BPM
Business Process Management

Background

- Organizations execute ***activities*** to provide ***products and services*** to their clients

- Each product or service is the ***outcome of several activities*** that can be performed
  - by employees manually
  - by employees with the help of information systems
  - by information systems automatically

Background

- Products and services are provided according to ***business goals***, such as
  - Increase customer satisfaction
  - Reduce costs
  - Improve efficiency
  - Reduce execution time
  - Reduce error rates

- To reach business goals, enterprise's resources (employees, information systems) are expected to ***work together***

What we need

- To reach business goals we have to
  - Organize the enterprise's activities
  - Understand how the activities interact with each other
- The solution stands in defining, analyzing, enacting and monitoring so called ***business processes***
- Business processes ***facilitate the collaboration*** among enterprise's resources in efficient and effective manner
  - Business processes can be effectively managed if they are described and documented by ***process models***

Business Process

- ***Business Process (BP)***
  - A BP is a set of ***logically related activities*** that are executed in ***coordinate way***
  - These activities jointly perform a ***business goal***
  - A BP consists of events, activities and decision points
  - The ***outcome has value*** for at least one BP's customer

- ***Workflow or automated business process***
  - A process that is automated in whole or in part by a software system
  - The software system transfers information from one participant to another according to the temporal and logical dependencies in the process model

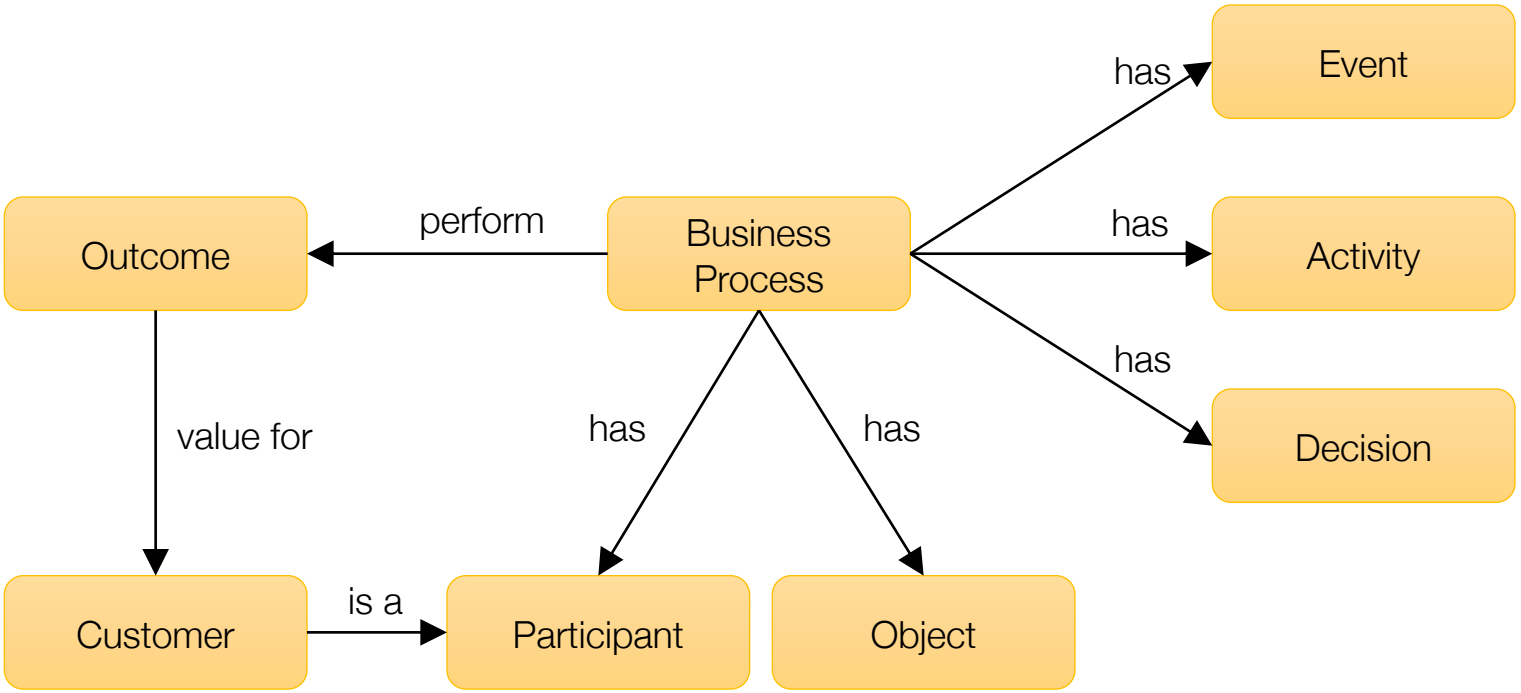
Business Process Interactions

- Each BP is performed by a single organization, but it may require some kind of interaction with BPs of other organizations

