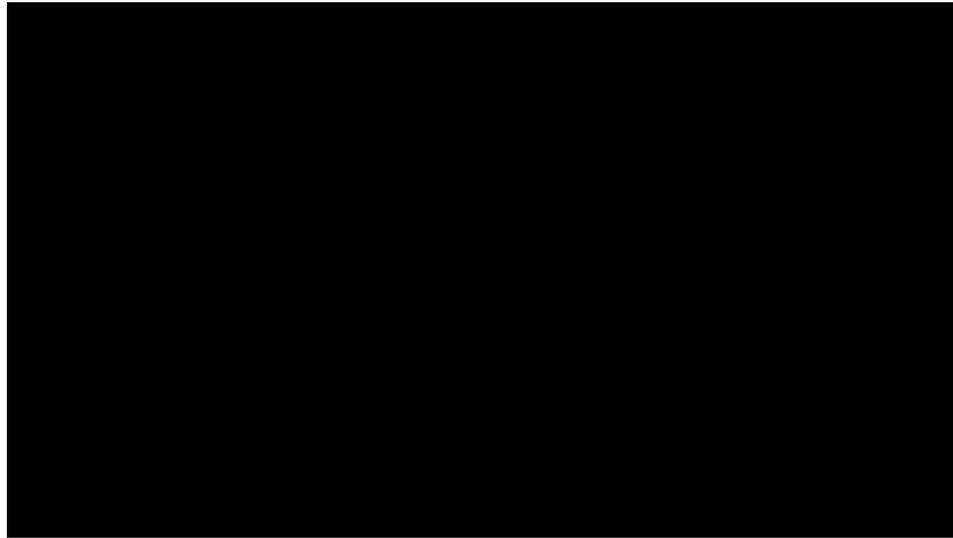
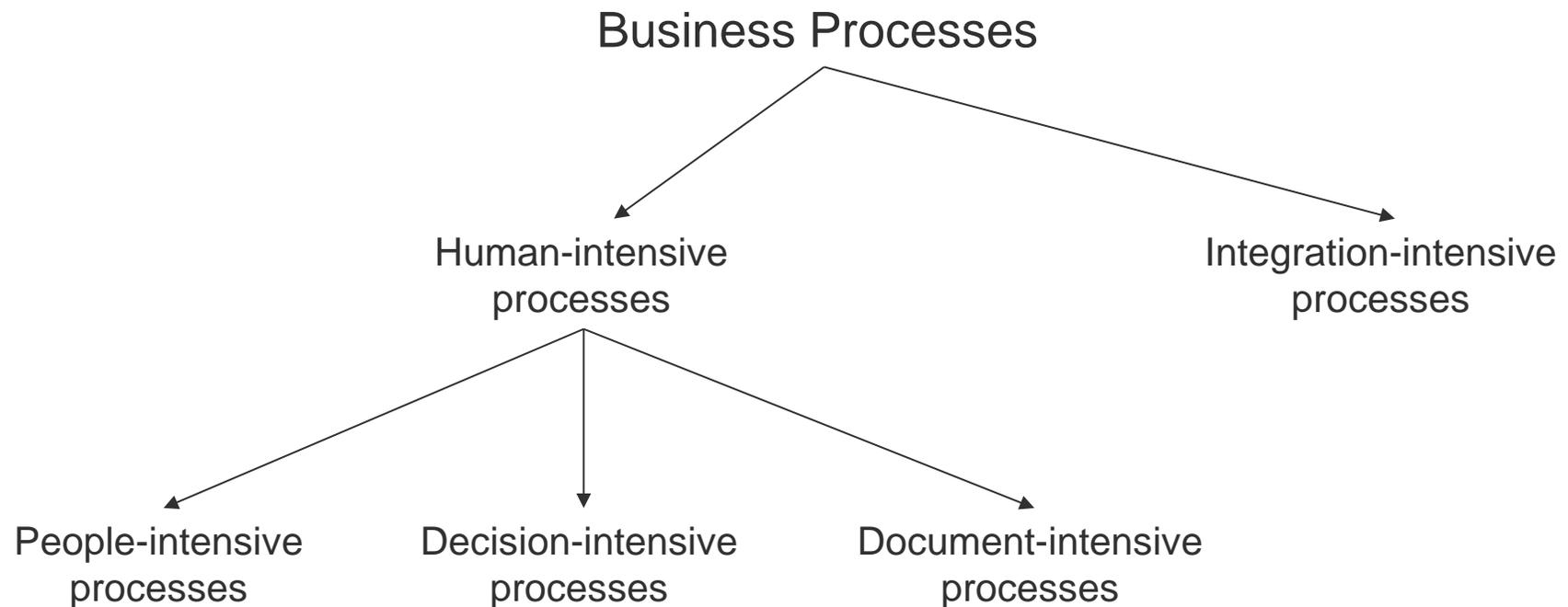


# *Digitalization of Business Processes*





# Business Process Categories



Source: Forrester



# “Types of BPM”

## ■ Human-centric BPM

- ◆ require people to get work done by relying on and interacting extensively with business applications, databases, documents, and other people (via collaboration tools).
- ◆ require human intuition or judgment for decision-making during individual steps in the business process.

## ■ Integration-centric BPM

- ◆ manages the interactions between packaged applications, custom applications, external applications, and occasionally, the people that use them.

Source: Forrester



# System-/integration intensive processes

- These business processes involve
  - ◆ high volume of transactions
  - ◆ need to integrate with other systems
  - ◆ high degree of straight-through processing
  - ◆ very limited human interaction

Source: The Forrester Wave™: Human-Centric BPM for Microsoft Platforms, Q4 2007



## People-intensive processes

- These involve a high level of interaction among individuals for routing, approving, and fulfilling requests.
  - ◆ high degree of human interaction
  - ◆ need for human intuition or judgment
  - ◆ high rate of exception handling.

Source: The Forrester Wave™: Human-Centric BPM for Microsoft Platforms, Q4 2007



# Decision-intensive processes

- These complex processes involve
  - ◆ gathering information
  - ◆ automatic and manual scoring
  - ◆ mission-critical decision-making.
- Insurance and financial services companies that have high-value processes with important decisions should make this process type their highest priority.

