

# Business Process Management -Introduction

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## Outline

- ▶ Introduction to BPM
- ▶ Motivation & Definitions
- ▶ Business Process Lifecycle
- ▶ Classification of Business Processes
- ▶ Goals, Structure, and Organization

## Introduction

- ▶ Business process management has received considerable attention recently by
  - ▶ Business administration
  - ▶ Computer science communities
- ▶ Business administration are interested in
  - ▶ Improving companies operations
  - ▶ Increasing customer satisfaction
  - ▶ Reducing cost of doing business
  - ▶ Establishing new products
  - ▶ Services at low cost

## Introduction

- ▶ Two communities in computer science are interested in business process

### Researchers

- A background in formal methods investigate structural properties.

### Software community

- Interested in providing robust and scalable software systems , and integration of existing information systems.

## Motivation & Definitions

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- ▶ BPM is based on the observation that each product that a company provides to the market is the outcome of a number activities performed.
- ▶ Information technology deserve an important role in BPM , because more and more activities are supported by information systems.
- ▶ Business process activities can be enacted automatically by information systems , without effective collaboration.

## Motivation & Definitions

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- ▶ In many companies there is a gap between:
  - ▶ Organizational business aspects
  - ▶ Information technology
- ▶ Competitive advantages of successful companies:
  - ▶ Internet-based communication facilities spread news
  - ▶ Create new product and bring to market rapidly and at low cost
- ▶ Realizes by information systems

## Motivation & Definitions

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- ▶ The definition of business process by Hammer and Champy :
  - ▶ A business process as a collection of activities that take one or more kinds of input and create an output that is of value to the customer.
- ▶ The definition puts emphasis on the input/output behavior of a business process.

## Motivation & Definitions

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- ▶ The definition of business process by Davenport:
  - ▶ A set of logically related tasks performed to achieve a defined business outcome for a particular customer or market.

## Motivation & Definitions

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### ► Definition 1.1

- A business process consists of a set activities that are performed in coordination in an organizational and technical environment.
- Each business process is enacted by a single organization , but it may interact with business process performed by other organizations.

## Motivation & Definitions

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### ► Definition 1.2

- Business process management includes:
  - Concepts
  - Methods
  - techniques
- To support the
  - Design
  - Administration
  - Configuration
  - Enactment
  - Analysis of business process

## Motivation & Definitions

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- The basis of business process management
  - The explicit representation of business process with activities and the execution constraints between them.
- Enterprises can achieve additional benefits
  - If they use software systems for coordinating the activities involved in business process.
  - These software systems are called “business process management systems”.

## Motivation & Definitions

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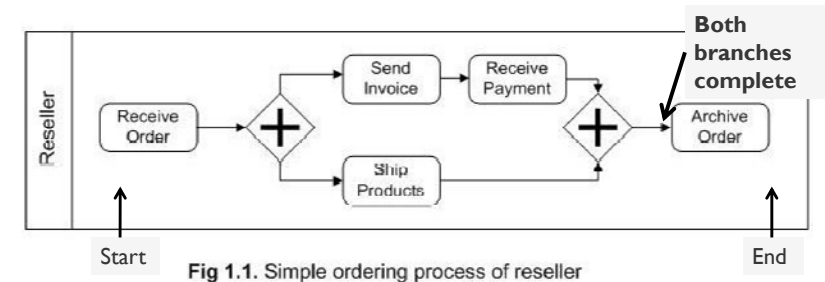
### ► Definition 1.3

- A business process management system is a generic software system that is driven by explicit process representations to coordinate the enactment of business process.

## Motivation & Definitions

- ▶ A business process sample
  - ▶ An ordering process
    - ▶ An order is received
    - ▶ An invoice is sent
    - ▶ Payment is received
    - ▶ The order products are shipped
- ▶ Graphical notations are well suited to expressing orderings between activities of a business process.

## Motivation & Definitions



## Motivation & Definitions

- ▶ The ordering process can be used as a blueprint that allows the reseller company to organize its work.
- ▶ Important concepts in business process management:
  - ▶ Business process models
  - ▶ Business process instances

## Motivation & Definitions

- ▶ Business process models
  - ▶ The blueprint is shown in figure 1.1
- ▶ Business process instances
  - ▶ Each order that is processed according to this model
- ▶ There is one a one-to-many relationship between business process models and instances.

## Motivation & Definitions

- ▶ Definition 1.4
  - ▶ A business process model consists of a set of activity models and execution constraints between them.
  - ▶ A business process instance represents a concrete case in the operational business of a company, consisting of activity instances.

