business Network in the map should be considered to be task units – but not elementary ones. In practice such a precision would lead to incomprehensible maps, so more peripheral tasks are represented by legal entities such as companies or parts thereof. These parts are relatively independent actors with there own objectives, own management and some power. We call them management nodes and they usually consist of two or more task units.
Our two basic frameworks for analysing and understanding operations are then the Task Unit and the Business Network (in a Business Landscape) and there we study the Value Chain, Business Transaction and Order Fulfilment.

**The Internet Bookshop business network and landscape**

In this Business Landscape for the Virtual Bookshop in Figure 4.2 you also find the Business Network and essential factors in the different environments the institutional, the technological and the social – factors that influence or may influence the business although they not participate in the ongoing business operations.

![Figure 4.2. Business Landscape for Internet Virtual Bookshop.](image-url)

However, the primary objective for this map is to show all relevant task units for the value creation chain, the order fulfilment and the business transactions. For order fulfilment it is relevant to break down some of the overall task in subtasks while in other cases other units are represented by their formal organisation (Publisher B) company or parts thereof (management nodes – Cross-Docking Centre).

The map is made from the perspective of the unit in focus (the Virtual Bookshop). This unit is often called core unit or star unit.

Each task unit may be further broken down in separate tasks and corresponding units when necessary. Companies and management nodes are looked upon as task units although they in reality contain a number of elementary task units.
The different task units have more or less tight relationships to the core unit. We have the task units of the company in focus as the innermost group (usually with a hierarchical relationship). In the Alliance we have the partners to the company the units that are closely related to the business of the core unit and participate in the development of it (contractual and social relationship). The Value Network embraces all units necessary for the creation of the products and services to the customer market (market relationship). Finally, the Constellation covers also the customers – i.e. all units that have to participate in order to keep the business running (market relationship). If any of the groups does not participate the show will stop. It is necessary to have a win-win-win business situation for all units in the Constellation in order to have an ongoing business running.

Within the Business Network there is co-production to create value for the customer; within the Constellation there is co-production to create value together with the customer and for the customer and all other nodes.

The Internet Bookshop built its Constellation very consciously and had two major issues in creating win-win for all parties:

- Why should the publishers endanger their business with the traditional bookshops by making special arrangements with an Internet Bookshop? They had long discussions with the publishers before they could convince them.

- For what group of customers would it be attractive to use an Internet Bookshop instead of a traditional one? They identified two primary groups

  - Students – they know exactly what books they had to have for their classes, they were already on the net and they were attracted by low prices.
  - Business Professionals – they often had access to the net and they estimated how easy it was to order the wanted literature without having to leave their desk.

(The map could also be used to ask questions such as what will the competitors such as the University Bookshops, do?)

**The Clog Factory business network**

In Figure 4.3 below we have tried to present all relevant nodes/task units and their relationship to the Clog Manufacturing Company.

The centre is the company in focus – now divided into three task units/nodes: Marketing, Clogs Operations and Soft Shoe Operations. (Clogs are not the only products of the company). As the company has a very close connection to the US Agent (partly owned) it is located in the inner circle. The relationship in this inner circle is hierarchical i.e. more or less ruled by top management (=Marketing = owners).

In the next circle of relationships – the Alliance – we find the Partners who do have more than pure a market relationship type (more than short/long term economic win-win) with the company and also take part in the development of the company and vice versa. The alliance is quite small: the bank, the wood supplier and the local equipment service company. There is interdependency between the company and its partners having them to maintain these long-term relationships. The relationships are both of market type, also of a more social type built on personal relationships and shared visions and on efficiency by reuse of well-known routines and established communications.
Next circle is the value network that consists of all the task units necessary for creating value to the customers i.e. get the clogs to them. The relations to the task units outside the Alliance is more of a true capitalistic market type (short/long term economic win-win) i.e. if the Clog Factory could find another supplier with a better offering they would consider a switch. But it is reciprocal so if e.g. the nail manufacturer could decide to stop producing these small amounts of special nails in order to reduce their assortment, they might do it.

The value network includes also the wholesalers and agents – market relationships. The relationships to the US Agent is closer than that at least they belong to the Alliance but we have chosen to put the in the innermost Company circle.

Outside the value network we have what is conceived as customers: the retailers and end-customers. They are part of the total Business Constellation i.e. all the actors needed in order to make business. If any group in the Constellation is not willing to participate, this will stop the whole show. The business concept must provide win-win solutions for all nodes.

The step from focusing on the Value Network and its creation of value for the customer to focus upon the whole Business Constellation and the creation of value for all units is important. We will develop that aspect further in under “Value Creation by Services” below.

The map of the total Business Landscape also includes companies, actors, nodes, and infrastructures that may have an impact on the business in focus – i.e. competitors, potential customers etc. more important for the possible future development than for understanding the ongoing operations.
Business relationships

Short-term profit is not the only reason for making business. Our analysis of e.g. the Clog Factory describes and inner circle – an Alliance – where the units have much closer relationships.

One of the surprises for many e-business initiatives has been that business is not only a question of business transactions for short-term profit but also a question of the development of long-term relations between the actors, between the task units/management nodes. Phrases such as “your competitor is one click away” and “the Eldorado of price comparisons” imply a market of actors driven only by short-term profit. However there are many reasons for maintaining long-term relationships: long-term profit, shared knowledge of each other business (products and routines) leading to very effective handling of business transactions; shared long-term development; and personal relations including feelings of trust and security.

Business relationships have a number of ingredients such as power, profit and personal feelings. Ouchi (1991) classifies the different types of networks of relationships in markets (profit relationships), bureaucracies (power relations), and clans (personal relations and feeling)

The relationships between the task units within a company are mainly of the hierarchical bureaucratically type i.e. one unit (top management) has power over the other ones.

Between the Internet Bookshop and its customers we have a pure market relationship i.e. they keep on doing business as long as the win-win situation persists. The customer may leave if he finds a better book provider (lower prices and/or more pleasant and convenient service) and the Internet Bookshop would break the relationship if the customer does not pay.

Other bonds may be of a more personal and social character – the students are maybe loyal to the University Bookshop at their University.

These are the three main ingredients in a relationship – power, profit and personal relations – usually one of them is dominating.

Relationship marketing – to develop these relations as a part of the execution of business transactions but also activities outside these transactions – have always been done by companies especially in B2B (business-to-business i.e. between companies) relationships. The business transactions are of course very important – that is where the value is exchanged – but good business relationships are getting more and more important. Good relationships give e.g. a more stable environment, lower transactions costs and improved services. The awareness of the importance of consciously building and maintaining these relationships has increased.

When the e-business and IT industry understood this fact their first reaction was to solve it by CRM (customer relationship management) systems. However, to manage relationships is a subtle task where human beings may be supported by a CRM system but can hardly be replaced by it. So, the model of the Business Landscape is also used to analyse the relationship both between dyads of units as well as by groups of units in the above-mentioned way: Core Unit, Company, Alliance, Business/Value Network, and Constellation.

Chapter 5: Value creation by services

Until now we have had a traditional industrial production view of value creation with the value creation chain as the backbone, a flow of objects and products step by step to the end customer.
from alder trees to clogs at end-user feet. This manufacturing view is implicitly the thinking behind many theories and models for understanding business operations.

However, during the 1980’s these theories and models did not fit very well in a number of cases and the concepts of services and relationships began to appear. During the last 20 years this thinking has resulted in a number of new concepts and models but “The distinction between services and products is both difficult to define and not particularly useful.” (Slack, 2001) In the literature there is no common agreement upon the definition of services although all agree when we are talking about a tremendous growth in the service industry.

