



Introduction

Enterprise and Business Process Modelling

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Outline

- Motivations and Definition
- Business Process Life-Cycle
- Classification of Business Process

Motivations

- Business Process Management (BPM) is the art and science of overseeing **how work is performed in an organization** to ensure consistent **outcomes** and to take advantage of **improvement opportunities**
- The term “improvement” may take different meanings depending on the objectives of the organization.
 - Typical examples of improvement objectives include:
 - reducing costs
 - reducing execution times
 - reducing error rates
- BPM is not about improving the way individual activities are performed; it is about **managing entire chains of events, activities and decisions that ultimately add value to the organization** and its customers in order to provide **products** or **service**
- These “chains of events, activities and decisions” are called **processes**

Process Everywhere: Examples

- Order-to-Cash
- Procure-to-Pay
- Application-to-Approval
- Claim-to-Settlement
- Fault-to-Resolution (Issue-to-Resolution)
- ...

Exercise

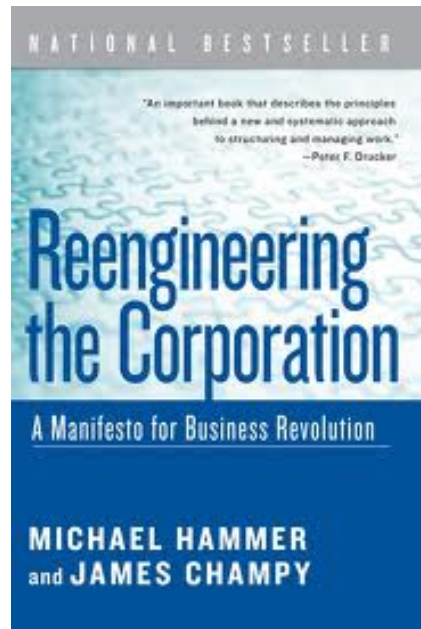
With respect to the above process, consider the following questions:

- Who are the actors in this process?
- Which actors can be considered to be the customer (or customers) in this process?
- What value does the process deliver to its customer(s)?
- What are the possible outcomes of this process?

Process orientation roots (1990's)

- A **business process** is a **collection of activities** that take one or more kinds of **input** and create an **output** that is of value to the customer

Hammer & Champy (1993)



Seminal book advocating the radical redesign of the business process of a company as opposed to evolutionary improvements

How vs What

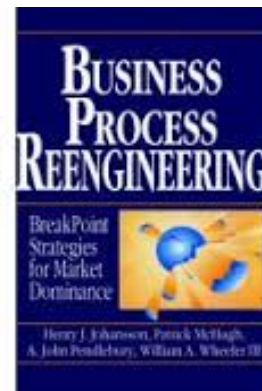
- The main innovation is the shift of focus on the business logic of the process (**how work is done**), instead of the product perspective (**what is done**)



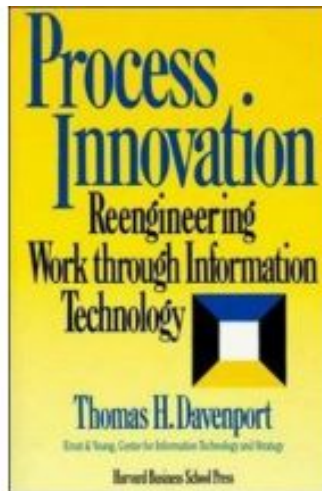
Process orientation roots (1990's)

- The transformation that occurs in the process should add value to the input and create an output that is more useful and effective to the recipient either **upstream** or **downstream**
- A process is a set of **linked** activities that take an input and transform it to create an output

- Johansson et al. (1993)



Process orientation roots (1990's)