Source: The Forrester Wave™: Human-Centric BPM for Microsoft Platforms, Q4 2007



# Document-intensive processes

- These processes require users to
  - ◆ review documents for approval
  - ◆ enter data from documents into a back-office system
  - ◆ make decisions.
- Action is driven by information
  - ◆ found in scanned images or electronic forms or
  - ◆ electronic documents created in office tools or applications

Source: The Forrester Wave™: Human-Centric BPM for Microsoft Platforms, Q4 2007



# Business Process Categories

## Types of business processes

Integration-intensive	People-intensive	Decision-intensive	Document-intensive
<b>Characteristics</b>			
<ul style="list-style-type: none"> <li>• Strong focus on automating processes that integrate systems and applications</li> <li>• Typically involves few exceptions and limited human participation</li> <li>• Can handle high transaction rates</li> <li>• Often used for externally focused processes linking two or more enterprises</li> </ul>	<p>Strong focus on automating people-intensive activities like servicing customers, operating call centers, managing sales operations, supporting field-based agents, routing internal requests by employee</p>	<ul style="list-style-type: none"> <li>• Strong focus on processes that require employees to make mission-critical decisions using information and business rules</li> <li>• Processes in which the decision criteria and process rules change frequently</li> </ul>	<ul style="list-style-type: none"> <li>• Strong focus on processes that involve extensive use of scanned images for back-office processes</li> <li>• Focus on processes that require people to use documents extensively (not just author documents)</li> </ul>

Source: The Forrester Wave™: Human-Centric BPM for Microsoft Platforms, Q4 2007



# Drivers for Digital Revolution

The availability of **digital data**, the **automation** of production processes, the **interconnection** of value chains and the creation of **digital customer interfaces** is transforming business models and reorganizing entire industries



Digital Data



Digital Customer Access



Connectivity



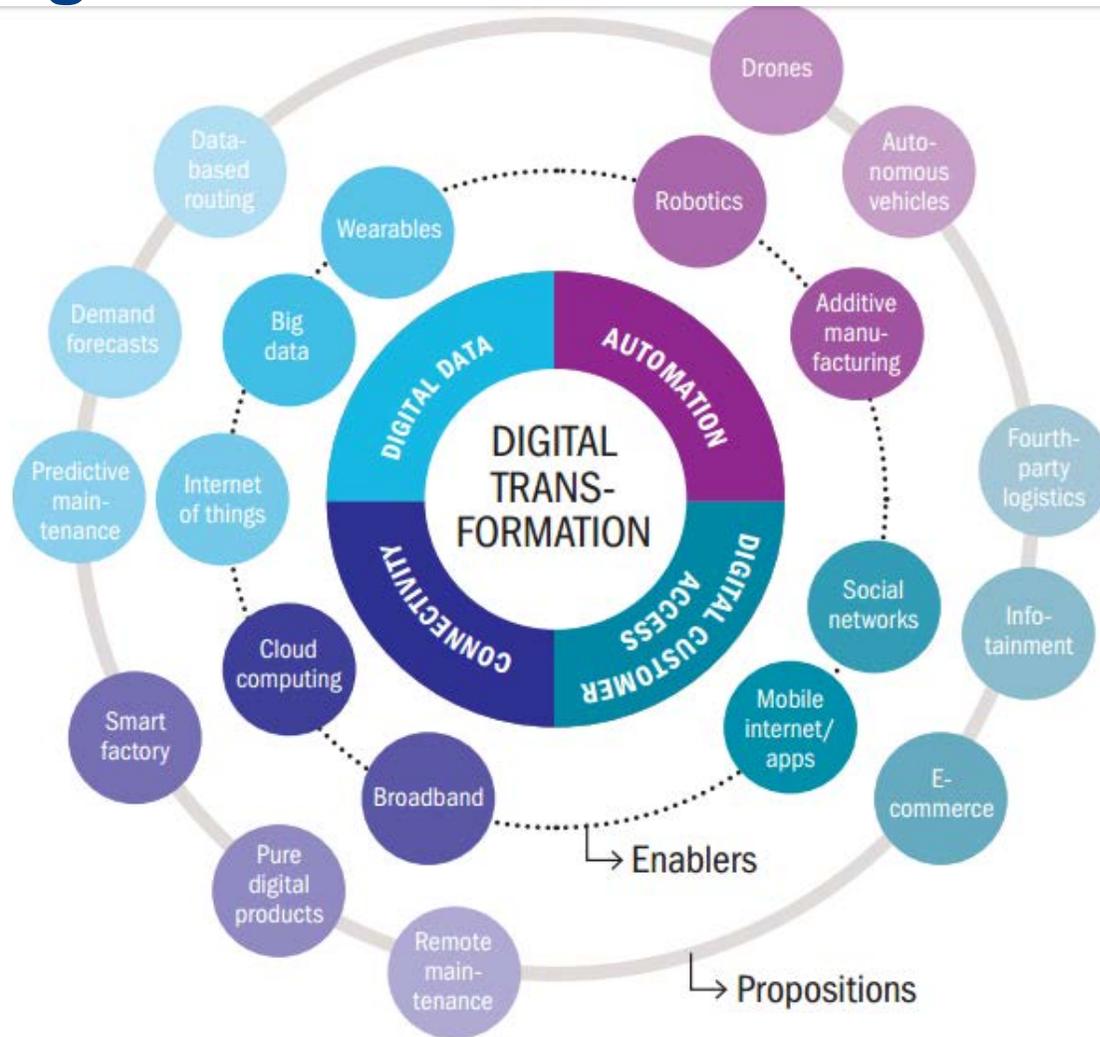
Automation

# Four Levers of Transformation

- **DIGITAL DATA.** Capturing, processing and analyzing digital data allows better predictions and decisions to be made. Structured data instead of documents.
- **AUTOMATION.** Combining traditional technologies with artificial intelligence is increasingly giving rise to systems that work autonomously and organize themselves. This reduces error rates, adds speed and cuts operating costs.
- **CONNECTIVITY.** Interconnecting the entire value chain via mobile or fixed-line high-bandwidth telecom networks synchronizes supply chains and shortens both production lead times and innovation cycles.
- **DIGITAL CUSTOMER ACCESS.** The (mobile) internet gives new intermediaries direct access to customers to whom they can offer full transparency and new kinds of services.