To define product business is easier: it is the passing of an object/a product from provider to customer for money and at the same time passing the ownership.

To define services as something else as just not-product business seems to be very difficult. Also, it is less meaningful to look for a clear-cut distinction between products and services, as many offerings today are a combination of products sold/delivered and services provided. Still, traditional industrial product business is as important as brand-new service business and we have to understand and be able to manage both of them often in combination.

One new approach is to widen the view and also cover the customer’s task in order to see what could be done to support his value creation; Normann (2001). Our approach is to ask the question: “What is the provider able to do in order to contribute to the profit and the pleasure of the customer’s task in cooperation with the customer”. By creating economic value and positive experiences (“profit and pleasure”) for and with the customer, the provider achieves his implied objectives of doing more business with the customer, getting more customers via word-of-mouth and be able to get fair payment for his contributions.

**The Hotel business**

Let us take a traditional hotel service for a typical businessman as an example of value creation and look at order fulfilment.

What is value-adding transformation task? It is the customer’s task to survive in a foreign city from one day to another, to leave the business on the afternoon the first day and be ready for fight next morning.

What is the object of transformation? The businessman himself: input – hungry, dirty, tired and output – clean, alert and ready for a new day.

The activities or subtasks to perform this conversion are: sleeping, washing, relaxing, eating, maybe working a little, etc. To what degree and in what order the different activities are performed varies from guest to guest but most of them are probably performed by most guests.

Who are the participants? In contrast to the traditional industrial production – primarily the guest, the customer!

But what does the hotel provide? Primarily equipment: room, bed, bathroom, TV, telephone, Internet connection, desk, chairs – transforming resources to be used by the participant – the guest. They also have resources in place to ad hoc perform the room-service when the customer wants to eat something. Here the hotel provides people (participants) both in direct interaction with the customer (front-office activities) and behind the scenes in the kitchen (back-office activities).
So, the hotel supports the customer to get profit and pleasure mainly by providing a room full of resources (enabling services) but also people and the resources they need for tasks in front and back-office (relieving services).

This situation raises the question: Who is responsible for the successful outcome of the customer’s stay, the transformation? Well, the guest is certainly responsible to his company to arrive next morning alert and fresh. He has sub-contracted the hotel, done some “outsourcing” but is still responsible for the overall outcome.

The hotel is responsible to the guest for providing the necessary resources and the execution of the relevant tasks enabling him to achieve his over-night objectives.

Here is a table showing the division of responsibilities between the customer/guest and the hotel:

<table>
<thead>
<tr>
<th>TASK FRAMEWORK</th>
<th>HOTEL EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object/material</td>
<td>Customer in many dimensions (physical, ...)</td>
</tr>
<tr>
<td>Responsibility</td>
<td>Customer – overall, hotel – for resources and sub-tasks</td>
</tr>
<tr>
<td>Activities &amp; participation</td>
<td>Customer – 95%, hotel personnel front and back office – 5%?</td>
</tr>
<tr>
<td>Equipment and info</td>
<td>Customer – 5% (PC, tooth-brush), hotel – 95 % (room, bed, sheets, alarm-clock, bathroom, hairdryer, ...........</td>
</tr>
</tbody>
</table>

This covers the main value creation task. If we put that in perspective of the whole business transaction process it will look like this:

<table>
<thead>
<tr>
<th>Customer activities</th>
<th>Search market</th>
<th>Evaluate and buy</th>
<th>Receive &amp; integrate</th>
<th>Perform main task</th>
<th>Dis-integrate</th>
<th>Pay</th>
</tr>
</thead>
<tbody>
<tr>
<td>The same in hotel words</td>
<td>Search for accommodation</td>
<td>Order room</td>
<td>Check-in</td>
<td>Live there</td>
<td>Check-out</td>
<td>Pay</td>
</tr>
<tr>
<td>Provider activities/processes</td>
<td>Market services</td>
<td>Sell/reserve room</td>
<td>Give access to clean room</td>
<td>Support when needed</td>
<td>Get access to the room</td>
<td>Clean the room</td>
</tr>
</tbody>
</table>

One distinction between product and non-product business is the transfer of ownership. Therefore, we have a new column, a new step in the process – the disintegration i.e. the return of the provider’s equipment (don’t forget to return the cosy bathrobe!) and of staff (e.g. in consultancy services).

The important process is how the customer/guest is creating value for himself. The room process is a supply process but a supply to let, not to buy (cf Figure 5.1).

As the customer will evaluate his use of the services not only from the main value creation task (main task) but from his experiences (pleasure) of the whole transaction process the provider has to perform well in all its subtasks in order to achieve more business, good market image and keep fair prices.
The main dimensions to consider when analysing how to support the customer’s value creation task are:

- **Object**: what is the object transformed? Who owns the object?
- **Transforming resources**:
  - **Activities**: what is the balance between customer and provider participants?
  - **Equipment and information**: who provides what? During what time?

**Task responsibility**: what are the formal and informal contracts between customer and service provider? Who is responsible to whom and for what?

By focusing upon the customer’s value-creating process and how the provider is able to contribute to the execution of that task we circumvent the need to participate in the product-service debate. To provide a product is only one way to support/enable a customer’s value-creating process.

**Analytical approach for services**

Thus our main analytical approach for service processes is as follows:

First, we focus upon the customer’s value-creating task and process and then we classify the different ways the producer/provider may contribute to the customer’s profit and pleasure.

Second, although we focus upon the customer’s value-creating tasks we also look at the total business transaction process, the steps leading to the main task and the steps thereafter.

Third, we look at the value creation chain upstream and downstream from the core task. To be able to cooperate and to contribute to the customer’s value-creating process the provider has to take the following steps or tasks:
produce the resources to be used in the customer’s process
mobilize and deliver these resources and have them integrated into the customer’s task unit.
take responsibility for at least the performance of his own(ed) resources during the execution of the customer’s task but also focus upon the customer’s profit and pleasure – as this is what is leading to more business.
when the task is finished, retrieve and refresh his resources to be available for next customer.

Fourth, we look upon the business transaction from both customer’s and the provider’s perspectives. We study both how well it works as well as its impact on the relations especially in person-to-person situations.

“Advice to a hotel owner”:

Build a warehouse of resources – a hotel – and get and organize resources for support customers through the business transaction process: reservation, checking in, room service and kitchen, checking out and payment.
Integrate these resources into a customer’s task unit – check him in. Contribute to the success of his value creating task – make staying rewarding and nice – customer profit and pleasure. Every front office personal contact with the customer should be pleasant (hopefully for both parties).
Retrieve and refresh your resources – after check-out, clean the room

Focus upon the objectives e.g.

get monetary compensation – make profit
build a set of frequently recurrent price-insensitive customers
get an excellent image on the market = getting more guests
create a motivating atmosphere for your staff (profit and pleasure for them, too)

Chapter 6: The Task Unit Framework and similar frameworks

The main task is to transform input to output to create value. The value of output (in customer terms) should be larger than the cost of material input and of the use of the transforming resources. The focus is upon this main transformation task where value is created and added to or built into objects out. Activities are needed to achieve this transformation. Organised and structured resources such as people, equipment and information are the necessary bases for the execution of these activities. We use the Task Unit Framework to model: transformed material/objects, transforming activities and transforming resources organised and structured to perform the task.