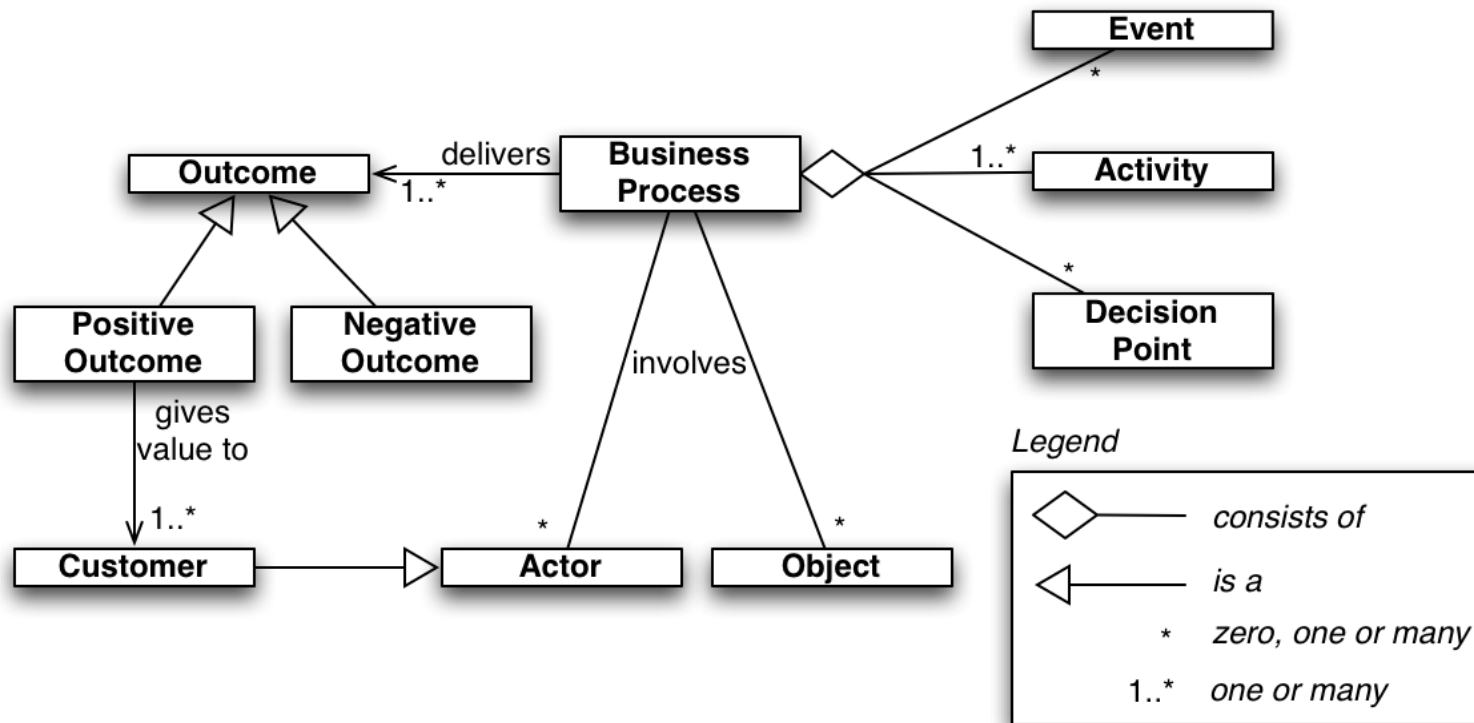


- Processes as structured, measured sets of activities designed to produce a specific output for a particular market
- A **process** is a specific **ordering** of work activities across **time** and **space**, with a **beginning** and an **end**, and clearly defined **inputs** and **outputs**: a structure for action

Keywords

- *Hammer & Champy*: **collection, input, output**
- *Johansson et al.*: **upstream, downstream, linked**
- *Davenport*: **structure, ordering, time, space, begin, end**

Business Process Ingredients



Business Process

- A **Business Process** consists of a set of **activities** that takes one or more kinds of **inputs** and creates an **output** and that are performed in coordination in an **organizational** and **technical environment**. These activities jointly realize a business goal. Each business process is enacted by a **single organization**, but it may interact with business processes performed by together organizations.
[BPMBook:2007] Mathias Weske. Business process management : concepts, methods, technology. Springer, 2007.
- A compilation of the various business process definitions can be find in
[LDL:2003] A. Lindsay, D. Downs, and K. Lunn. Business process - attempts to find a definition. Information and Software Technology, 45:1015–1019, 2003.

Business Process Management

- **Business Process Management** can be defined as the set of all management activities related to **Business Process** with a focus on concepts, methods and activities to support its life-cycle

Mathias Weske. Business process management : concepts, methods, technology. Springer, 2007.

- A **Business Process Management System** is a generic software system that is driven by explicit process representation to coordinate the enactment of a business process

Mathias Weske. Business process management : concepts, methods, technology. Springer, 2007.

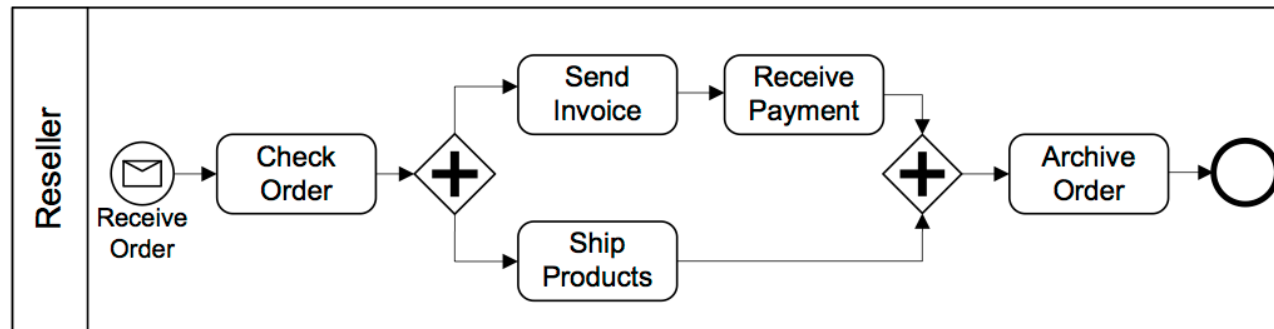
Business Process Model and Instance

- A **business process model** consists of a set of activity models and execution constraints between them
[BPMBook:2007] Mathias Weske. Business process management: concepts, methods, technology. Springer, 2007.
- A **business process instance** represents a concrete case in the operation business of a company/public administration, consisting of activity instance
[BPMBook:2007] Mathias Weske. Business process management: concepts, methods, technology. Springer, 2007.