## Motivation & Definitions

- ▶ Business process models are the main artifacts for implementing business process.
- ▶ This implementing can be done by
  - ▶ Organizational rules
  - ▶ Organizational policies
  - ▶ Software system

## Motivation & Definitions

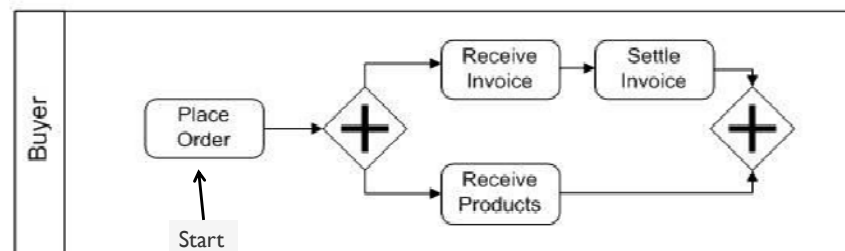


Fig 1.2. Ordering process of a buyer

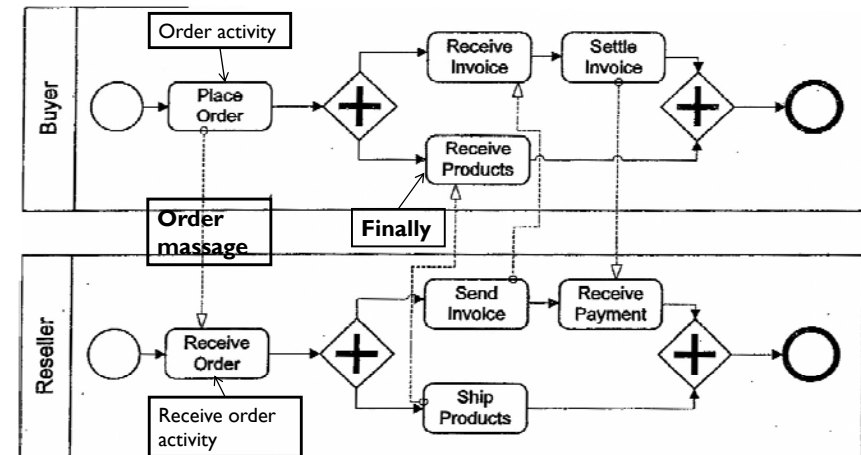
## Motivation & Definitions

- ▶ Definition 1.1 indicates that each business process is enacted by one organization, and that business process can interact with each other.
- ▶ Buyer and reseller interact with each other in the following way
  - ▶ Buyer sends an order message to the reseller.
  - ▶ Reseller accepts the order message in the Receive Order activity.
  - ▶ Reseller sends an invoice (send invoice) and ships the ordered products (ship products).

## Motivation & Definitions

- ▶ Buyer receives the invoice in the Receive Invoice activity .
- ▶ Buyer sends the payment in the Settle Invoice activity
- ▶ Finally , the buyer receives the ordered products in the Receive Products activity.

## Motivation & Definitions



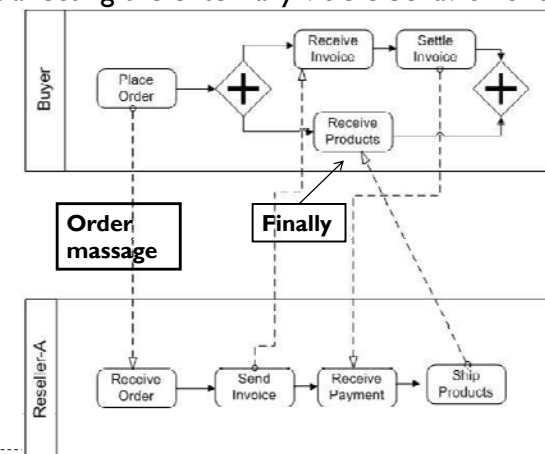
**Fig. 1.3.** Interacting business processes form process choreography

## Motivation & Definitions

- ▶ Large parts of the interacting business process shown in figure 1.3 can also be implemented by software systems.
- ▶ Internet-based
  - ▶ Searching online catalogue
  - ▶ Providing address
  - ▶ Billing information
  - ▶ Pressing the submit button ( it realizes the message flow from the buyer to the reseller)

## Motivation & Definitions

- ▶ The realization of business process by participants can change without affecting the externally visible behavior of the process.



**Fig 1.4.** Variant of reseller process with interacting business process

## Motivation & Definitions

- ▶ Reseller-A realizes the following business rule : a product is sent only after the payment has been received.
- ▶ The examples discussed so far have shown
  - ▶ How to represent individual business process that realize process orchestrations.