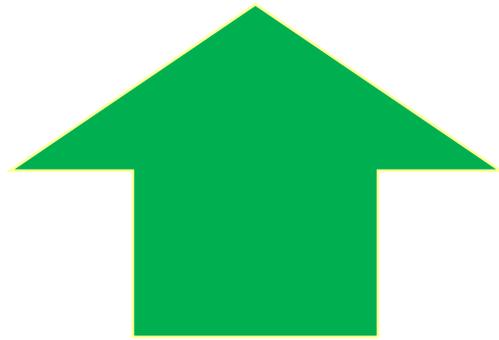


# Drivers of Digitization

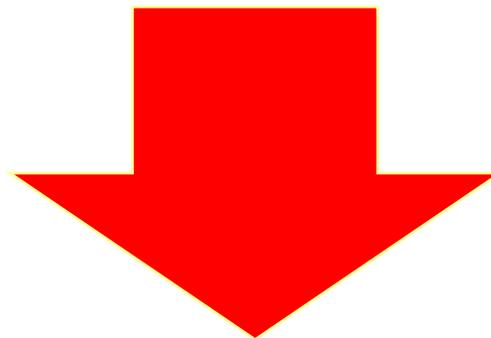


Bloching, B., et a. (2015). *The Digital Transformation of Industry*. Roland Berger Strategy Consultants GmbH & BDI. Retrieved from [https://www.rolandberger.com/media/pdf/Roland\\_Berger\\_digital\\_transformation\\_of\\_industry\\_20150315.pdf](https://www.rolandberger.com/media/pdf/Roland_Berger_digital_transformation_of_industry_20150315.pdf)

# Consequences of Digital Transformation for Business Processes

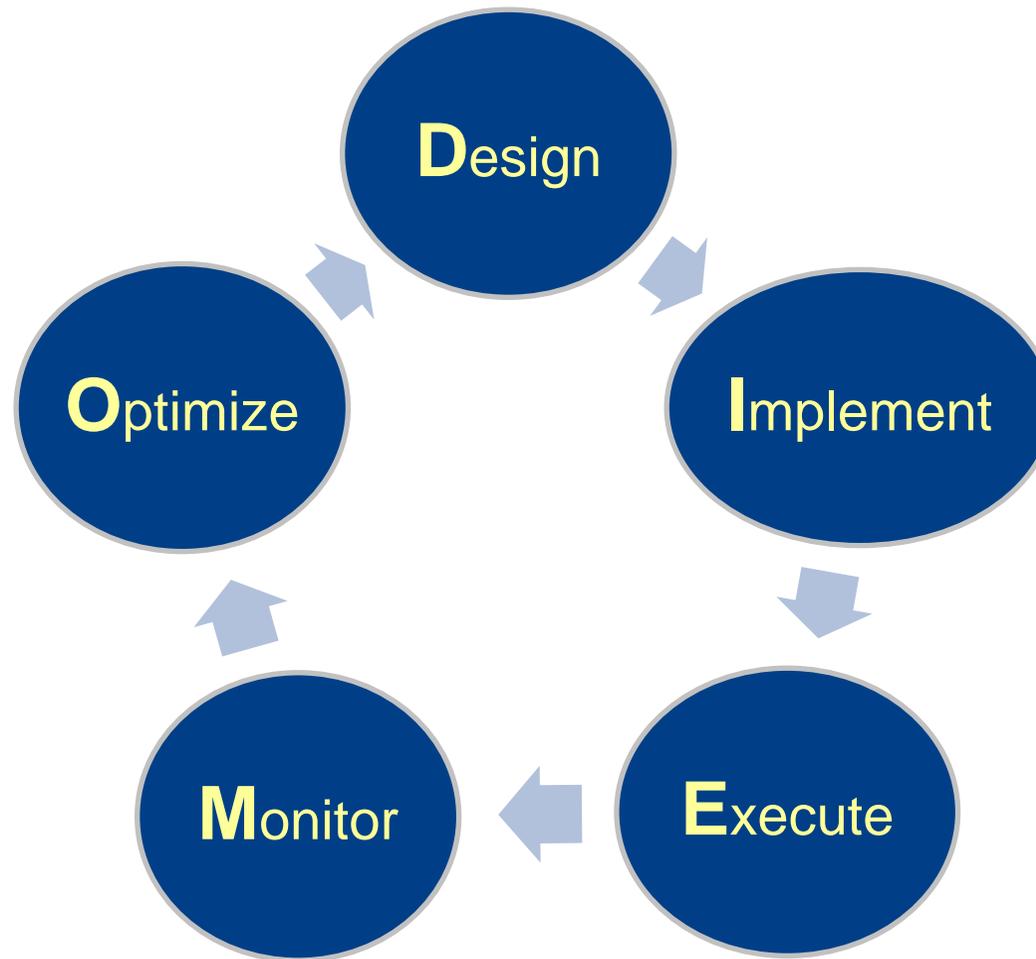


- Integration intensive
- Decision intensive



- People intensive
- Document intensive

# Standard model for the BPM life cycle



# Standard model for the BPM life cycle

## ■ Model

- ◆ Designing/Modelling the process (build time)



Module Business Process Management

## ■ Implement

- ◆ Selecting the „right“ IT-solution

## ■ Execute

- ◆ Running the process instance (run time)

## ■ Monitor

- ◆ Gathering data from the running processes

**Focus of this module**

## ■ Optimise

- ◆ Analysing the data for further improvement



Module Business Process Management



# Elements of a BPM suite



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# Elements of a BPM suite

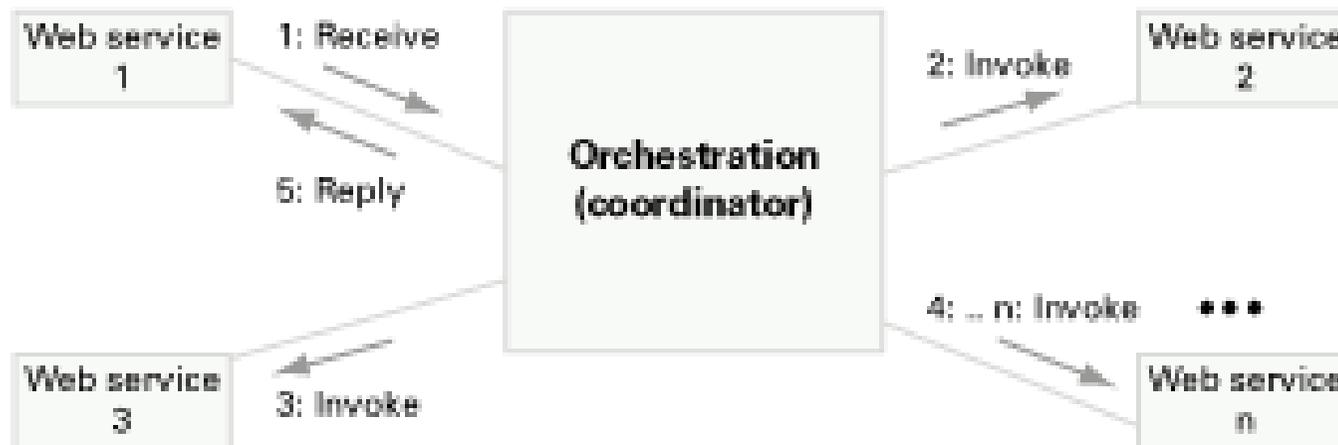
- Process Engine
  - ◆ a robust platform for modeling and executing process-based applications, including business rules
- Business Analytics
  - ◆ enable managers to identify business issues, trends, and opportunities with reports and dashboards and react accordingly
- Content Management
  - ◆ provides a system for storing and securing electronic documents, images, and other files
- Collaboration Tools
  - ◆ remove intra- and interdepartmental communication barriers through discussion forums, dynamic workspaces, and message boards