ONE to MANY Relation

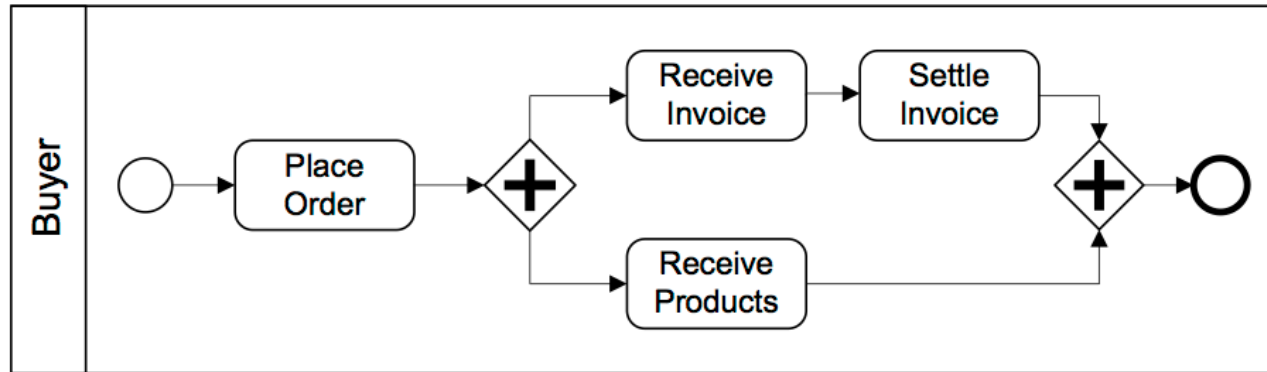
From textual to graphical notation: Reseller



M. Weske: Business Process Management,
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Simplified BPMN notation of a simple ordering process

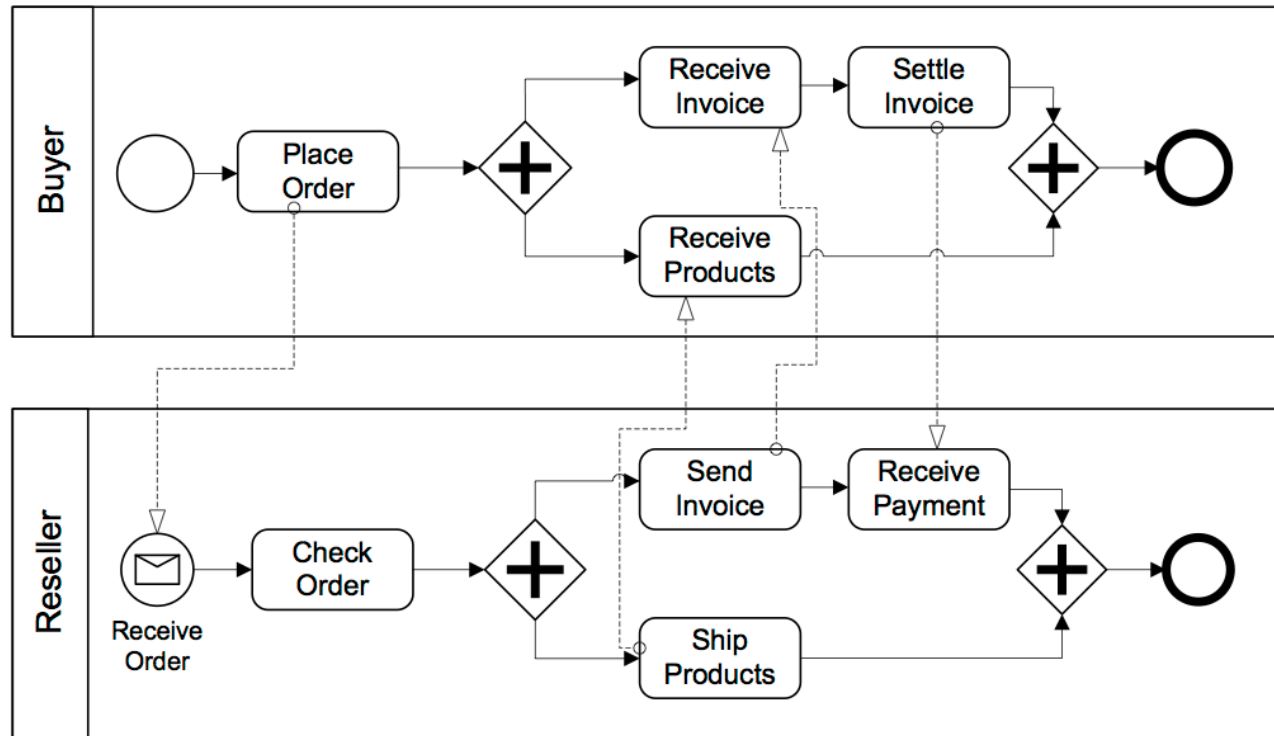
From textual to graphical notation: Buyer