The basic Task Unit Framework

Figure 6.1 shows the basic Task Unit Framework. The triangle represents the whole task unit i.e. the business entity adding value to input by transforming it to output.
Sometimes these Task Units coincide with the formal organisation, sometimes they don’t. Often the resources needed for a task are collected from different organisational units i.e. the clog manufacturing task needs resources from the common pool of workers in times of high demand. Then the responsibility for the execution of the task is up to the formal organisation but all the resources are not owned by them. Out-sourcing or out-tasking is another case. Then a whole sub-task (or even the whole task) is delegated to an outside organisation.

In order to understand a business one has first to identify the tasks that have to be done, then one is able to explore each task. A task may be broken down in sub-tasks i.e. a task unit into sub-task units. A useful concept in this understanding of a business organisation is the management node: a node in the Business Network responsible for one or usually more tasks that have to be recognised in order to understand the operations.

**Similar frameworks**

**The Work System Framework**

Our task unit framework is similar to the Work System Framework by Steven Alter, 2001 (cf Figure 6.2) and the Management Node by Peter Keen, 2001.

Alter’s Works System Framework “is a system in which human participants and/or machines perform a business process using information, technology and other resources to produce products and/or services for internal or external customers.”
The main difference between the Task Unit Framework and the Work System Framework is that the latter is more stand-alone while we use our in the context of a Business Landscape Framework. The Customer element is in our case another task unit in the network and the products and services are the links between different task units.

However, to compare the two models gives an insight in both:
<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>WORK SYSTEM</th>
<th>TASK UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customers</td>
<td>Those who receive benefits from what is produced by the work system</td>
<td>Same definition but the element is a separate task unit in the Business Network.</td>
</tr>
<tr>
<td>Products &amp; Services</td>
<td>What the work system exists to produce.</td>
<td>The task unit produces only deliverables. Services are defined in the Business Network Model as support to customer tasks. The Task Unit Framework also gives more focus to material not only as output but also as input and work-in-progress.</td>
</tr>
<tr>
<td>Business Processes</td>
<td>The set of work steps or activities that are performed. They may be precisely predefined or relatively unstructured.</td>
<td>Same concept but we prefer to use the term activities to avoid the common fallacy to look upon business processes as something always well structured.</td>
</tr>
<tr>
<td>Participants</td>
<td>The people who perform the work in the business processes.</td>
<td>The same</td>
</tr>
<tr>
<td>Information</td>
<td>The information used by the participants to perform their work. Much information is not computerized and is not part of a formal information system.</td>
<td>For us information is primarily what the participants do have in their heads and is controlling the activities. In order to build that information they have access to data; computerized and documented.</td>
</tr>
<tr>
<td>Technology</td>
<td>The hardware, software and other tools and equipment used by the participants to perform their work.</td>
<td>Same concept but we use the term equipment for all “hard” physical resources.</td>
</tr>
<tr>
<td>Context</td>
<td>The organisational, cultural, competitive, and regulatory environment within which the work system exists.</td>
<td>Same concept and may appear both on the task unit and the business network level.</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>The shared human, informational, and technical resources that the work system relies on even though these resources exist and are managed outside of it.</td>
<td>This is divided into supporting task units and in the environment in the business network model.</td>
</tr>
</tbody>
</table>
Management nodes

Peter Keen in “the eProcess Edge” (Keen & McDonald, 2000) has a network view and models business in terms of a network of management nodes. “A management node can be loosely defined as an organisational unit of control or influence.” For us, the task unit is that management node and the elements of the business network are task units. These units may belong to different companies.

Sometimes “actor” is used in the same sense. We prefer task unit or node because the participants are the true actors in the network and the tasks.

The Task Unit Framework has emerged by putting the Work System Framework in a Business Network environment.

Operations management

However, there have also been influences from the Operations Management field (Slack et. al. 2001). Our focus on transformation and the terms for the three levels of the task unit are similar to what is used in the field of Operations Management. Business activities may be viewed as transforming input to output and thereby creating value and are often called “operations”. In that sense the Task Unit is a framework for operations. Another meaning of “operations” is the specific task unit (or network of task units) for the creation of output to be delivered to the organisation’s external customers.

Slack et al. (2001) differentiates between:

- operations as a function, meaning the part of the organisation which produces the products and services for the organisation’s external customers (i.e. task unit)
- operations as an activity, meaning any transformation of input resources in order to produce products and services, for either internal or external customers (i.e. process).

While they focus on operations as a function = customer order fulfilment, we will use the term in its more general sense = the activities in a task unit.

Business process management

The process management thinking is another base in our work as this is focussing upon the transformation process that is the core or the task (Davenport, 1993). Process modelling is the primary tool when analysing value creation in more detail. The Business Landscape, the Business Transaction and the Task Unit put these value-creating processes in their proper business context.

Important characteristics of task units

Size

There are two measurements of task unit size: revenue and number of participants. With increasing revenue the importance of the task unit is normally increasing. An increasing number of participants increase the demands on organisation and coordination.

Transformed object

The transformation process is very different depending on the type of object the unit is working with and produces as output. It is necessary to distinguish between
• physical objects: primarily equipment and material (clogs) but also data in physical form (books, bills) and physical aspects of people (haircut)

• data especially in electronic form

• mental objects: person’s knowledge, skill, attitudes

The processes of changing, moving and creation/copying are very different between these different types of objects and hence the transformation processes and their technology are very different. Many units have a mix of different types of objects as input and also as output. To identify the type of main object processed by the unit is of vital importance for understanding the task.

**Stability in process and base**

Every task unit is changing over time due to erosion, spontaneous learning and/or conscious development efforts. Here we focus upon the ongoing operations and leave these changes out of account and focus upon the changes/transformations that are a planned conscious part of the way the unit operates.

**Factory type operations**

For factory-type operations the objectives are to have a pre-defined, rigid activity structure for repetitive work in order to secure efficiency, quality of output and to reduce dependence of individual skills. There are three versions.

Continuous processes: the output is a flow with high volumes of objects with almost no variety e.g. electric utility. The process is ever the same using a fixed base.

Mass production: the output is a number of objects with high volumes with varieties within pre-defined limits, e.g. car manufacturing and ATM services. The process is always the same using a fixed base of transforming resources.

Batch production could be treated as a sequence of mass production of different but usually very similar products using (almost) the same base of transforming resources. Clog manufacturing is a typical case. The clogs are very similar and have the same production process but the differences in style and size require a production in separate batches for each size and style. Slightly different processes are run using to a large degree the same parts of a fixed task base. To switch from one batch to another a more or less time-consuming and costly set-up process is needed. Some resources may not be always allocated to the unit but may have to be leased from other internal or external resource pools when needed.

For these types of operations it is usually very efficient to be able to work with clearly pre-defined processes in order to optimise the workflow and secure the quality.

**Workshop type operations**

Car repair is an example. Each execution of the repair task is unique but usually very similar to many previous ones.

The process – activity structure and the transformation are not rigidly defined and require creativity and craftsmanship to execute. The necessary transforming resources are still pre-defined and at hand
but used differently from execution to execution depending on the customer’s/the car’s needs. These workshop/jobbing processes are characterised by lower volumes and a high variation in output.

The car repair workshop has a given base of facilities and tools, manuals and skilled mechanics. Each incoming car is more or less unique and requires a more or less creative process to be fixed. The individual task varies from being pure routine to “never-seen-before”. So, the structure of the process varies from object to object using the given resources in the base. Hotel services could be classified in this category although they tend to be very repetitious from the provider’s perspective due to the freedom of the guest to structure and execute the task.

The proper design of these processes requires a balance between to have process structure as a back-bone and creative resources to fulfil the task. Many attempts have been done to treat workshop-type operations to become factory-type operations sometimes with disastrous results.