# What is Business Process Automation (BPA)?

- Implementing, deploying and executing business processes
- BPA dimensions
  - ◆ Organisational aspects
  - ◆ Data aspects
  - ◆ Technical aspects
- Benefits
  - ◆ Increase in efficiency (e.g. cost reduction by automation)
  - ◆ Increase in speed and accuracy
  - ◆ Enabling an adequate monitoring of process instances
  - ◆ Enabling new business models
  - ◆ Gathering necessary data for business process optimization

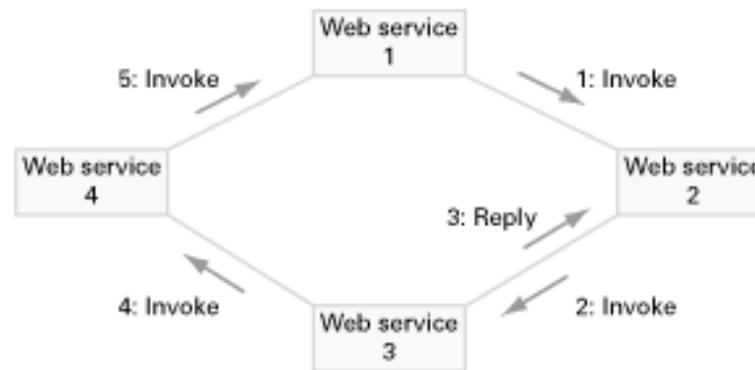
# Orchestration vs. Choreography

- In *orchestration*, a central process (which can be a workflow engine or another service) takes control of the involved (Web) services and coordinates the execution of different operations.



# Orchestration vs. Choreography

- *Choreography* does not rely on a central coordinator. Rather, each (Web) service involved in the choreography knows exactly when to execute its operations and with whom to interact.
- Choreography is a collaborative effort focusing on the exchange of messages in (public) business processes



# Synchronous vs. asynchronous communication

- Synchronous operation
  - ◆ An operation defined with both an input and an output message (acts like a “function”)
  - ◆ Whenever it is invoked, a synchronous operation is guaranteed to return a value (or a fault) to the caller. The calling entity must, therefore, suspend its execution until that return value arrives.
  - ◆ Request and response are «coupled».
- Asynchronous operation
  - ◆ An operation defined with only an input message (one-way, acts like a “method”)
  - ◆ An entity invoking such an operation need not suspend execution after the invocation.
  - ◆ Communication with the sender through «callback operations».
  - ◆ Request and response are «decoupled» (“fire and forget” mode).

# Workflow and Workflow Management System

- Business Process

A set of one or more linked procedures or activities which collectively realise a business objective or policy goal, normally within the context of an organisational structure defining functional roles and relationships.

- Workflow

The automation of a business process, in whole or part, during which documents, information or tasks are passed from one participant to another for action, according to a set of procedural rules.

- Workflow Management System (WfMS)

A system that defines, creates and manages the execution of workflows through the use of software, running on one or more workflow engines, which is able to interpret the process definition, interact with workflow participants and, where required, invoke the use of IT tools and applications.

# Workflow Management

**Manual  
Steps**

**+**

**Automated  
Steps**

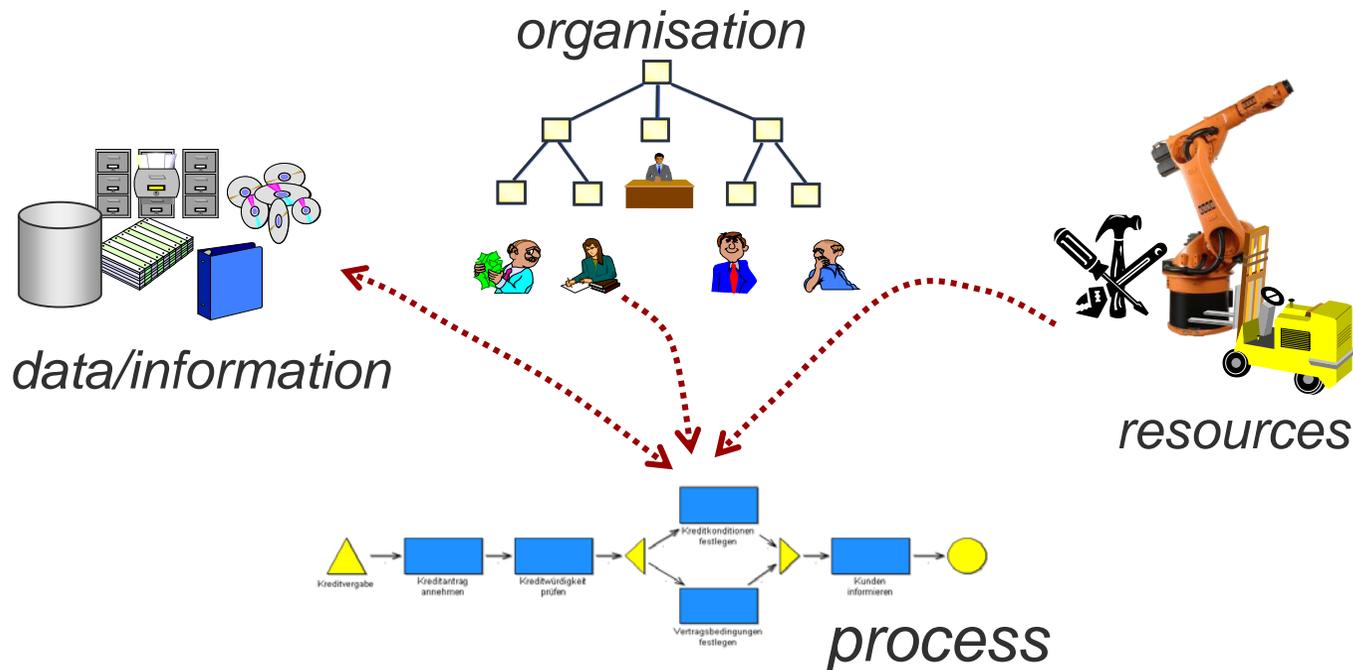
*Generate PDF*  
*Check order state in SAP*  
*Book flight through webservice*

*Select helpdesk ticket*  
*HR needs to approve the expense*  
*Joey needs to call the customer*