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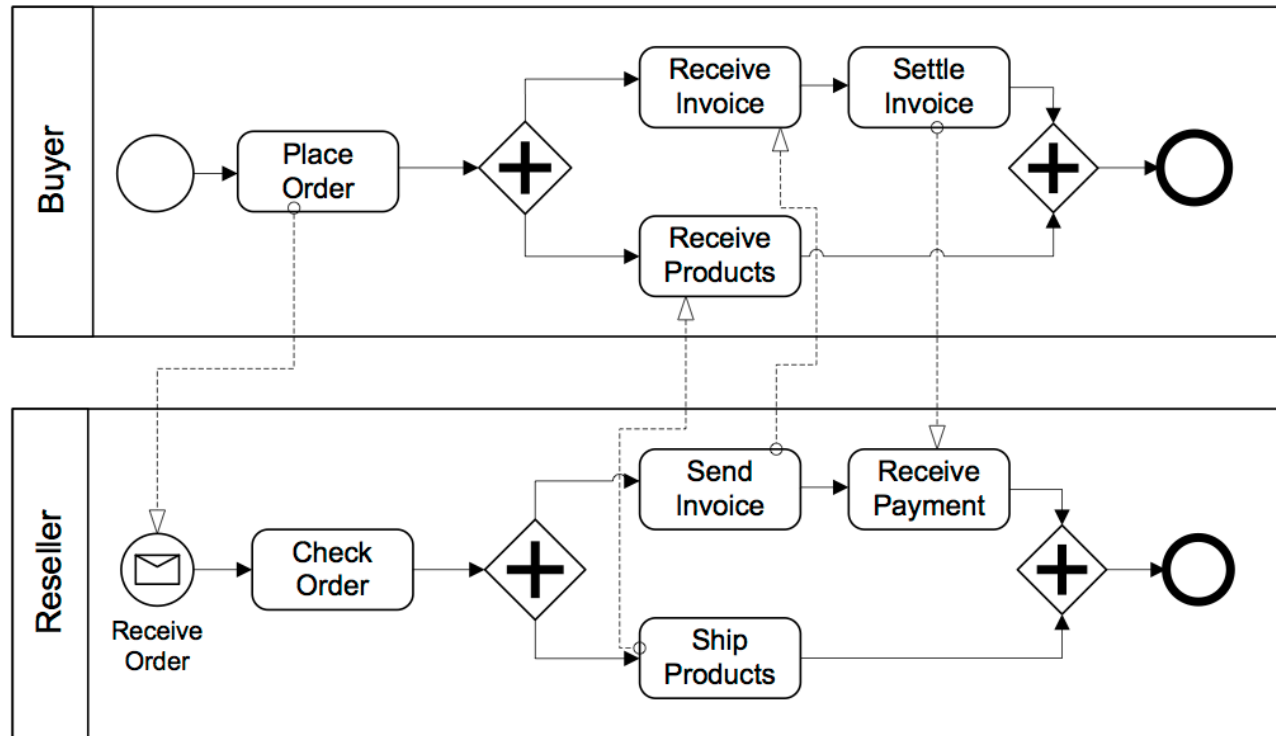
Simplified BPMN notation of a simple ordering process

Buyer – Re-seller: Collaboration



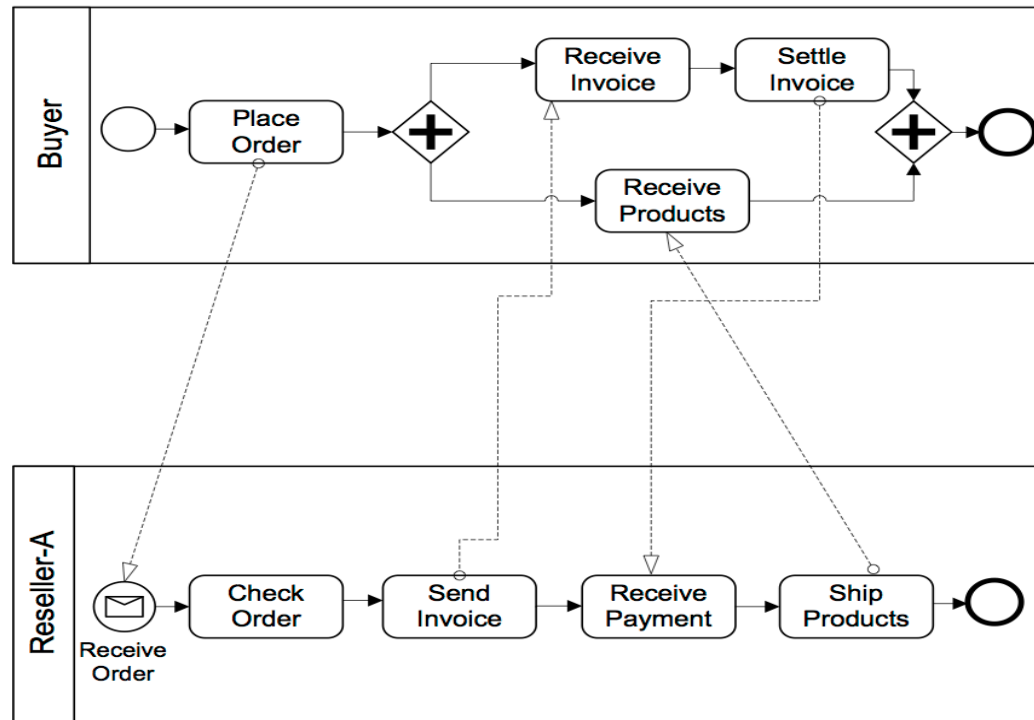
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Process Choreography



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Protecting Reseller from Fraudulent Buyers