- ***Business process orchestration***
  - BP performed within the organization can be controlled in a centralized way
  - Similar to an orchestra with its conductor

- ***Business process choreography***
  - BP requiring interaction with BPs of other organizations
  - Synchronization by message passing
  - Similar to dancers that have to perform an own dance according to a common choreography

Business Process Key Concepts



Business Process Management (BPM)

- ***Business Process Management (BPM)***
  - A better understanding of organization's operations and their relationships can be enacted by the explicit representation of business processes
  - BPM is a process-centric approach for ***improving performance*** combining ***information technologies*** with process and governance methodologies
  - BPM includes ***concept, methods, techniques, tools*** to support al phases of BP's lifecycle

BPM Related

- Other disciplines concern organizational performance improvement
  - ***Total Quality Management (TQM)***
    - Continuously improving and sustaining the ***quality of products*** and services
    - Focus in on product and services, not on processes
  - ***Lean Production***
    - Elimination of ***wasting activities*** that do not add value to the customer
    - Low use of information technology
  - **Six Sigma**
    - ***Minimization of defects*** (errors) strongly using output measurement (especially in terms of quality)

- BPM gets the continuous improvement approach of TQM, uses principles and techniques of Lean and Six Sigma and combines them exploiting information technology capabilities

Stakeholders

- With Business Process Management several artifacts are produced
  - Each artifact has ***different scope*** and level of abstraction according to ***specific stakeholders***

- Stakeholders can be grouped in different roles

Stakeholders roles

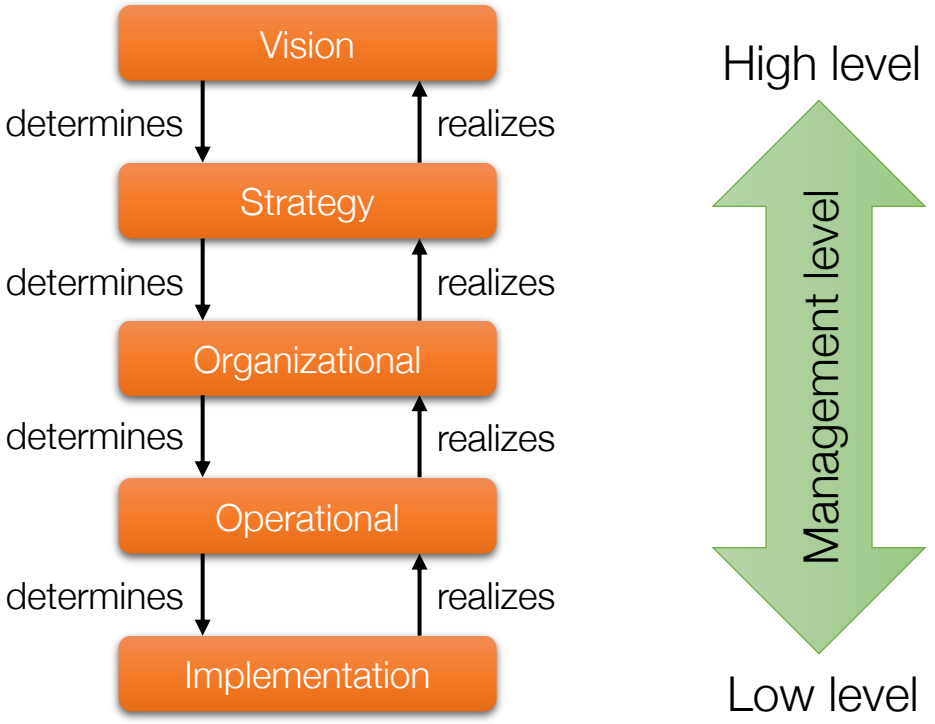
- ***Chief Process Officer***
  - Top-level management role
  - Globally manages the enterprise's BPs
- ***Business Engineer***
  - Domain expert
  - Defines the strategic goals of the BPs
- ***Process Designer***
  - Models BP interacting with other stakeholders