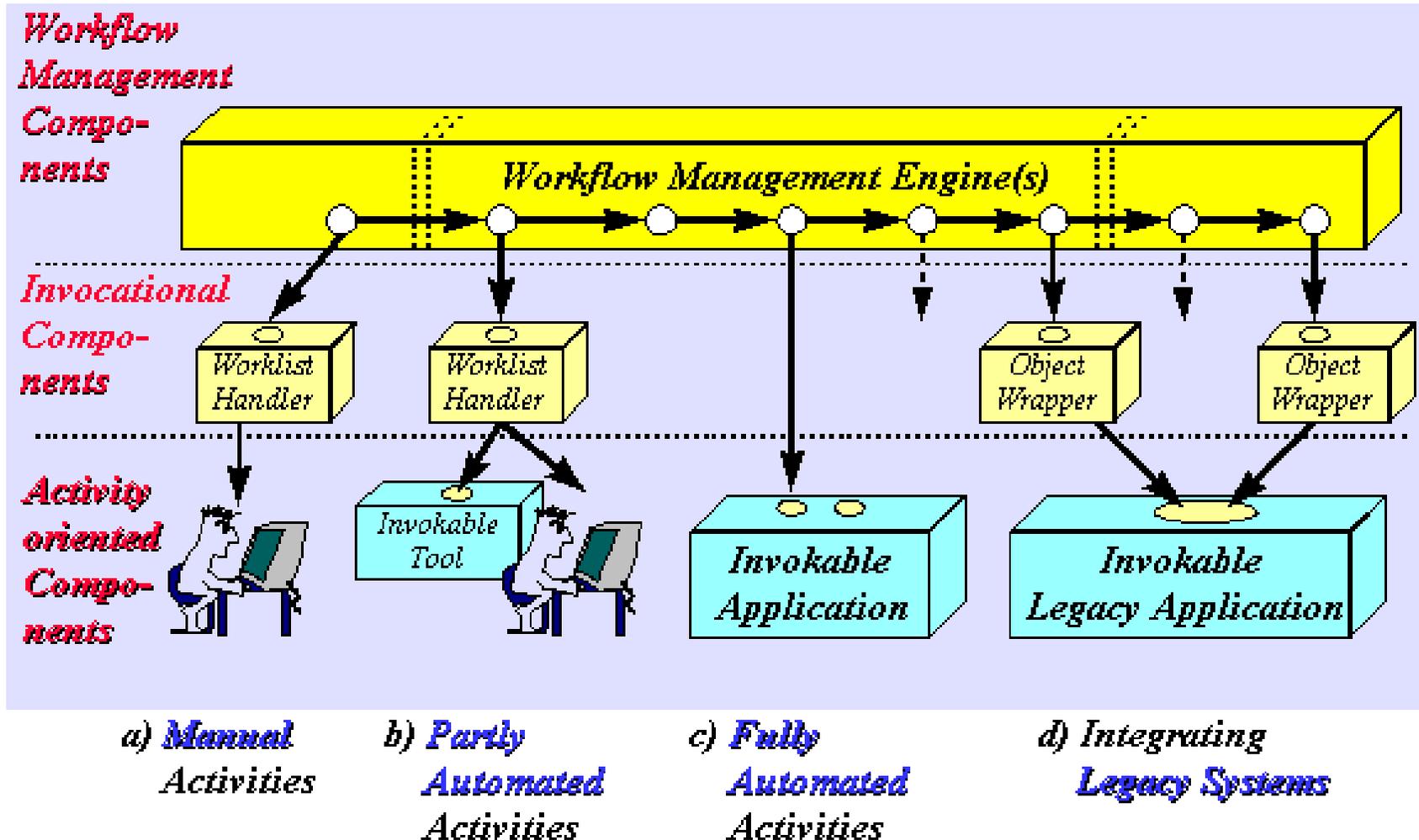
# Workflow Management

## ■ A WfMS

- ◆ automates data-centric, decision-centric tasks
- ◆ manages human tasks
- ◆ coordinates automated tasks with physical resources



# Principle of Workflow Management System



# Definitions

- Worklist:
  - ◆ List of tasks assigned to a person or role
- Worklist Handler
  - ◆ Management of the worklists of the workers
- Legacy Systems
  - ◆ “old” non-standard application program that is still in use
- Workflow Engine
  - ◆ Run-time engine which controls the execution



# How to implement a Business Process

## ■ Sequential Approach

- ◆ Model the process from business perspective
- ◆ Transform the process model to a workflow model
- ◆ → Two models for process and workflow

## ■ Integrated Approach :

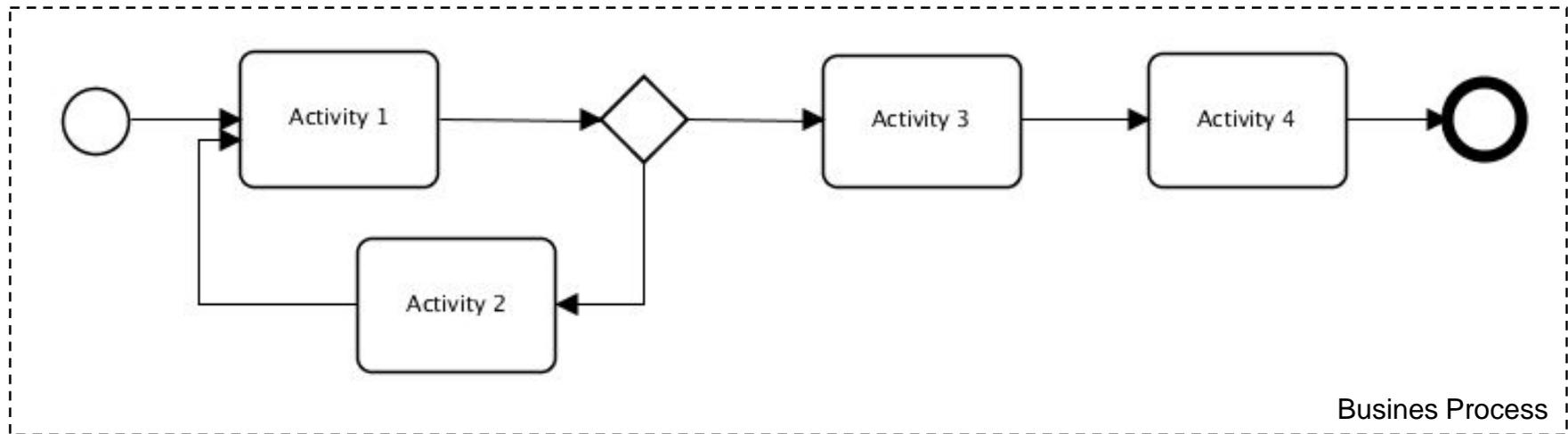
- ◆ Add execution information to the business process model
- ◆ → one model,
- ◆ Problem: different aspects for business and execution in one model