## Motivation & Definitions

- ▶ The examples focus on the
  - ▶ Activities of business process
  - ▶ Their relationships
  - ▶ The business partners involved

## Business Process Lifecycle

- ▶ The phases are organized in cyclical structure, showing their logical dependencies. Many design and development activities are conducted during each of these phases, and incremental and evolutionary approaches involving concurrent activities in multiple phases are not uncommon.

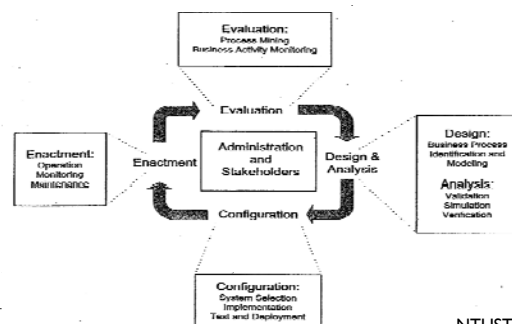


Fig. 1.5. Business process lifecycle

## Design and Analysis

- ▶ The business process lifecycle is entered in the Design and Analysis phases.
- ▶ Explicit business process models expressed in a graphical notation facilitate communication about these processes, so that different stakeholders can communicate efficiently, and refine and improve them.
- ▶ Business process modelling techniques as well as validation, simulation, and verification techniques are used during these phases. Business process modelling is the core technical subphase during process design.

## Design and Analysis

- ▶ An initial design of a business process is developed, its needs to be validated. A useful instrument to validate a business processes a workshop, during which the persons involved discuss the process.
- ▶ Simulation techniques can be used to support validation, because certain undesired execution sequences might be simulated that show deficits in the process model.
- ▶ Business process modelling has an evolutionary character in the sense that the process model is analyzed and improved so that it actually represents the desired business process and that it does not contain any undesired properties.

## Configuration

- ▶ Once the business process model is designed and verified, the business process needs to be implemented. It can be implemented by a set of policies and procedures that the employee of the enterprise need to be comply with.
- ▶ In case a dedicated software system is used to realize the business process, an implementation platform is chosen during the configuration phase.
- ▶ The system needs to be configured according to the organization environment of the enterprise and the business process whose enactment it should be control. This configuration includes the interaction of the employees with the system as well as the integration of the existing software systems with the business process management system.

## Configuration

- ▶ The configuration of business process management system might also involve transactional aspects.
- ▶ Once the system is configured, the implementation of the business needs to be tested. Traditional testing techniques from the software engineering area used at the level of process activities to check, for instance, whether a software system exposes the expected behavior.
- ▶ At the process level, integration and performance tests are important for detecting potential run time problem during the configuration phases. Once the test subphases is complete, the system is deployed in its target environment.

## Enactment

- ▶ A monitoring component of a business process management system visualizes the status of business process instances. Process monitoring is an important mechanism for providing accurate information on the status of business process instances.
- ▶ Visualization techniques can be based on colours, so that, for instances, an enabled activity is shown in green, a running instance is marked in blue, and a completed process instance is represented in grey. Most business process management systems provide monitoring information that is based on states of active business processes.
- ▶ During business process enactment, valuable execution data is gathered typically in some form of the log file. These log file consist of ordered sets of log entries, indicating events that have occurred during business process.



## Evaluation

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- ▶ The evaluation phases uses information available to evaluate and improve business process models and their implementations. Execution logs are evaluated using business activity monitoring and process mining techniques. These techniques aim at identifying the quality of business process models and the adequacy of the execution environment.

## Administration and stakeholders

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- ▶ The business process domain is characterized by several types of stakeholders with different knowledge, expertise, and experience; these are classified into the following roles:
  - ▶ Chief Process Officer: The chief process officer is responsible for standardizing and harmonizing business processes in the enterprise.
  - ▶ Business Engineer: Business engineers are business domain experts responsible for defining strategic goals of the company and organizational business processes.

## Administration and stakeholders

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- ▶ Process Designer: Process designers are responsible for modeling business processes by communicating with business domain experts and other stakeholders.
- ▶ Process Participant: Process participant conduct the actual operational work during the enactment of business process instances.
- ▶ Knowledge Worker: Knowledge workers are process participants who use software systems to perform activities in a business process.
- ▶ Process Responsible: Each business process model is assigned an individual who is responsible for the correct and efficient execution of all business processes using this model.