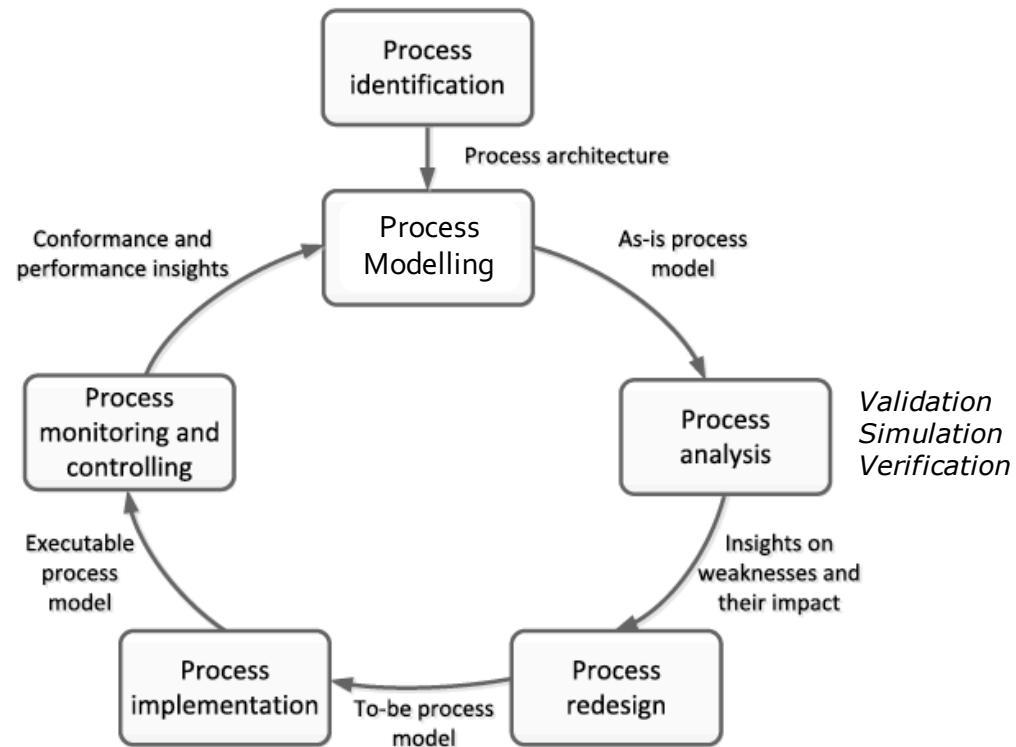


M. Weske: Business Process Management,
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Business Process Life-Cycle

BP Life Cycle



Business Process Modelling

- ▶ Require **surveys** on the business processes their organizational environment their technical environment

- ▶ Based on these surveys, business processes are:
 - ▶ Identified
 - ▶ Reviewed
 - ▶ Validated
 - ▶ **Represented** (by business process models)

- ▶ **Phase OUTPUT - Set of processes**

Focus Group Methodology

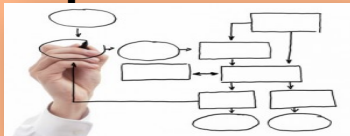
Tell your story



Discuss facts and create abstractions



Build formal representation



- **Tellers** tell stories since they are the main perform the work, they have domain knowledge about functional and behavioral aspects of the process
- **Facilitators** mediate the practice of telling stories, they have professional experiences in the application domain and they are able to abstract stories reported by Tellers having a more general view on the topic
- **Modelers** take part of the meeting and considering the abstraction supported by the Facilitators they are able to graphically model BPs and other models using specific modeling languages

Santoro, Flavia Maria, Marcos RS Borges, and José A. Pino. "Acquiring knowledge on business processes from stakeholders' stories." *Advanced Engineering Informatics* 24.2 (2010): 138-148

Modelling

- ▶ Explicit business process models expressed in a graphical notation facilitate communication about these processes so that different stakeholders can: **communicate** efficiently **refine** them **improve** them
- ▶ **The objective of a business process description is to provide a basis for communication for various purposes**
 - ▶ In the everyday life of a company they serve as manuals for process participants or as learning material for newcomers
 - ▶ In business process re-engineering projects they provide a basis for discussion in order to detect optimization potential
 - ▶ In preparation for the use of a WFMS, they provide a basis for agreeing on the processes to be supported.
- ▶ From informal descriptions to a particular business process modeling notation
- ▶ **OUTPUT - Set of process models**

Validation

- The initial design must be validated by checking that **all valid process instances are reflected** by the business process model
- Useful instrument: a **workshop** where the persons involved can discuss the business process model

Simulation

- Simulation techniques can support validation
- Simulate undesired execution sequences to show deficits in the process model
- Via Simulation stakeholders can walk through the process in a step-by-step manner and to check whether the process actually exposes the desired behaviour

Verification

- The business process model must be analyzed and improved to make sure
 - It actually includes all desired instances
 - It does not contain any undesired properties
- Error-prone activities, to be repeated several times, for which automatic tools are necessary
- During verification we can looking for deadlock, it means that all activities in a business process come to a halt

Re-design

- Process redesign (also called process improvement). The goal of this phase is to identify changes to the process that would help to address the issues identified in the previous phase and allow the organization to meet its performance objectives
 - To this end, multiple change options are analyzed and compared in terms of the chosen performance measures. This entails that process redesign and process analysis go hand-in-hand:
- Eventually, the most promising change options are combined, leading to a redesigned process.
- The output of this phase is typically a to-be process model, which serves as a basis for the next phase

Implementation Phase

- From (designed and verified) business process models to implementation as
 - A set of policies, guidelines and procedures (to be followed by employees)
 - A dedicated **software system** (over a chosen implementation platform)
- **Software systems** usually require additional technical information
 - The model must be decorated with such data, to be exploited for configuring the system
 - Examples: interactions of the employees with the system, integration of existing systems, wrapping of legacy software