Stakeholders roles

- ***Process Responsible***
  - Is in charge to ensure correct execution of the BP
- ***System Architect***
  - Sets-up information systems to enact BP
- ***Developers***
  - IT professionals that implement the BP in the systems
- ***Process participants and workers***
  - Perform the assigned activities in BP instance

Business Process and Management

- There are different kind of business processes according to the level of management involved



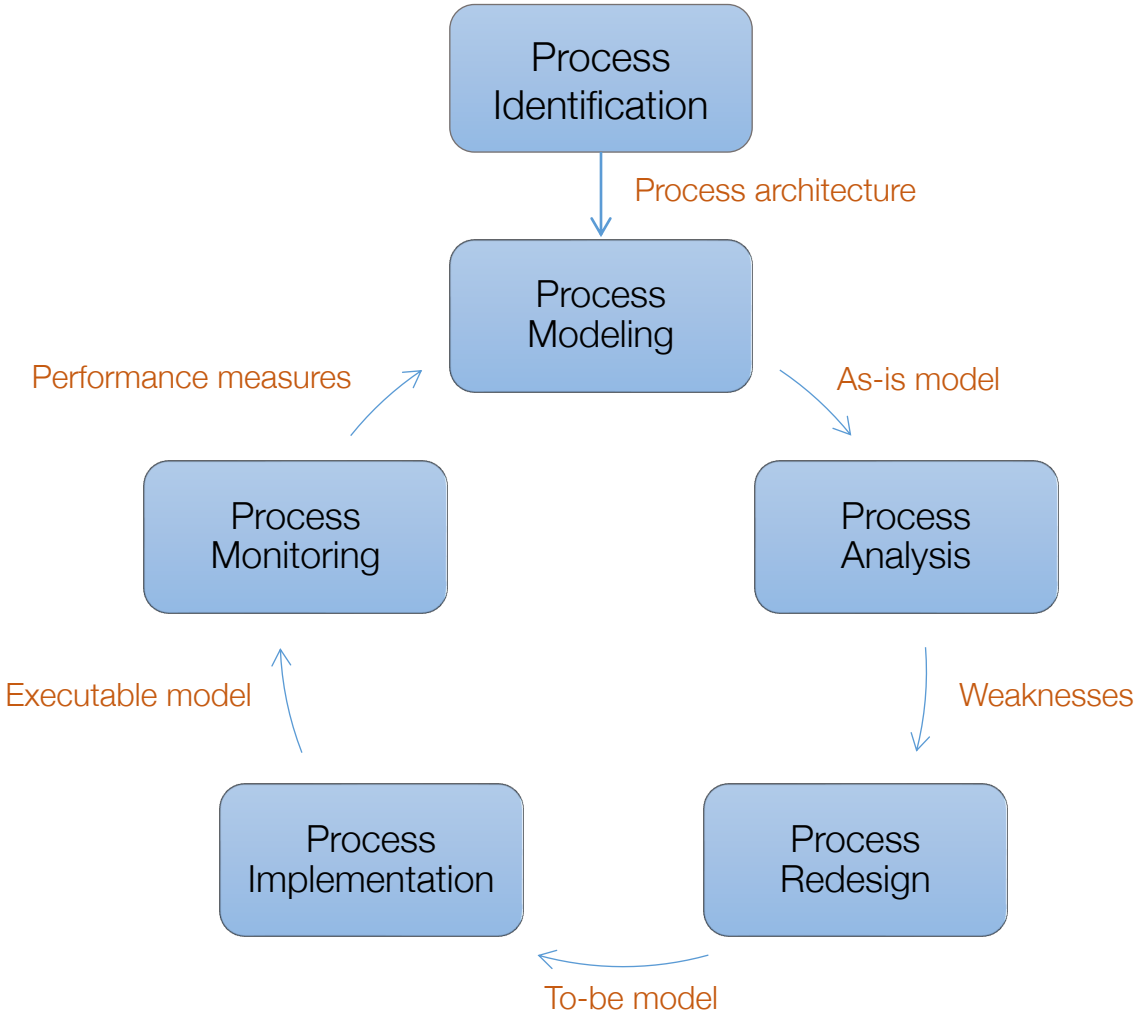
Business Process Levels

- ***Organizational Business Processes***
  - High-level processes
  - Define business functionality without technical details
  - Generally defined in textual form with the use of semi-formal techniques (simple diagrams)
- ***Operational Business Processes***
  - Definition of the BP models
  - Specification of activities and relationships
- ***Implemented Business Processes***
  - Include technical information to enact the BP on a specific platform