## ■ Isolated Approach:

- ◆ Directly create workflow model without business process model

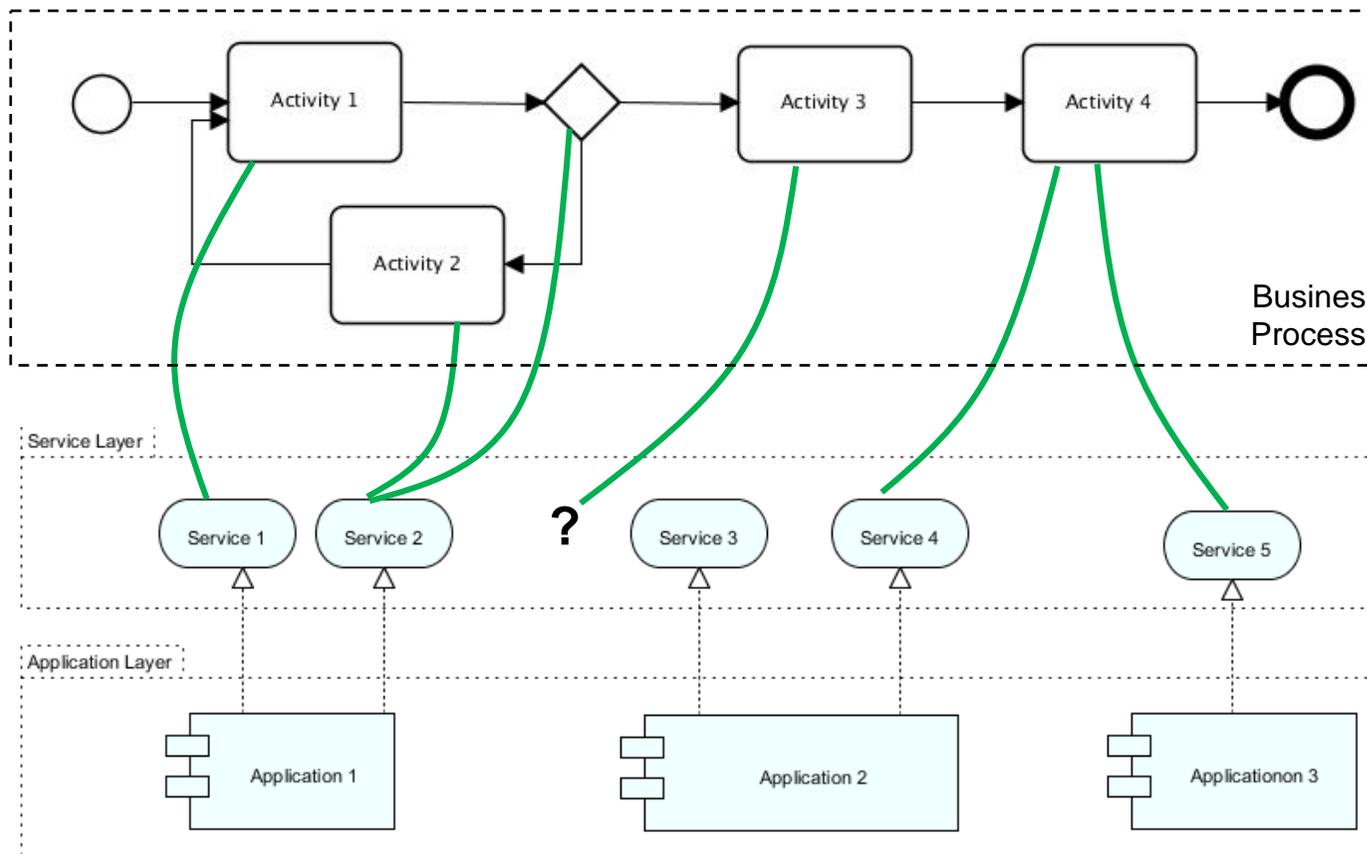
# How to create a Workflow Model

Step 1: Identify the various business activities based on business process modelling



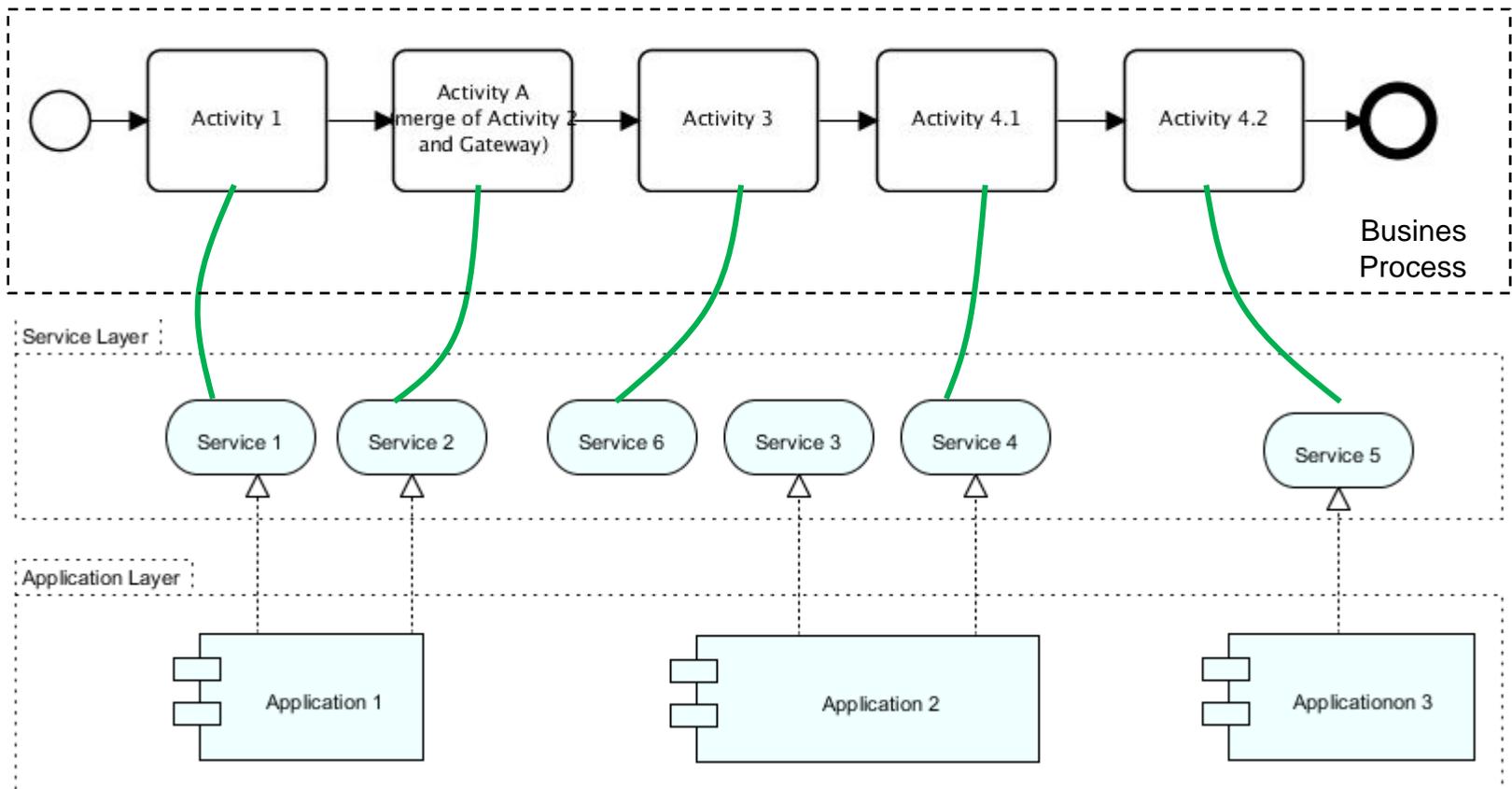
## How to create a Workflow Model (2)