Testing

- When the system is configured, it must be tested before deployment
- Usual testing techniques from software engineering: Integration tests and Performance tests
- Other possible activities: training of personnel, migration of application data

Enactment Phase

- When the system is deployed, business process instances can be **enacted**
- Typically, each process instance is initiated after an **event** occurs (i.e. the receipt of an order)
- The system must control and monitor the execution of all instances according to the model to guarantee a correct process **orchestration**

Monitoring

- At each moment in time, the current **status** of any instance must be **known** (and **logged**) by the system as accurately as possible
 - Both for process instances and activity instances
 - Such information is highly valuable for customers (tracking of orders)

- ▶ The information collected during instances enactment can be used to evaluate and improve business process models

- ▶ Activity business activity **monitoring** and **process mining** techniques aim at identifying the quality of the model and the adequacy of the environment

Business Activity Monitoring

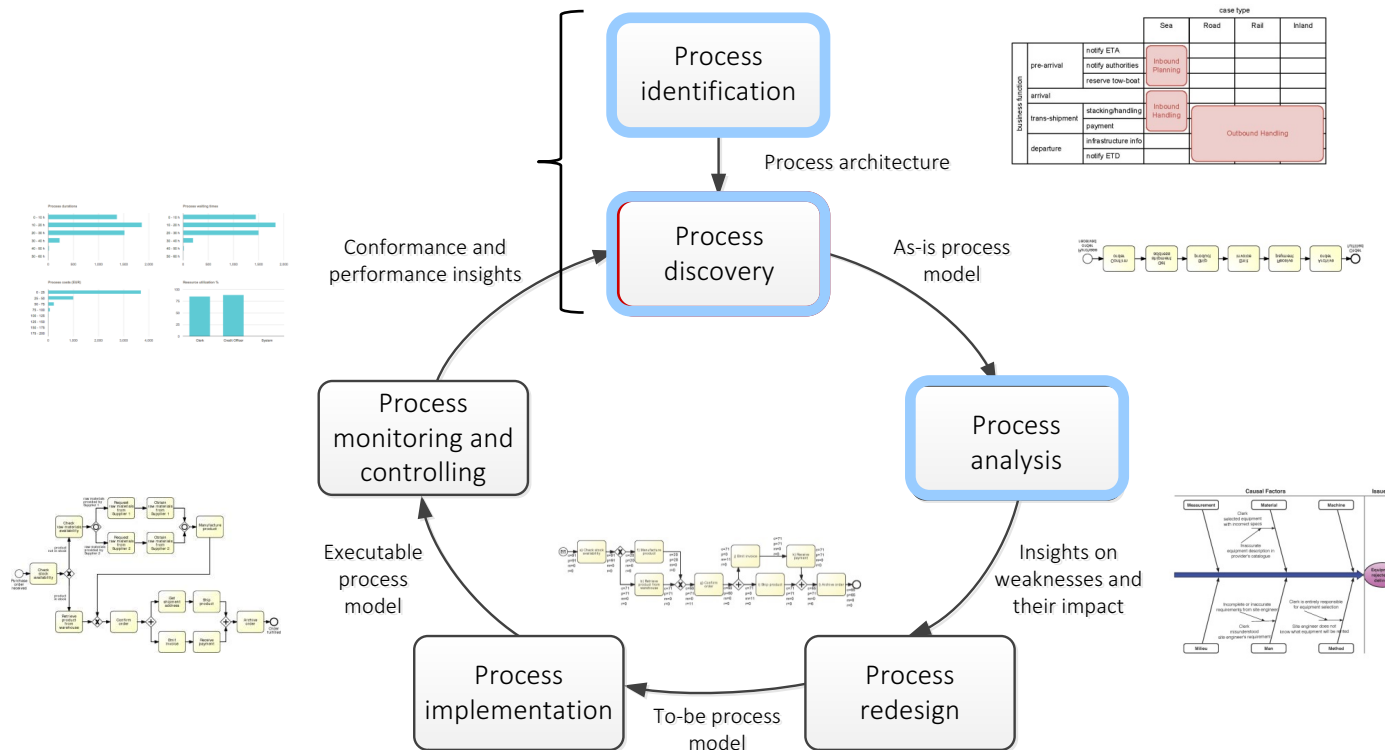
- Log files typically include information such as the start / end timestamps of activity instances
- Activity monitoring serve to identify that certain activities take too long or need more resources
- The same information can be also exploited in the simulation sub-phase of the design and analysis phase

Process mining

- Process mining has recently turned into an active field of research
- Thanks to mining techniques, execution logs can be used for the automatic generation of business process models in the design and analysis phase
- They can also be used to assess and compare different models to see which fits best the enacted instances

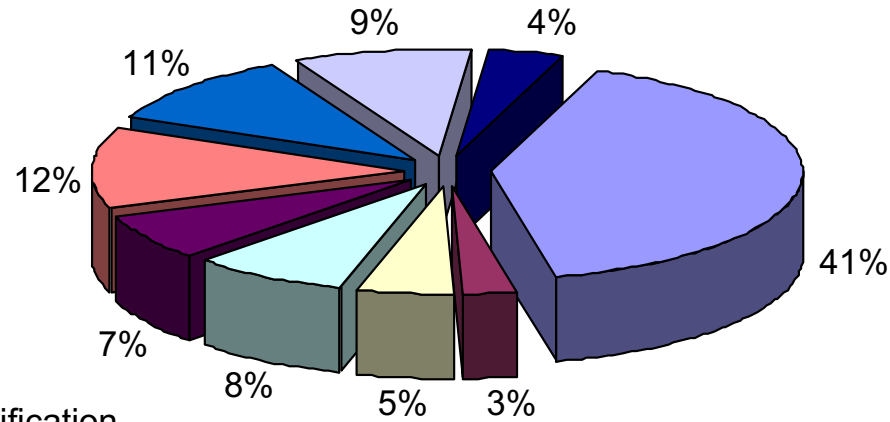
Our Focus

...design, and analyze business processes...