Business Process Lifecycle

- BP lifecycle consists of ***phases*** related to each other according to a spiral development model
- Each phase is composed by ***several activities*** with logical dependencies among them
- ***Incremental and evolutionary*** approaches are also possible to implement BP lifecycle

Business Process Lifecycle



Process Identification

- The first step for the BPM team is the ***identification of the processes*** that are relevant and the ***relations*** between them (***process architecture***)

- To determine what process is relevant, it is necessary to ***measure the value*** delivered by it

- Process performance measures have to be clearly defined
  - ***Cost-related measures***
  - ***Time-related measures***
  - ***Quality-related measures (error rates)***

Process Identification

- Process identification consists of two successive phases
  - ***Designation***
  - ***Evaluation***

- Neither of those phases include the development of detailed process models

Designation Phase

- Obtain an understanding of the organization's processes and their interrelationships

- The number of processes identified in the designation phase has to be a right trade-off
  - ***Few processes***
    - Big scope for each of them (each process has a large number of operations) so a process redesign could have large impact on organization's effectiveness, but the process redesign is more complex
  - ***Many processes***
    - Little scope for each of them, the impact of a redesign is less but is easier

Evaluation Phase

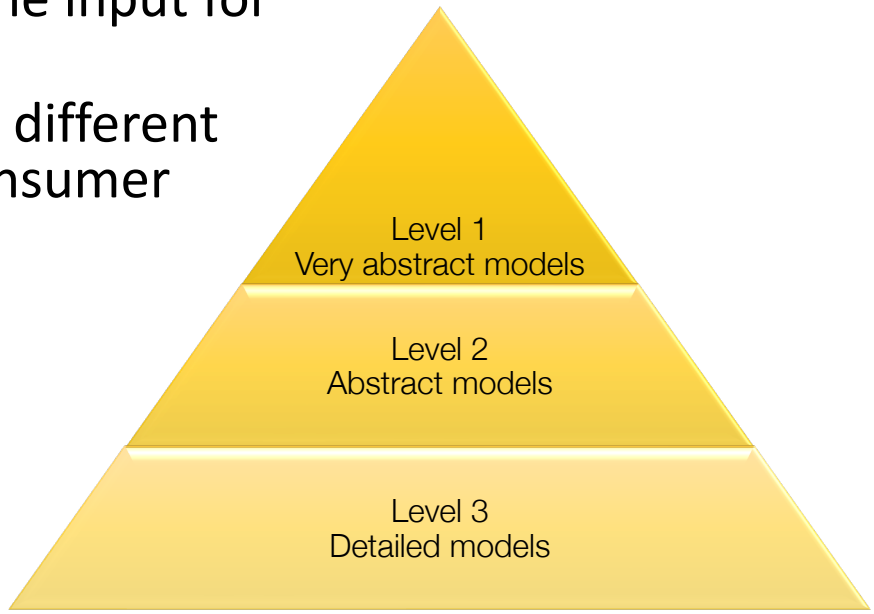
- Processes should be prioritized because they are not equally relevant
  - Processes that could create loss or risk have to be analyzed for consolidation, decommissioning, or elimination

- Criteria for evaluation phase
  - ***Importance***
    - Select processes that have the greatest impact on the company's strategic goals
  - ***Dysfunction***
    - Determine the processes that are in the deepest trouble because these processes profit most from BPM initiatives
  - ***Feasibility***
    - BPM should focus on suitable processes from which is reasonable to expect benefits

Process Architecture

- The process architecture is a ***conceptual model*** showing ***processes and relationships*** between processes

- Typical relationships are ***consumer–producer***
  - The output of one process is the input for another process
  - A process architecture defines different level of detail for produces-consumer relationships
  - The most important challenge is capturing the processes on level one



Process Architecture Definition

- Process architecture can be defined considering the following two aspects
  - ***Case type***
    - Classification of ***cases managed*** by an organization
    - A case could be a product or service delivered by an organization to its customers
  - ***Function***
    - ***Decomposition*** of the organization
    - A function is something that the organization does (purchasing, production, sales)

Process Architecture Definition

- When cases and functions are identified, a ***matrix*** can be composed
  - A mark in the cell means that the corresponding function can be performed for the corresponding case type

- In final stage it is selected which ***combinations*** of business functions and case types form a business process

		Case type			
		C1	C2	C3	C4
Functions	F1	X	X	X	
	F2			X	X
	F3	X	X	X	X

Modeling

- Modeling is a way to ***manage complexity***
  - Understand the real-world behavior
  - Identify and prevent issues