## Administration and stakeholders

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- ▶ System Architect: System architects are responsible for developing and configuring business process management systems so that the configured business process management system enacts the business processes in the context of the information systems infrastructure at hand.
- ▶ Developers: Developers are information technology professionals who create software artefacts required to implement business process.
- ▶ These different types of stakeholders need to cooperate closely in designing business process and in developing adequate solutions for enacting them.

## Classification of Business Processes

- ▶ Organizational versus Operational
- ▶ Intraorganizational Process versus Process Choreographies
- ▶ Degree of Automation
- ▶ Degree of Repetition
- ▶ Degree of Structuring

## Organization versus Operational

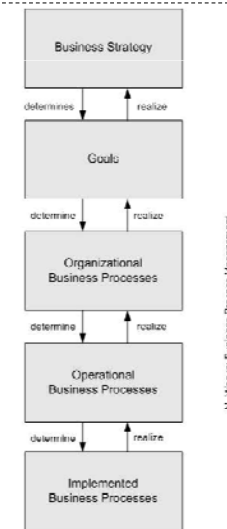


Fig 1.6. Levels of business processes: from business strategy to implemented business processes

- At the highest level, the strategy of the company is specified, which describes its long-term concepts to develop a sustainable competitive advantage in the market.
- At the second level, the business strategy is broken down to operational goals. These goals can be organized, so that each goal can be divided into a set of subgoals.
- At the third level, organizational business processes can be found. Organizational business processes are high-level processes that are typically specified in textual form by their inputs, their outputs, their expected results, and their dependencies on other organizational business processes. These business processes act as supplier or consumer processes.

## Organization versus Operational

- ▶ In operational business processes, the activities and their relationships are specified, but implementation aspects of the business process are disregarded. Operational business processes are specified by business process models.
- ▶ Operational business processes are the basis for developing implemented business processes. Implemented business processes contain information on the execution of the process activities and the technical and organizational environment in which they will be executed.

## Intraorganizational Processes versus Process Choreographies

- ▶ As defined above, each business process is performed by a single organization. If there is no interaction with business processes performed by other parties, then the business process is called Intraorganizational
- ▶ The primary focus of intraorganization business processes is the streamlining of the internal processes by eliminating activities that do not provide value.

## Degree of Automation

- ▶ Business process can diverge in the level of automation. There are business processes that are fully automated, meaning that no human is involved in the enactment of such a business process. An example is ordering an airline ticket using Web interfaces.
- ▶ Enterprise application integration is another area where automated business processes can be found. The goal is to integrate the functionality provided by a heterogeneous software landscape.
- ▶ Many business processes require manual activities; but they also include automated activities. Processing an insurance claim is an example of such a process. Manual activities enter the customer data and determine the settlement of the damage, while automated activities are used to store data on the damage in the software systems of the company.

## Degree of Repetition

- ▶ Business processes can be classified according to their degree of repetition. Examples of highly repetitive business processes include business processes without human involvement, such as online airline ticketing. However, business processes in which humans are involved can occur frequently, for example, insurance claim processing.
- ▶ If the degree of repetition is high, then investments in modelling and supporting the automatic enactment of these processes pay off, because many process instances can benefit from these investments.
- ▶ Business processes with a low degree of repetition are often not fully automated and have a collaborative character, so that the effort in providing automated solutions is not required, which lowers the cost.

## Degree of structuring

- ▶ If the business process model prescribes the activities and their execution constraints in a complete fashion, then the process is structured. (ex: credit card)
- ▶ Leymann and Roller have organized business processes according to dimensions structure and repetition. They coined the term production workflow. Production workflows are well structured and highly repetitive. Traditional workflow management system functionality is well suited to supporting production workflows.

## Degree of structuring

- ▶ If process participants who have the experience and competence to decide on their working procedures perform business process activities, structured processes are more of an obstacle than an asset.
- ▶ Skipping certain process activities the knowledge worker does not is not possible in structured business processes.
- ▶ To better support knowledge workers, business process models can define processes in a less rigid manner, so that activities can be executed in any order or even multiple times until the knowledge worker decides that the goals of these activities have been reached. So called ad hoc activities are an important concept for supporting unstructured parts of processes.

## Goals, Structure, and Organization

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- ▶ The most important goal of business process management is a better understanding of the operations a company performs and their relationships.
- ▶ The explicit representation of the business processes is the core concept to achieving this better understanding.
- ▶ Flexibility-the ability to change-is the key operational goal of business process management. Business process management not only supports changing the organizational environment of the business process, but also facilitates changes in the software layer without changing the overall business process.