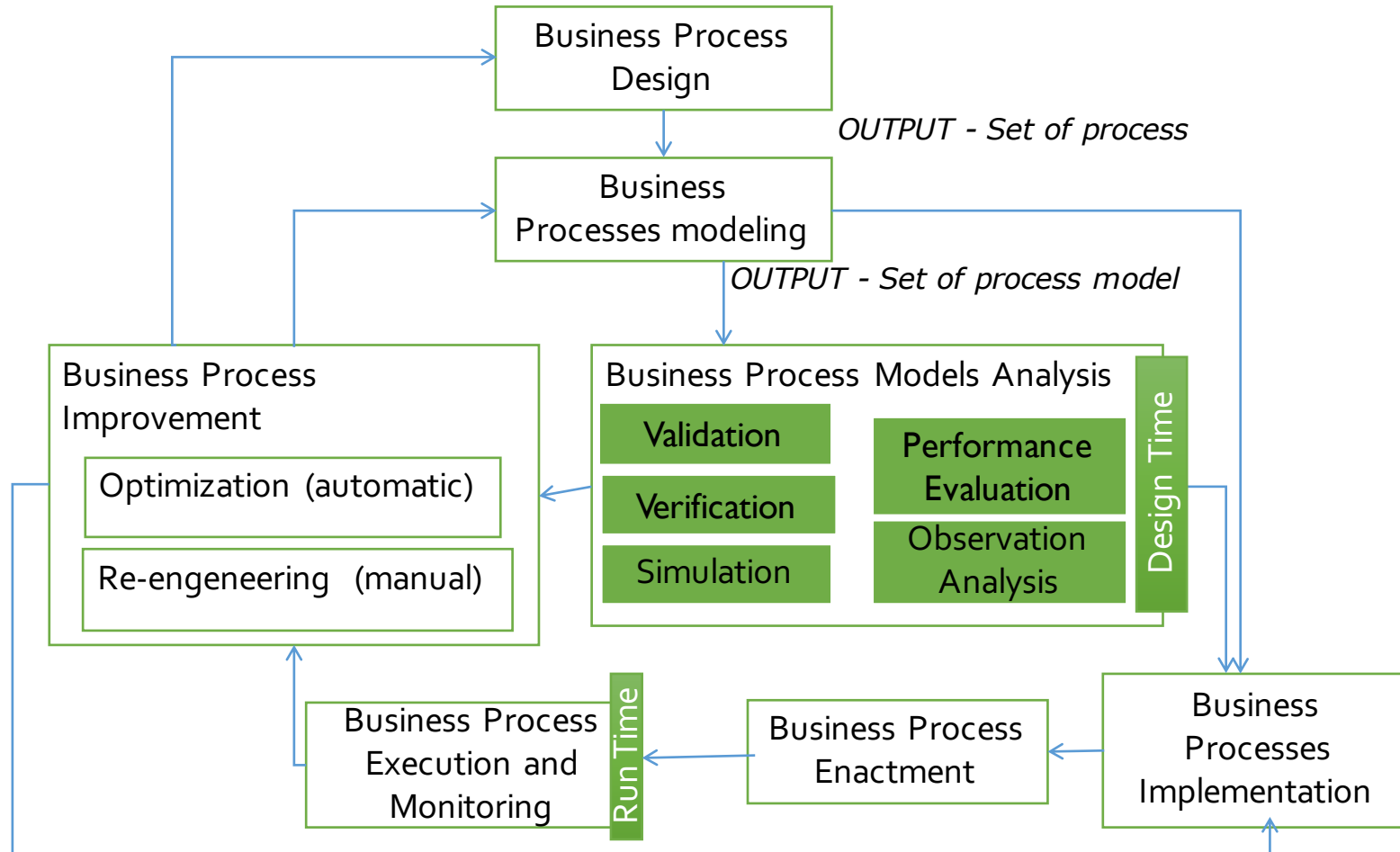


Time Investment in BPM Projects

- Process Discovery
- Project Team Selection
- Business Case
- Deployment and Training
- Testing and Debugging
- Implementation
- Tool Evaluation and Selection
- Functional and Technical Specification
- Project Documentation