- A ***model*** is an abstract representation with the intent of capturing specific aspects having respect to the following properties:
  - ***Mapping***
    - The model reflects the ***key aspects*** of the real world
  - ***Abstraction***
    - The model captures only relevant aspects for modeling scope ***abstracting from irrelevant*** ones
  - ***Purpose***
    - The model depends on the ***target audience*** and two main purposes for process modeling are identified

Process Modeling

- Process modeling (or process discovery or process design) aims to ***understand*** the business process in detail

- The outcomes of process modeling is one or more ***as-is process models*** documenting the current state of each relevant processes
  - As-is process models reflects the understanding about work that people in the organization have

- Models are often ***diagrams*** (flowcharts) in order to reduce ambiguity of free-form text
  - The diagram should use a notation that is understood by all stakeholders
  - A complementary textual description is allowed

Process Modeling

- Process modeling can be performed in four steps:
  - ***Setting team***
    - Assemble a team in a company responsible for working on the process
  - ***Gathering information***
    - Build an understanding of the process
  - ***Modeling***
    - Create the process model
  - ***Assuring quality***
    - Guarantee that the process model fulfills quality criteria

Setting Team - Process Modeling Roles

- In general, two roles are involved in process modeling
  - ***Process analysts***
    - They are familiar with ***modeling languages and diagrams***
    - Generally have a limited understanding of the process to be modeled
    - They depend upon the information provided by domain experts
  - ***Domain experts***
    - Have ***deep knowledge*** about how a process is performed
    - They could be a process participant, a process owner or a manager
    - They are not familiar with modeling languages

Setting Team - Process Modeling Roles

- Process analysts and domain experts have ***complementary roles***

Skills	Process Analysts	Domain Expert
Modeling	Hi	Low
Process knowledge	Low	Hi

Gathering Information

- Three methods of discovery techniques to gather information can be identified
  - ***Evidence-based***
    - Document analysis, observation or automatic process discovery
  - ***Interview-based***
    - Forward or backward
  - ***Workshop-based***
- The methods differ from each other in terms of objectivity, richness, time consumption, and immediacy of feedback

	Evidence	Interview	Workshop
Objectivity	high	medium	high
Richness	medium	high	high
Time Consumption	low	medium	medium
Immediacy of Feedback	low	high	high

Modeling Method

- A process can be modeled according to a method with five stages
  - ***Identify the process boundaries***
    - Define the scope of the process identifying events that trigger it and possible process outcomes
  - ***Identify activities and events***
    - Define, without order, main activities and intermediate events
  - ***Identify resources and their handovers***
    - Define who is responsible for activities
  - ***Identify the control flow***
    - When and why activities and events are executed
    - Define order dependencies, decision points, repetitions
  - ***Identify additional elements***
    - Extend the model with artifacts (documents, input data, output data, database) and exception handlers

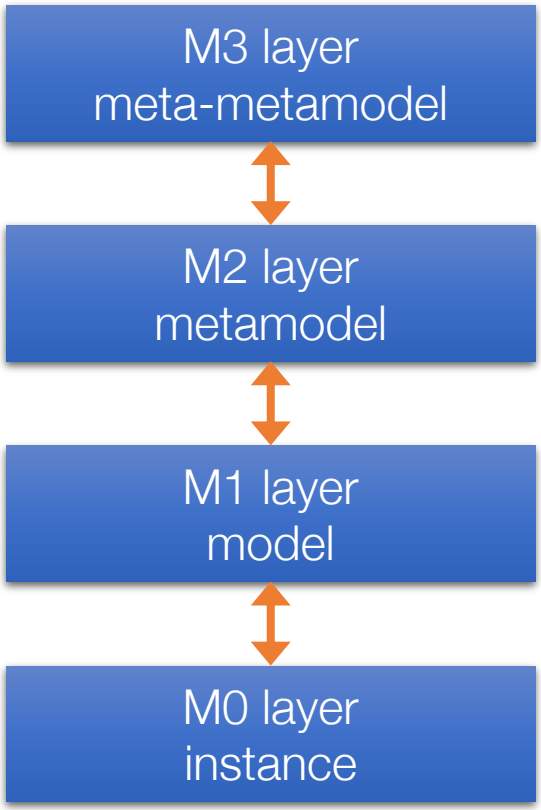
Business Process Modeling and MOF

- In modeling, the instance complexity can be managed using several ***abstraction levels***
  - At the bottom level there is the instance
  - At upper levels, concepts are more and more abstract