Ad hoc type operations – projects

For this type of operations not even the task resource base is pre-defined but is put together successively as the task is understood, and activities are successively defined and results identified. In some cases the process may be well known and well structured, e.g. for I/S development project. In other cases e.g. in professional services the structure and the needed resources are successively identified as the initial problem analysis proceeds.

The role of the Internet in the context of business processes

The basic quality of the Internet is to provide possibilities to more easily connect all task units and companies in the Business Constellation in one huge information web. This and other IT networks are increasingly used for a number of different purposes. First, to control the value chain. There are PC vendors (in cooperation with logistic providers) that give their customers opportunity to track not only where their delivery is, but also what is in stock and what is in production, i.e. to “see” along the whole value chain to be able to predict when their PC is going to arrive.

Second, to support the business transaction in all different steps: searching/marketing, ordering/confirming, tracking (see above), invoicing/paying.

By this, Internet has provided companies with possibilities to co-operate and there is a growing tendency to do so – to run a collaborative commerce and in consciously control more of the company’s ecosystem.

Third, when the product, the objects passed from provider to customer is possible to convert to digitised data the whole business may change. If the Internet Bookshop is using the two previous opportunities, the eBook is an example of this third. However, the eBook is not fully competitive to the paper book when it comes to customer profit and pleasure so the Business Constellation for success is not at hand – yet. It simplifies tremendously the mass-production and distribution of the content of the book but makes it more difficult for the reader to “get the message”.

The music industry is seeing this as a threat to the current order. Hence, their fight against Napster and shows how these new opportunities create a deadly threat to the existing companies.

There has also been a lot of fuss about innovative ways to build new business constellations (e.g. Bookshops, Marketplaces, Auctions etc.) but in many cases they have failed because some actors in
the Business Constellation did not participate as expected. They did not find any advantages of joining the constellation. It will probably take more time to develop these new constellations than expected.

However, Internet is also used to improve the cooperation within existing constellations both with a narrow unit-to-unit (B2B) focus and initiatives to coordinate existing value networks. This development started more slowly than the spectacular ones and the B2C-solutions, but is more enduring and seems to have more impact in the long run.

In all cases it is useful to use these frameworks and to identify the relevant tasks and task units in order to design the optimal solution. In the Internet Bookshop case this was done very consciously and the tasks were distributed carefully. When trying to improve an existing business network it is more difficult to realise this optimal task distribution because the transforming resources are already organised according to some functional structure. To change that may be politically difficult it will take time to re-allocate the resources e.g. adapting the information systems to the new structure.

Chapter 7: Business objects

An important characteristic of a business process is what type of object it is transforming. To differentiate between physical objects, digitised data and/or people is useful due to the different attributes of these types of objects.

The basic approach in process modelling is to identify the created business object out, identify the object in, track and describe its way through the different sub-processes until the object out is produced. It has proven to be very powerful to describe the state of the object at the transition points between the different sub-processes, departments i.e. at borders where responsibility for the object is transferred from one sub-process to another, from one management node to another. With an increase in outsourcing initiatives and virtual organisations these interfaces and transition points are getting more and more critical.

Different types of objects

The business object may be physical, digitised data, people and often in combination.

Information appears as all these three types:

- physical (printed on paper)
- digitised (stored in a computer – sometimes called electronic or virtual form)
- mental (information in people’s head)

(Note. Here we use the term information for something in people’s head and the term data for something outside the heads but that has the capability to be transformed into information – i.e. understood by someone.)

Value is created by the change of objects. These different types have very different attributes for transformation (and transportation – which is another type of value creation) it is important to understand those differences.

Digitised data objects have some peculiarities compared to physical ones:
• Easy to copy. In manufacturing the production is in reality a cumbersome re-production of the product developed in a costly development process. For digitised data objects the main process is development – copying and re-production is a minor process. Also the same object (e.g. an electronic article) may appear at the same time to be in all object states (outline, draft, early version etc.) and be processed in all sub-processes at the same time. Physical objects (e.g. clogs) move step by step along the process, exist only in one state and are processed by only one sub-process at a time.

• Easy to transport. Transportation for data objects is very cheap and fast. The same object (e.g. a picture on TV) may appear to be in many places at the same time.

• Easy to modify and change. It is possible to have changes in any state (outline, draft, early version, etc.) without changing any of the other ones (which creates problems). What you want is that a change in an earlier state will update the other downstream states (a change in the outline – new concept is introduces – will later be reflected in draft and final version).

People (or other living creatures) are unique and much more complex. We are objects and participants, we experience the change, we are a mix of physical, psychological and mental active beings, and we have our own will. This makes human change a very special process. We cannot treat human beings in the same way as physical or data objects.

So the type of object has a major influence on the characteristics of the transformation process.

Physical objects are often transformed in well-structured processes, each object is in one sub-process at a time and is moving forward step-by-step.

Processes dealing with data objects are more often of the workshop type.

As soon as people is subject to transformation their reactions is more or less individual and unpredictable. Although we may have a well-defined change process we really have to be prepared to unexpected reactions and to adjust the process accordingly.

Now let us take a closer look upon these different types of transformation.

**Different types of object transformations**

An object is a “thing”, a logical entity but it must not be the same type of object all the way. In the order process it starts as a data object – the order, is transformed to another data object – the item list, is transformed into a number of physical objects – the package and is transported to the customer. It is the data order that is the object in, the object that contains the vision of the physical output object.

The transformation of an object in a process may be of different types:

• Normally we have transformations without changing object type: physical (a clog is painted), data (an article is revised), person (a lesson is learned).

• A conversion of the object from data to physical (item list to physical package), from data to mental information and so on.

• A transportation of the object (package to customer) without any change of the object in itself.
However, the common quality of these different transformations is that they all increase the customer value of the object.

The different types of object transformations are reflected in different types modelling methods and visualisation techniques:

- Modelling transformations of physical objects
- Modelling transformations of data objects
- Modelling transformations of people and organisations

We will take a closer look at process modelling in Part II of this document.

**PART II: PROCESS MODELLING AND VISUALISATION**

Process modelling is a tool for analysing and designing business processes and operations. In this paper, we present an approach to process modelling, and when and how to use it. The purpose of process modelling may be to get an overview and overall understanding of business processes and operations, to have a base for measuring and controlling the performance of a process, and/or to describe the process in detail to be a manual for the process workers.

Like Part I of this document, Part II is based on Sundgren et al (2005), including Steneskog (2005a) and Steneskog (2005b).

In Part I we introduced and discussed business processes and related concepts, providing also examples of different types of business processes. Here we shall discuss how to identify and model these different types of business processes and business transactions in more detail. As was already mentioned, the first generation of business process modelling was developed in order to improve manufacturing processes with physical objects. These modelling methods are still valid for those types of processes and tasks. However, the modelling principles have had to be modified in order to be of value for other types of business processes and objects. It has been ineffective or even disastrous to use the methods for analysis and improvement of industrial mass-producing processes in a fundamentalist way, when trying to model and improve other types of processes, for example service processes and creative processes.

Business modelling is a convenient tool for systematic analysis of the ongoing operations of a business. How the work is done and how customer value is created are identified and modelled by using a process view. It is a way to get a more detailed understanding of value chains, business transactions and order fulfilment; not only to understand but also to control and improve. Here we describe how the steps in a process modelling may be taken in practice. This is by no means a standard recipe but one way to do it.

Modelling is usually not done in one straight sequence. First get a rough picture of the process and then improve it in a more iterative way until the “business painting” is relevant for the current purpose.

There is a wide spectrum of business processes in terms of how pre-defined and repetitive their results as well as their activity sequences are. It is necessary as early as possible to try to understand what type the current process belongs to, as they have to be treated differently.