Business Process Management Life Cycle

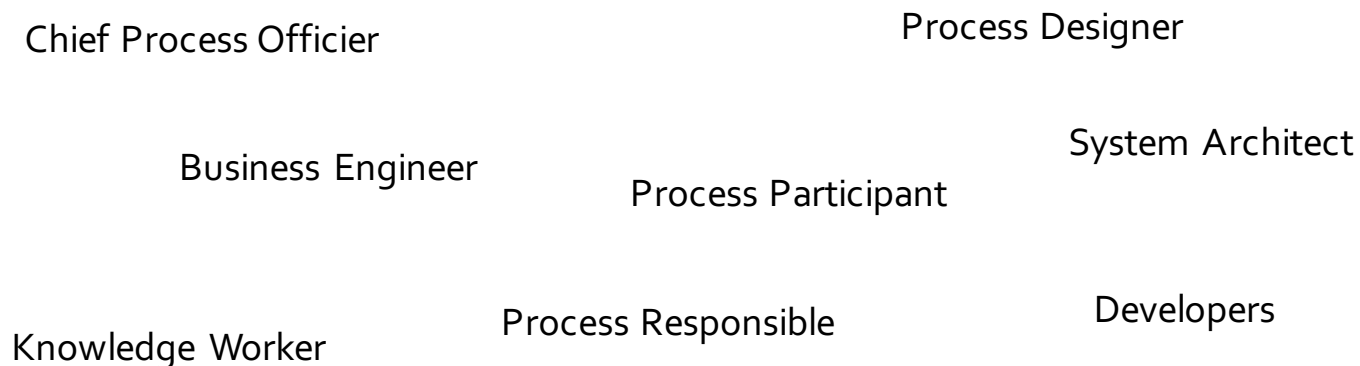




Business Process Stakeholders

Relevant Stakeholders

- Several types of stakeholders co-exist in the process domain
- They have different kind of educational background, knowledge, expertise, experience
- Roughly, they can be classified into a few roles



Chief process officer, Business engineer

- Chief process officer
 - Top level management
 - Responsible for standardizing and harmonizing business processes in the enterprise
 - Responsible of business process evolution in the presence of changing market requirements
- Business engineer - Business domain expert
 - Responsible for defining strategic goals of the company and organizational business processes
 - Often equipped with non-technical educational background
 - It is preferred to communicate with these stakeholders by means of simple-to-use process modeling notation

Designer, Participant, Knowledge Worker

- Process Designer
 - Responsible for modeling business processes by communicating with business domain experts and other stakeholders
 - Must be equipped with good analytical capabilities and excellent communication skills
- Process Participant
 - Conduct the actual operational work during the enactment of business process instances
 - They are knowledgeable about the activities conducted and thus play a fundamental role for the modeling phase
 - Their information must be assembled by the process designer to compose an overall picture and put it in the process model
- Knowledge Worker
 - Process participants who use software systems to perform activities in a business process, often autonomously

Responsible, System Architect, Developer

- Process Responsible
 - Each business process model is assigned an individual who is held responsible for the correct and efficient execution of all business process instances of this model
 - Responsible for detecting inefficiencies and improving the process model
 - Close collaboration with process participants and the process designer is needed
- System Architect
 - Responsible for developing and configuring business process management systems on the information system infrastructure at hand
- Developer
 - Information technology professionals
 - Responsible for creating the software artefacts required to implement business processes
 - Implementation of interfaces is a relevant part of the work done by developers



Classification of Business Process

Different Classifications

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

Organizational versus Operational



Intra-organizational Process versus Process Choreographies

- Each business process is performed by single organization
 - --> INTRA-ORGANIZATIONAL

- Most business process interact with business process in other organizations forming process choreographies
 - --> INTER-ORAGANIZATIONAL
 - Communication aspects
 - Legal matters
 - Heterogeneous software infrastructure

Degree of Automation

Fully Automated

- No human is involved in the enactment of such business process
- i.e. ordering an airline ticket (Airline)

Manual

- The process require some manual activities
- i.e. insurance claim

Degree of Repetition

Highly Ripetitive

- It refers to high repetitive business process
- Investment in modelling and supporting the automatic enactment of these processes pay off, because many process instances can benefit from the investment

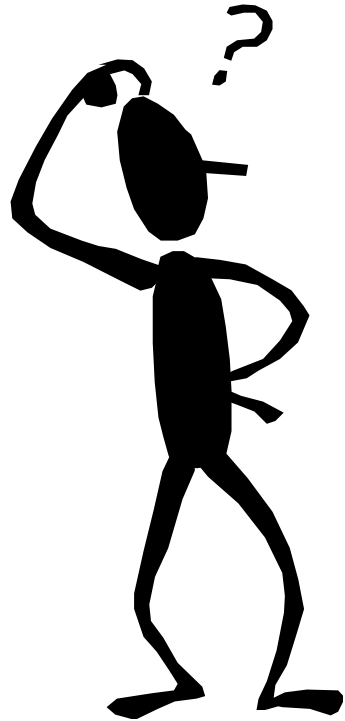
Low Ripetitive

- Business Processes are not fully automated and have a collaborative character, so that the effort in providing automated solutions is not required, which lowers the cost
- Collaboration between the person involved in modelling and enactment is not only efficiency

Degree of Structuring

- **High level of structuring**
 - Process model prescribes the activities and their execution constraints in a complete fashion
 - PRODUCTION WORKFLOW – are well structure and highly repetitive
- **Low level of structuring**
 - Case handling is an approach that supports knowledge workers performing business process with a low level of structuring and, consequently, a high level of flexibility

Structured Process	Case	Ad hoc process
Structured process flow	Process flow can partly be structured	Process flow cannot be structured
Activities can be defined in advance	Activities can partly be defined in advance	Activities can partly be defined in advance
Many repetitive elements	Some repetitive elements	Marginal portion of repetitive elements
No degrees of freedom for people with respect to process flow	Degrees of freedom for people with respect to process flow	Very high degrees of freedom for people with respect to process flow



Questions?