Identify services for activities of the business process. A direct correlation between business activities and the identified services within the application is not likely at the outset.



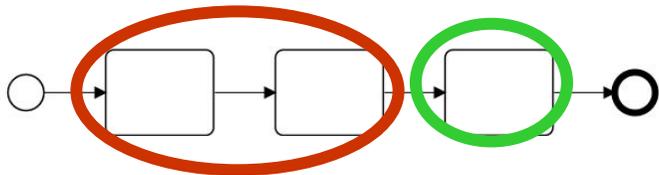
# How to create a Workflow Model (3)

Refine the process model to include more activities in order to achieve a one-one mapping between activity and service.

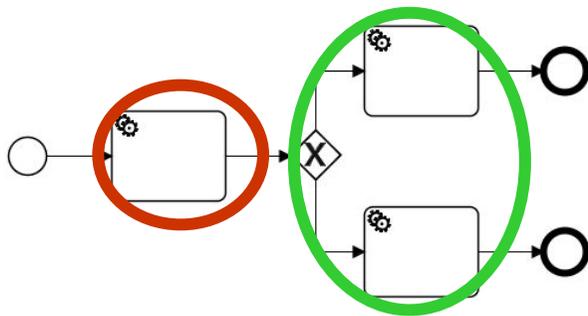


# From Business Process Model to Workflow Model

## Business Process Model



## Workflow Model



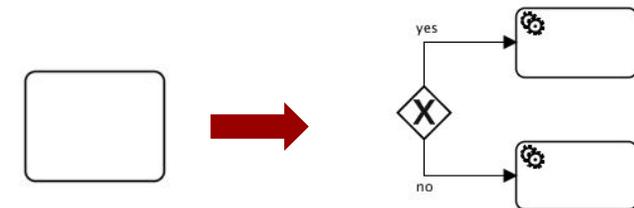
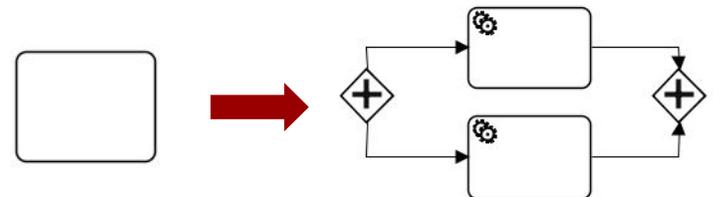
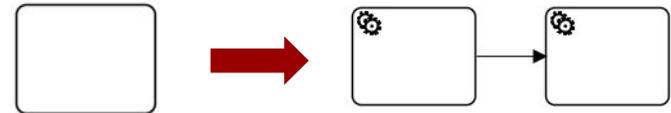
- Business process model:
  - ◆ *What* has to be done
  
- Workflow model:
  - ◆ *How* is it implemented
  - ◆ Add technical details:
    - applications
    - data
  - ◆ Changes in process structure
    - split activities
    - integrate activities by automation

# From Business Process Model to Workflow Model

## *Splitting Activities*

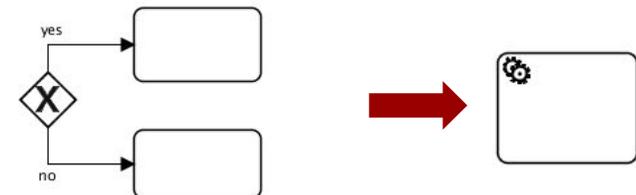
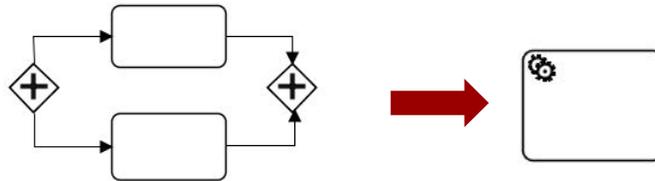
A single activity in a business process model can be split, if it invokes several applications