We present here a number of conventions on how to model processes. In practice it is not that important to use exactly these conventions but they constitute a list of the concepts that is useful to
be able to express in process models. Modelling is an art. You need to know and master the basic rules but you may have to go beyond them to express what the business is really about.

Chapter 8: Modelling business processes and business operations

The Task Unit, the Business Transaction, and the Business Landscape conceptual instruments to be used to create models and to get an overall understanding of the business for the company or task unit/core unit being the focus of the study. The term perspective implies a viewpoint, a position from which we look upon the business i.e. most cases the analysis is done from the perspective of the core unit. The task unit, business transaction, and the business landscape are different views from that perspective and we use the different frameworks to create the relevant models.

To increase our understanding, sometimes we may use two or more perspectives. For example, the business transaction is analysed from both the provider’s and the customer’s perspective.

In many cases we have to go deeper in order to understand the ongoing operations to the degree that is necessary for our study and there are many tools for that. We have found three tools to be very useful: process modelling, concept modelling and value modelling.

Process modelling

This is the primary tool for analysing ongoing value-creating operations and its importance and use has grown considerably during the last 10 years. It is used to analyse and describe the transformation processes, the customer order fulfilment process, the value creation chain as a process and also the business transaction process. This will be described more in detail in chapter 6.

Process modelling may here be used for different purposes, requiring an increasingly detailed description

- to get an overview and overall understanding of the process
- to have a base for measuring and controlling the performance of a process
- to describe the process for development purposes (“is” as well as “to be”) including the creation of IT-systems supporting the process
- to describe the process in detail to be a manual for the participants

Value modelling

In order to keeps a profitable business running it is necessary that all units, actors, companies in the business constellation want to participate for profit and pleasure. Value modelling is used to get a grip on that. For more peripheral units a very simple evaluation may be sufficient and for other e.g. the core unit a more careful analysis may be necessary (see chapter 5)

Also when digging deeper into a task, its sub-tasks and the corresponding transformation processes goal modelling is often a necessary complement.

Conceptual modelling
As the purpose of models is to create understanding and communication among people it is vital that the different terms for objects, tasks, processes, etc, are understood in the same way. Especially for what you deliver – the transformed objects out from the task – you have to agree upon what they consist of and what terms to use for them. To discuss a task unit when different people have different understanding of what the output is will lead to either endless debates or a superfluous agreement covering non-agreement.

**Organisational modelling**

The common organisation chart could be defined as a model, a picture of responsibilities (which management nodes/formal units are responsible for the performance of which tasks) and resources (which management nodes control which resources). As this is a well-known model we do not describe the framework.

**Chapter 9: Business processes and task units**

Business processes are the core of value creation. They are the raison d’être for the task units. The business process in itself is both the successive transformations of input to output and the necessary activities to achieve that transformation.

In all business process concepts there is as strong focus on the activity view of the process. We believe the object view to be of equal importance, because it is the objects that are transformed and carry the value further on. When the process execution is over, the activities have vanished but the output objects remain.

There are two “schools” of process modelling – one has more focus on transformation and value creation, one on activities and resource usage/cost. *Figure 9.1* indicates how the two approaches could be accommodated within one common framework.

*Figure 9.1. Processes and the Task Framework.*

![Diagram of processes and task framework](image-url)
The process is about “HOW” to create the output objects – the “WHAT”. The actors (participants) in a process perform activities that cause transformations of the objects; see Figure 9.2. Very visible processes are found in manufacturing (for example with clogs as objects), and it is easy to track the flow of objects/products along the production lines and to understand their “how” and “what”.

![Diagram](image)

*Figure 9.2. The basic elements of transformation.*

The basic symbols used in Figure 9.2 are the arrow-shaped process, the rectangular object, and the arrow indicating that the process creates the object.

**The Rent-A-Video case**

Rent-A-Video is a shop where customers may rent video cassettes. Which are the important processes in the shop? How do they create value for the customer? Who is the customer?

**Producing video cassettes**

One approach is to start to look at the business constellation. In the Rent-A-Video Shop we find easily the customer and the shop clerk; see Figure 9.3.

![Diagram](image)

*Figure 9.3. Process Actors/Participants.*

The next step is to find the main objects that are transformed and carry value. Which are the important objects? Especially, what is delivered from the process as output objects, from the shop to the customer, to provide value? Obviously the videocassettes are the output objects, symbolised by a rectangle:
And as for the process – the set of transforming activities executed to create customer value and to push the flow of objects further on – we use an arrow-shaped symbol for it:

The business process in this case could be describe verbally as follows:

- "The customer enters the shop, walks around, selects and picks videocassettes, continues to the cashier. The lease is recorded and the customer is paying and leaving."

The process graph in Figure 9.4 visualises this process in a structured way. The process is a business transaction process, an interaction between several participants (actors), in this case the provider (the clerk in the videoshop) and the customer in two roles (as a buyer and as a user of the video).
The process graph shows:

- an incoming object – the customer’s need for a video
- search and select/buy processes (done by the customer) that is adding value to the need by transferring it into a video title and then an order for the selected video title
- a production process where the videoshop clerk picks a matching cassette from the shelf and provides it to the customer – now the immaterial need is transformed into a physical cassette given to the customer as a loan
- the object out – the “right” cassette available for 3 days is brought home by the buyer and loaded into the video player

This seems to be the central process showing the flow of cassettes through the shop creating customer value. It is very useful to rigidly follow a convention of showing an object-process-object-process-object chain to identify the value created. However, note that the incoming object driving the process forward is not the cassette on the shelf, but the customer’s need for it. The need is transformed into a cassette.

Two rules of thumb:
- OPOPO: object-process-object-process-object
- Backbone – one and same object is transformed all the way through

Creating customer value

But that is not the whole story. There is no value in just having a loaded cassette. The real value for the customer in this case is how the user (maybe the same person as the buyer, maybe not) is experiencing the performance. Let us track the lifecycle of the object further through the business transaction. It is brought home by the customer (delivered), put into the recorder (integrated), and its data content is exposed to the spectator(s). But who is that? The customer/hirer? Or the customer’s children? Grandmother? Who is after all the real customer? See Figure 9.5. The participants may be noted below the process symbol.

![Diagram](image)

*Figure 9.5. Who is the real customer? How is value created?*

But how is value created for the customer? The real value for the customer is created when the video is looked at – that is where the main task is performed; see Figure 9.6. The videocassette is a transformation resource hired by the customer to create pleasure (if it is an entertaining video), or maybe profit (“How to repair your own house”), or free time (“Keep the children quiet”).
The cassette is temporary a part of the process platform, of the transforming resources. Enabling the customer process by lending him resources/cassette for his process is another way of value creation/having fun than to buy clogs and have nice walks that includes transfer of ownership.

This video service is similar to hotel services – the customer is temporary hiring a resource – a room - from the provider in order to perform his intended value-creating task all by himself. We have a service situation – the video shop is just providing resources to enable the customer to run his process.

Thus, Rent-A-Video is far from the traditional manufacture-deliver business where the normal case is that there is an object out with value is sold to the customer and never coming back. Especially in service situations it is necessary to model and understand the customer’s process because it is there that the desired value is created.

Now we have a process model of the business transaction including order fulfilment. What do have more? Let us return to the object life cycle to find out if there is more.

When the cassette has been played one or more times it is returned to the shop, the return is recorded, and the cassette is put back on its shelf. OK? (Receive and restore.) Then the cassette is ready to be selected by another customer.

The payment process

But where does payment appear in the models?