- One of the most used hierarchical abstraction structure is the ***Model Object Facility (MOF)*** standard provided by Object Management Group (OMG)

MOF overview

- Meta Object Facility architecture is based on 4 levels



A metamodel is composed by entities and connections

A sequence is a temporal relation between two activities

The process is the sequence of activity A and then activity B

Real business process

MOF and BPMN

- Using the same M3 meta-metamodel (MOF), several M2 metamodels can be defined
- According to MOF, OMG has defined the ***Business Process Model and Notation (BPMN)*** M2 metamodel
- BPMN use a graphical notation to design and document business processes

Process Analysis

- Identification and analysis of the ***issues*** of the processes
  - Understanding the main causes of negative outcomes allow to identify the best way of addressing that issue
- The output of analysis is a structured collection of issues
- Issue should be quantified using ***performance measures***

Performance Measures

- Generally the process performance is measured with respect to the following three aspects
  - ***Time***
  - ***Cost***
  - ***Quality***

- Each performance aspect can be refined into several process performance measures (***Key Performance Indicator - KPI***)
  - KPI is quantity that can be unambiguously calculated starting from process information

Time Measure

- Time is the most frequently used performance measure

- Process performance time can be measured in terms of
  - ***Cycle time or throughput time***
    - Time taken to handle one case from start to end
    - Generally considered for process redesign
  - ***Processing time or service time***
    - Time spent by resources (e.g. process participants or software applications invoked by the process) for handling the case
  - ***Waiting time***
    - Time spent in idle mode
    - Waiting time includes queuing time (waiting for resource), waiting for synchronization, waiting for input from another participant

Cost Measure

- To measure cost, it can be decomposed in
  - ***Fixed costs***
    - Costs that are not affected by the intensity of processing
    - E.g. use of infrastructure or maintenance of information systems
  - ***Variable costs***
    - Costs that are correlated with some variable quantity
    - E.g. level of sales, the number of purchased goods, the number of new hires

Quality Measure

- Quality can be seen from the client's and the participant's point of view, so quality can be decomposed in
  - ***External quality***
    - Client's satisfaction regarding to product or the process
    - Product satisfaction in terms of specification or expectations achievement
    - Process satisfaction in terms of how the process is executed
  - ***Internal quality***
    - Quality related to participant's point of view
    - Level of control in an activity, amount of variations in process flow

Performance Measure Techniques

- ***Flow analysis***
  - Allows to estimate the overall performance of a process given the performance of its activities
- ***Queuing theory***
  - Mathematical techniques to analyze systems having resource contention
- ***Simulation***
  - Simulation executes several virtual instances of a process recording information about each step of the execution
  - Produces statistics related to cycle times, average waiting times and average resource utilization

Process Redesign

- Identification and analysis of ***remedies*** for the issues
  - Multiple options for addressing a problem are possible
  - Possible remedies are compared in terms of the chosen performance measures

- Once issues are understood and potential remedies identified, a redesigned version (***to-be***) of the process is proposed
  - The to-be process is the main output of the process redesign phase
  - Analysis and redesign are intricately related (for each change option in redesign phase, an analysis has to be performed)

Process Redesign Challenge

- Changing a process is not easy
  - Workers change with difficult because they are used to work in a certain way
  - Changes could require to modify the information systems with costs associated
  - Changes could affect also other organizations than the one that coordinates the process

Process Implementation

- In the process implementation the changes required to move from the as-is process to the to-be process are performed

- Process implementation involves two aspects
  - ***Organizational change management***
    - Set of activities required to change the ***way of working*** of the participants in the process
  - ***Process automation***
    - Development and deployment of ***IT systems*** for executing the to-be process

Organizational Change Management

- Explaining the changes to the process participants
  - It is necessary to ***explain what changes*** are introduced and what are the benefits
- Define a change management plan
  - When changes will have effect
  - How to ***manage transition***
- Training
  - Teach the new way of working
  - Monitoring the changes

Process Monitoring

- Monitoring and analysis of the relevant data collected on the process to identify possible adjustments
  - ***Status of the business process***
  - ***Exceptions***
  - ***Execution times***
  - ***Resource usage***

- Managing a process is a ***continuous effort***

Process Monitoring

- Adjustments might be necessary to fulfill business process expectations in terms of performance measures and performance objectives
  - Detection of bottlenecks, recurrent errors or deviations from the expected behavior
  - Identification of remedies