As a matter of fact the order consists of two parts (or sub-objects): the desired delivery (the cassette, now) and the economic conditions (5€). The latter in transformed into a demand for payment and then into money for the provider. Figure 9.7 shows the payment process from order to money.
Now, we have identified all the different parts of the business transaction: Buy/sale, produce, create customer value and pay.

For the customer the need is transformed into own value creation and satisfaction and money to the provider. For the provider the object is enabling customer satisfaction and the money; see Figure 9.8.

**Value chain process**

But is really the complete transaction lifecycle the same as the complete lifecycle for the cassette as such from the video shop’s point of view? Doesn’t the cassette as such have a birth and a death, too as well as the customer’s need? These questions lead us to model the value chain for the cassette as such; see Figure 9.9.

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*Figure 9.7. The payment part of the total business transaction process.*

*Figure 9.8. The Objects of Exchange in a Business Transaction.*

*Figure 9.9.*
There is a long production process to create the cassette including writing the script, recording the video, copying and distributing the cassettes. Then comes for the Video Shop the purchasing process, where the cassette is bought and put on the shelf. What they buy is the content packaged on the cassette. The death then occurs when either the body (the cassette) is broken or the soul (the content) is no longer in demand among the customers. Depending on which died first, different actions are taken.

The Lease/Hire sub-process in the Life-cycle Value Chain process is the shown in the business transaction process. Here, the business transaction between the user and the Video Shop and the long value chain process overlap.

In order to make the graphs easy to grasp and understand we add two more recommendations (in addition to OPOPO and backbone):

- name each process with a verb in the imperative mode (Search, Put, Lease, Scrap)
- describe each object with its name and state

It is important that there is no confusion or misunderstandings about what the object really is and to write a clear description or provide a conceptual model may be useful.

**Business landscape**

Now we have a good overview of the business landscape and the most important processes. A primary condition for having an ongoing business is that all nodes perceive a win-win situation. Hence we have to take a closer look at the customers. We have identified two different roles: as a buyer coming to the shop (an actor, a node) and as the user – the spectator looking at the video (an object to be changed). The buyer and the spectator may be the same person but the buyer might be a parent hiring the video for his children in order to keep them quiet and get some time for himself (so he is maybe still the end-customer). All participants must be satisfied, the children must like the video, and the parent must be satisfied with the quiet time. Both should want to lease another video.

But is this really process analysis? Isn’t it goal analysis? Yes, it is: In order to understand processes we have to understand why they are run, why the participants are motivated to participate. Thus, during process analysis we do some strategic thinking, too, because the processes are going to create value in the customer’s task according to our business strategy. When modelling the processes only rough strategic modelling may be done, but has to be in accordance with more complete strategy models.

In the same way process modelling requires some object modelling to avoid confusion. Sometimes careful descriptions of the business objects and their different parts and relations to each other are necessary. In the Rent-A-Video case there are two different parts of the object we have to be aware of: the video (data) and the cassette (physical carrier). In our case they are stuck to each other but in some cases the data may be set free and run amok on the Internet in the same way as music is doing.
A detailed conceptual model of all relevant objects is often done only when the data requirements for an IT solution are to be identified. But sometimes conceptual modelling may be very useful for other stages of analysis as well.

Process modelling needs to be completed with ideas/models of the business landscape, the objects/concepts and the goals/strategies in order to be put in context.

Chapter 10: Process models and process executions

A cornerstone in process thinking is to understand the difference between a process model and the corresponding executions.

In order to explain this difference we can use a three-world model inspired by the philosopher Karl Popper; see Figure 10.1. The model shows:

1. the real world – the “Reality”
2. the mental world – our internal intrasubjective mental models
3. the world of models and descriptions for intersubjective communication.

![Figure 10.1. The three worlds of data/information.](image)

A process model exists in the 3rd – intersubjective – world and describes the course in its entirety from start to end. A person who is going to participate in the execution of the process has to build his personal mental model of the process (in 2nd world) by combining the process model with his own knowledge and experience. This mental model is then his base for action.

The process execution exists in the 1st real world and is caused by the enactment of the mental models by the participating persons. In the “psychological now” – the only reality that exists – only a slice of the process model is reflected in the execution. The process model exists all the time in its
entirety but process executions only as temporary slices, and often not at all (when no executions are active).

In the clog factory the process models exist all the time. Process executions do not exist during the night. When the morning comes, a number of parallel executions are started and run successively during the day.

The inability to differentiate between the model and the execution has for a long time created confusion in process theory. Attempts to define what a process is has run into trouble because then you try to formulate one definition for two very different (although related) phenomena.

Process executions do almost never happen as described in the process model. The creative, unreliable human being in between has his own unique mental model and his own will. The process model is a framework for desired action but the human being makes his own interpretation of it and adapts it to the current situation. This is a problem in factory type processes and a priceless asset in studio type processes (see further below).

**Chapter 11: Modelling different business object transformations**

In Part I of this document, we introduced the concept of business objects and discussed briefly some typical processes for transforming different types of objects. Here we shall go deeper into the modelling of such processes.

**Processes for transformation of physical objects**

The Clog Factory order fulfilment (see Figure 11.1) is a case where we treat all objects as physical ones. The arriving customer order (although it might be arriving via the Internet) is the object in and we are able to physically track how the different physical objects are transformed and put together to create the required object out.

![Figure 11.1. An example of a process transforming physical objects.](image)
The processes are pre-defined, routine, value-creating transformations. The output is pre-defined the moment we start the process.

**Processes for transformation of data objects**

Compared to physical things and objects, data objects have some special qualities.

First, data (coded information) does not exist without having a carrier. It might be attached to a physical base e.g. paper or electronically coded in computers. The characteristics of the carrier decide what type of process we have i.e. data carried by a physical object is marred by physical characteristics (e.g. a rune stone).

Newspapers are data carried by physical paper. Once printed, they are difficult to modify, every copy has to be physically produced and then transported as any other physical object.

So, could the creation of a newspaper edition be looked upon as a physical factory operation? But isn’t it a lot of creative work in the production of articles and of the content of the edition?

Let us take a look at it (see Figure 11.2):

![Figure 11.2. Creating next newspaper edition.](image)

The creation of the first edition of the day starts with a preliminary design: how many pages, what balance between advertisements and editorial parts etc. Then these editorial parts of the newspaper have to be filled in: what do we have left from yesterday, what is going on out there in the world, what are our journalists and correspondents producing just now?

If we model the underlying flow of data objects becoming the content of the next edition and we use the traditional process view we will get a graph like this (very simplified) one:

An event occur, the journalist gets there, captures the data (get informed) and creates text and pictures. This is edited into an article; the articles are rejected or accepted. A number of articles are put into the edition according to the edition plan and at a certain point in time the completed edition is ready for printing.

The usual comment after having modelled this type of processes is: “Well, in a way it is right but in reality it is not done this way because everything is done concurrently. There is an almost continuous inflow of data (electronic form) because new events occur, already captured events develop further etc. There is also feedback (see Figure 11.3) from the process of editing the edition in order to create a physically and logically well-balanced edition: articles have to be re-edited or extended etc.”
As in a manufacturing factory there are new “orders” coming in as new interesting events occur and there is a flow of new articles moving up to the edit process. However due to the copy characteristics of digitised data these changes are not just moved up the chain – they are copied up the chain and finally the data is in a number of places. If the original event develops further or the journalist gets more data the corresponding change is entered and is the (hopefully) propagated up along the process.

The inflow is also controlled by feedback from the edit process because the on-going design of the edition creates demand for more or specific input.

Manufacturing processes are of a step-by-step type, the physical object moves in heavy steps up the line. Digitised data processes are more flows of parts of data objects. These flows are both production i.e. they create data in the articles that are of for the reader, but also design as the journalists design the different articles and the editorial board designs the edition and manage and control the whole edition development process.

Then suddenly, at a certain point in time, the newspaper process is taken to the next step.

The constantly changing edition object is now decided to be what is going to be delivered. The edition is “frozen” by a decision from the editor. It is now converted from being a “free” electronic data object to be stuck to its new carrier – printing plates and then multiplied on physical paper; see Figure 11.4. The edition data object is delivered for printing – getting stuck to physical paper – and then distributed as physical objects according to the rules of the traditional physical world.

Compared to that, the web version of the newspaper maybe continuously changed and enhanced all the time. The electronic uploading process maybe not negligible but much simpler that the physical printing. It is possible to upload new editions very often (almost continuously) and make them available on the Internet. Delivery (down-loading) is then taken care of by the reader.
When trying to understand data flows it is important to be aware of their fluent nature. To see them as step-by-step processes as in manufacturing is sometimes a good start and is good enough for many routine data flows. However, the more important and essential data development processes are usually of this more fluent nature consisting of many concurrent executions of the basic creation process.

These processes are usually not carried out in the same predefined repetitive way as the more “hard-wired” factory type of processes. Every execution is partly unique, but you will find certain reoccurring structures of activities for e.g. editing an article. The flow of activities is controlled more by rules, experience and creativity than by rigid job and process description. The skills and the creativity of the human actor as an individual is an important asset for the process. In factory type processes there is an ambition to have “identical”, exchangeable actors and to reduce the risky creativity factors. This is what distinguishes factory operations from workshop operations.

Symbols used for factory processes and workshop processes, respectively:

![Symbols for factory and workshop processes]

**Processes for transformation of people and organisations**

Changing people cover a wide spectrum of change from physical hair-cutting to psychological analytical therapy. In some rare cases they may be treated as physical processes (hair-cutting), in many cases as data processes (teaching/learning) but in many cases these approaches are insufficient. We are not going to study all those different types of processes, only to give some hints for those concerning organisational development i.e. how to change the ongoing tasks in a business.

As people is so different compared to other transformed objects it is important not to forget their uniqueness and individuality. In order not to forget that, it is helpful to use a special symbol for that; see **Figure 11.5**.

![Figure 11.5. Human beings are complex objects.]

A major difference is that for persons the relation between activity and change of the object is not of the same clear cause-effect type as for the other types of objects (painting a clog). As each person is an individual with individual frames of reference each person will have a unique response to an activity and often there is a varying time lag between stimulus and response. In an organisational change we then have to consider the interactions between the members of the organisation – interactions that may influence the direction and speed of change tremendously. “Organisational change is a process – it takes its time.”
An organisational change process is then not possible to predict in advance. First, an organisation is very complex so we are not able to understand it fully. Even if we had the necessary knowledge to model it completely (and we don’t have that knowledge) we would never have had the time. Second, as mentioned above – the reactions from individuals and formal and informal groups are unique and not possible to really foresee. Hence, an organisational change has to be managed by trying to control a process proceeding partly according to its own will. To manage such a process it is necessary to have a vision of to what to achieve and a strategy for how to achieve it. It is then possible to plan the next step and see what happens in some sort of controlled trial-and-error.

Running a change process is learning new things all the time. “If you want to understand a system, try to change it. “

This creates a major management problem. Do you dare to start such a process which will cost you a lot of money when you don’t know what the outcome will be and when it will be in place? So, you have to try to make some sort of plan and cost estimate in order to dare to start and not be surprised if the trip will be different from the planned route.

There are similarities between managed organisational change and warfare but there is a main difference – management should not treat their employees as enemies but friends with unpredictable reactions. (Competitors reactions will also count, are also more or less unpredictable – they may be looked upon and enemies.)

Chapter 12: Modelling business processes

Core elements

The core elements of a process are the object in/out and the transforming activities in between; see Figure 12.1. Often we have also to consider and model further entities and are getting close to model the task unit framework from a process view.

The core elements are the business object in/out and the symbol for transformation caused by activities. For each execution of the activity set one business object is transformed, one object out is produced. Also other material e.g. products to pick and pack are consumed by the process at the same rate.

<table>
<thead>
<tr>
<th>Basic Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible Task Unit</td>
</tr>
<tr>
<td>Object in</td>
</tr>
<tr>
<td>Material in</td>
</tr>
<tr>
<td>Platform Equip. Data People</td>
</tr>
</tbody>
</table>

*Figure 12.1. The standard process model.*
Then we have the platform, the task resources (the task base). They are necessary for the execution of the process and are used in a number of executions. The three categories are:

- equipment: factories, machines ...
- participants: people/actors including their skill, knowledge and mental models
- data: to be used by the participants when necessary

We have used special symbols for the arrows in the figure to express the different types of synchronisation (arrow for just in time with the process execution, dot = used for multiple executions.)

*Figure 12.1* also shows how lanes or “swimlanes” are used to express who is responsible for the process executions.

**Process relations**

The order fulfilment process (see *Figure 12.2*) is an example of a process that is a part of a more complex process web.

- **Object in** - The order object in contains two data objects – one of what is going to be delivered, where and when – and another of what is going to be paid for it, how and when. The first is triggering the real order fulfilment process. The latter is triggering an invoicing process that is synchronised by the order process. It is symbolised by unbroken lines with arrows to the left side of the processes.

- **Control message** - When a package is ready for delivery a message (dotted line) is sent to the invoice process (on top) to enable invoicing.

- **Material** - Manufacturing processes are building stocks of products. These products are material in to the order process (unbroken line with arrow from below).
Relationships between different processes are of different types and should be denoted in the graphs differently; see Figure 12.2.

- Object out from one process is object to the receiving one for further value adding (consumption) e.g. products from manufacturing to pick & pack. Arrow to the middle of the left side of the receiving process. The relation is synchronised i.e. one object in for each execution of the process.

- Object out from one process is material to be consumed. Arrow to the left side or bottom part of the receiving process.

- Object out from one process is transforming resource for another. Then we have to add a rectangle below the transforming process to denote the process base and the arrow in points to the left side. (There might be an arrow out on the right side if the object is returned to the provider after it is used – a service type situation.)

- Control data emerging in one process is sent to another as control data and is represented by a dotted line to the top of the controlled process. Be very restrictive with this type of arrows because there is usually lot of data flowing between the processes and only those really improving the understanding of the interaction should be used. (If the purpose is to build an IT application for the processes then all links have to be identified and analysed. This is described further under “Modelling IT requirements” below.

The multiple roles of objects

Objects are passed from process to process. The object out from one process is passed to another. However, it is important to understand what role the delivered object is playing for the receiving process.

Physical objects can take one of the following input roles for the next process

- Business object - to be value-added by the receiving task (order converted to 300 pair of clogs)
- Material - to be consumed by the receiving task (wood, leather, paint, ...)
- Resource - for repeated use in the process platform (capital investment e.g. nailing machine)

Data might appear in many different roles for different purposes.

- Main business object - to be transformed in/out (e.g. a film story)
- Directive data – controlling the current execution of the main object (“This clog is to be green”)
- Directive data for all executions of the process.
- General data – in the platform (process model and description)
- Information - in the participants, heads (know-how)

When e.g. analysing the data requirements for a given business processes it is sometimes necessary to consider and express all these aspects.
Business platforms & swimlanes

To describe who is running a process, which task unit is the responsible one, different ways may be used. The simplest is just to write its name under the process.

Another, very expressive, is to have different shelves or swimlanes for different actors/nodes as in the graph below (see Figure 12.3) describing provisioning and order fulfilment for the Clog Factory.

![Business Transaction Process Diagram](image)

*Figure 12.3. Use of swim lanes to point out the responsible task unit.*

Note. The name “swim lanes” emerged out of the fish-like symbol used to model factory type processes.

As shown in a number of examples above, sometimes the content of a platform is changed by another process. Then also the platform may be shown in the graph; see Figure 12.3.

Products and services

A common phrase when a company presents its process map is “here are our processes for delivering goods and services”. Then there is one problem with process modelling in the service business. “What is the business object out from a service process?” In order to identify how value is created
and delivered to the customer we have to find and define the object out and that has proven to be not so easy for service businesses.

Factory type of processes produce goods, data processes data chunks, but what does service processes produce?

If a customer has a transport task to perform there are three ways for a provider to support him.

- **Providing enabling products.** The provider is selling nails to the Clog Factory that uses them as material and they are consumed during clog manufacturing. The product could be a resource i.e. the provider offers cars for sale; the customer identifies the offering as a convenient one, buys a car and uses the car as a transforming resource to perform the transportation task; see Figure 12.4.

  ![Enabling by Product Delivery](image)

  *Figure 12.4. Enabling by Product Delivery and Transfer of Ownership.*

- **Providing enabling services.** The provider offers cars for leasing and the customer rents a car. The customer uses the car and the car is adding value to his task by enabling him to move his goods from A to B. When the task is finished the car is returned to the provider; see Figure 12.5.
- Providing relieving services. Here the customer out-sources or out-tasks the whole (or parts of the) transportation task to the provider. The customer is still responsible to his customer for a punctual delivery but the provider relieves him from performing the task by executing the process; see Figure 12.6.
Of what type is the Rent-A-Video? The shop just provides a transforming resource – the cassette – to be used by the customer when she is running the process herself. The provider delivers an object that enables the customer to run her process, perform her task so we have an enabling service by leasing a transformation resource – the customer is transformed but the video cassette and content is not (only used).

Another case is ATM-services where the bank is providing a complete system (platform) for self-service. The customer the only actor and is able to withdraw money and to execute the transfer of value from his account and convert it into bills in a self-service mode. The customer is responsible for the task of withdrawal but the bank relieves him by providing a system that performs the process.

Modelling a company

Process models are in many cases available company-wise although the scope more and is widened to cover also customer value creation processes as described above. In spite of the selected scope the following levels of models are the usual ones.

On the top level we have the overall map. This map tries to cover and describe the business as a whole. The main processes are classified according to their overall role. Core processes create and deliver objects of value directly to outside customers. Other processes are named development, support and control processes according to their relations to the core processes.

On the next level these main processes are then described in separate graphs and broken down in subprocesses. Sometimes these subprocesses are further broken down in sub-sub-processes. By following the above rules for modelling value creation processes these graphs shows What is done (transformations) and Why (value objects).

The third level (if used) is usually a shift in view from transformation to activities. The activities of each subprocess are then described using work-flow diagrams or simple checklists depending on the needs. By shifting focus from objects to activities the descriptions become much simpler. To understand the “what & why”; people have to turn to the previous level of process models. The activity descriptions may then be used to further specify IT requirements, IT use cases etc.

The shelving technique may be used not only to express who is responsible for running what process but also to express what resources such as databases or IT-systems has to play role. In this way we find the different use cases or interactions with the IT-systems.

Internet and business processes

Internet processes transform and transport data. The scope and flexibility of the Internet network has had and will have substantial impact upon businesses and their constellations and processes. Modelling is a necessary tool to invent, design and implement new ways of doing business. The important processes (value chain, business transaction and order fulfilment) take place between the nodes/task units in the business constellation and will be radically changed as the possibilities to create new constellation networks is provide by the capabilities of Internet.

To understand e.g. the Internet Bookshop and how it was built it is necessary to relate the order fulfilment process to the different actors in the constellation. Internet enables the construction of new business constellations and gives room for new types of businesses and new patterns of processes.
Some Internet organisations are virtual, i.e. to the customer they look like one organisation but behind the scene there is a number of business nodes in a complex process pattern. The processes are on-going operational processes and there are also processes/tasks for the further development of the products/services and processes. The processes in such an Internet business network may be modelled as other processes. The difference is not in the process view but in the opportunities of the underlying constellation network.

**Some conclusions**

To understand more in detail how a business creates value for its customers, business process analysis is a powerful method and an almost unavoidable tool for the development of business in the Internet age. Modelling is used to identify, invent, design and implement the main operational flows, what constitutes customer value and where and how it is created.

These value creating processes and flows have different characteristics that should be distinguished. At least the following have to be taken into account:

- **Process structure:** how pre-defined is the process/sequence of activities and the result/object out?
  - Factory type: a rigid activity structure in order to secure the quality of output, to reduce dependence of individual persons
  - Workshop type: an open structure where process and result are designed and performed/produced concurrently. Craftsmanship and creativity are needed to meet customer needs.

- **Object characteristics**
  - Physical objects: hard to change, arduous to transport, will only be on one place at a time.
  - Digitised data objects: easy to change, easy to transfer electronically, easy to copy = may seem be on multiple places at the same time
  - People: very complex as objects and at the same time being active subjects that may participate in the process (performing activities) or at least have an experience of the process.

- **Degree of direct interaction** between provider and customer during the customer’s value creating process and the rest of the business transaction process.

- **Type of value created** for the customer: economic and experiential (profit and/or pleasure).

- **Type of provider’s support** to customer’s value-creating task: product delivery, enabling services and/or reliving services.

The manufacturing processes i.e. factory processes creating physical objects have been the source of process thinking. From this sound base it has been possible to extend this thinking and modelling to fit also the other types of work situations. But to model non-factory processes for non-physical products the manufacturing way of thinking has to be extended but not abandoned.

**How to start?**

One approach to find out what a business really in doing in terms of value creation, processes and flow is to take the following steps:
• Identify the task unit/node in focus – the “Star” – whose world is going to be understood.

• Identify the most obvious participating business task units/nodes around (suppliers and customers)

• Study the business transaction process between our provider node and its customers and identify the type of provider support that is the dominating one (product delivery, enabling services, relieving services).

• Turn inwards
  o Sales, order flows, production/manufacturing processes, (development processes), management and control of these processes.
  o What are they doing in order to create customer value? What is unique and/or difficult to copy?
  o Where do problems appear in the processes and where in the processes are these problems created?

• Turn outwards
  o Who is the end-customer? What is their value-creating process?
  o What are the nodes between?
  o Do we have any important value chains upstream and downstream?

• Map the Business Landscape including Constellation etc.

• Iterate the work with the processes: Order Fulfilment, Business Transaction and Value Chain.

As data plays an increasingly important role in business today both as value added object in processes as well as control data for processes, IT and Internet has had and will be of major importance. It is used to rationalise and support existing processes but also creates opportunities for new types of processes and new business ideas and strategies.

Internet and its possibilities to easily connect a great number of business actors independent of time and place has already been used to improve existing processes and to develop new ones. Still, one should not forget that all nodes in the new business constellation must be motivated to participate. If one group won’t participate, the business will not get into the air. In many cases the presumed customers have not lived up to expectations. For a business constellation to work all nodes must participate.

For a company – to model and understand its Business Landscape and the different processes crossing it, is getting more and more necessary as new technologies cause radical changes of both constellations in the landscape and of the value-creating processes.
**Literature**