- a) sequential
- b) parallel
- c) alternative

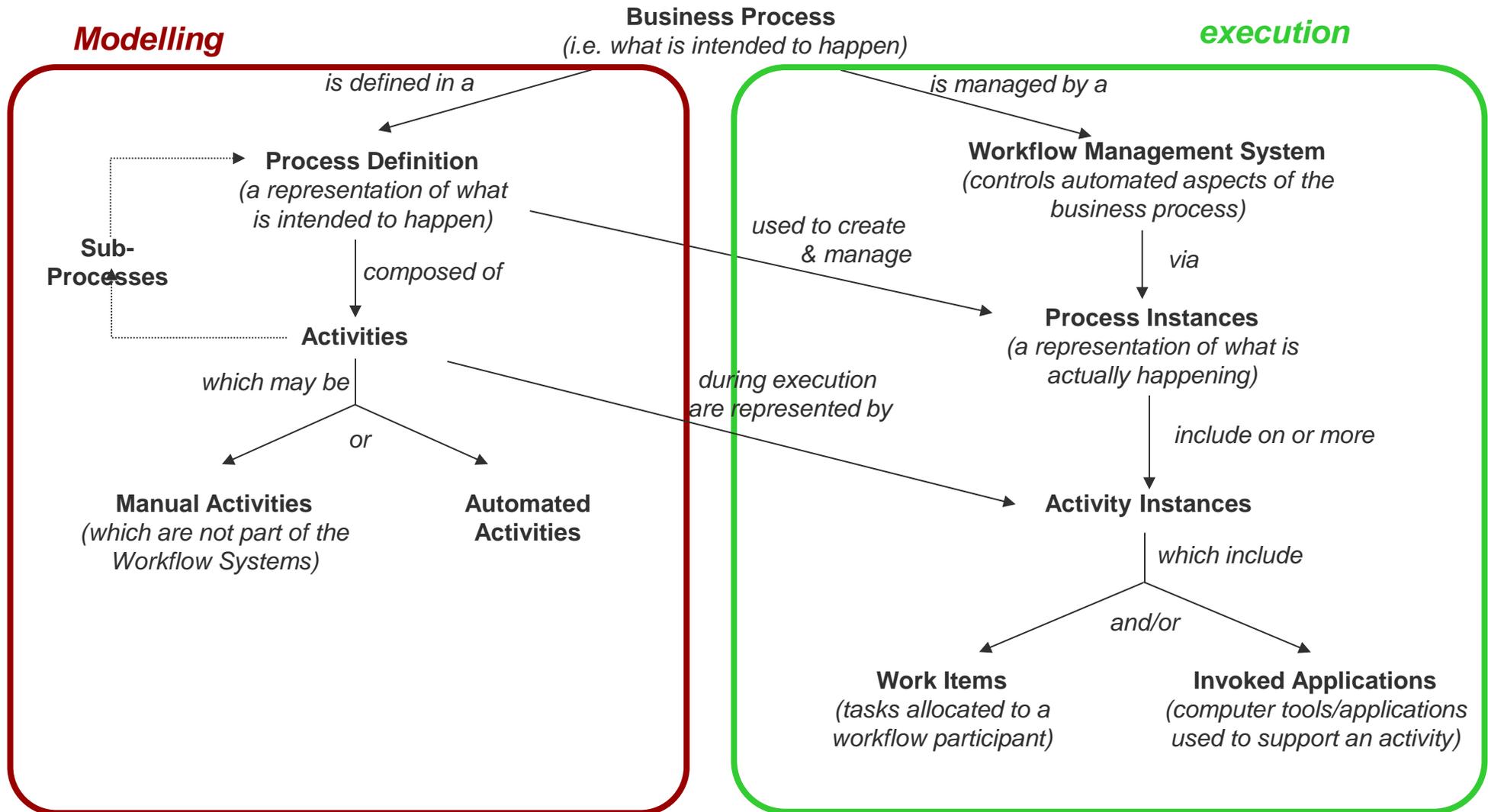


# From Business Process Model to Workflow Model

It is possible that a single application automates several activities



# Workflow Management Systems

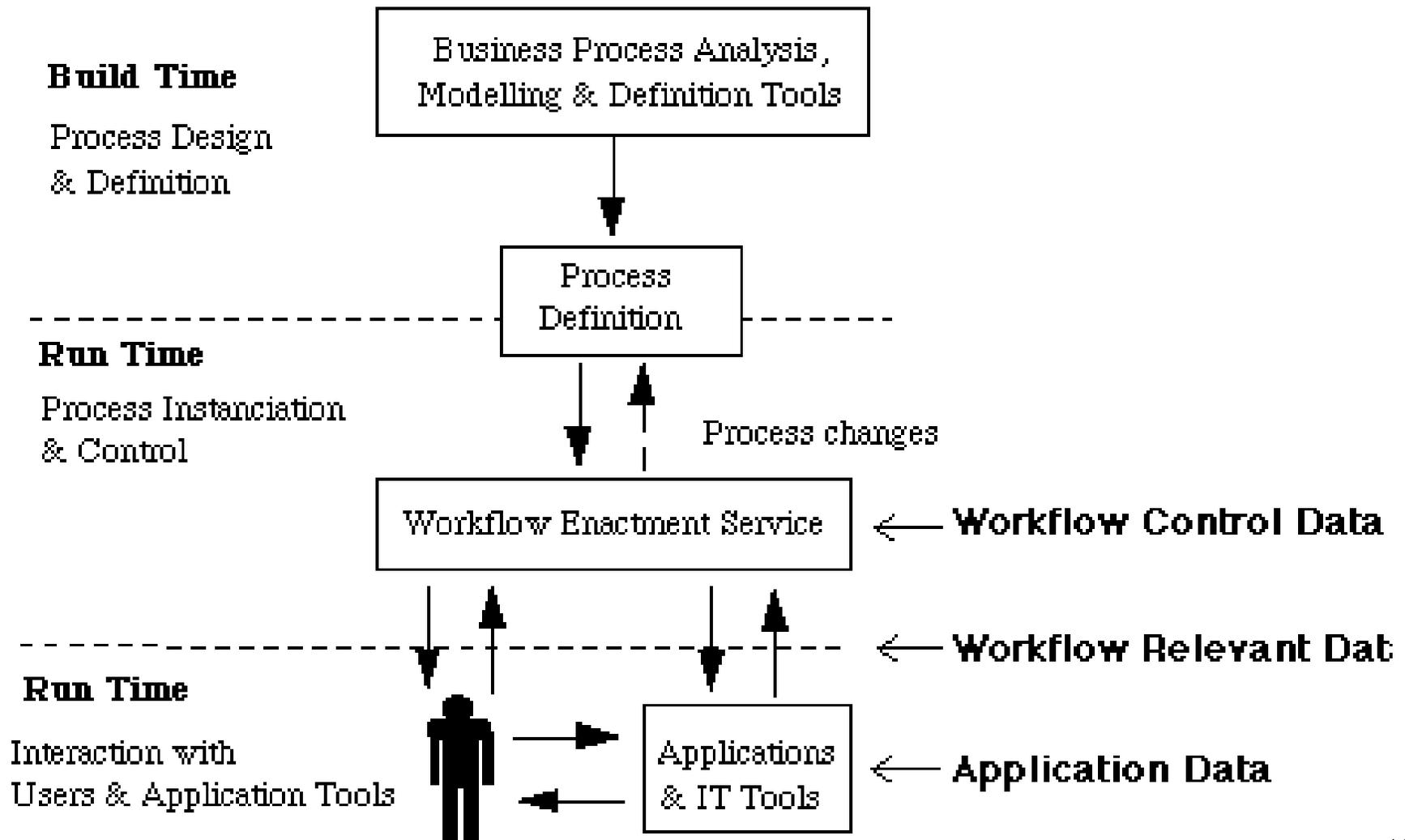


# Data in Workflow Management

- Application Data
  - ◆ Data, which are processed by application components/programs
  
- Workflow-relevant Data
  - ◆ Application data, which determine the control flow
  - ◆ Are accessible by the workflow engine
  
- Workflow Control Data
  - ◆ Internal data, which the workflow engines use (e.g. process ID, start/end time of activities, worker)



# Components of WfMS and their Interaction

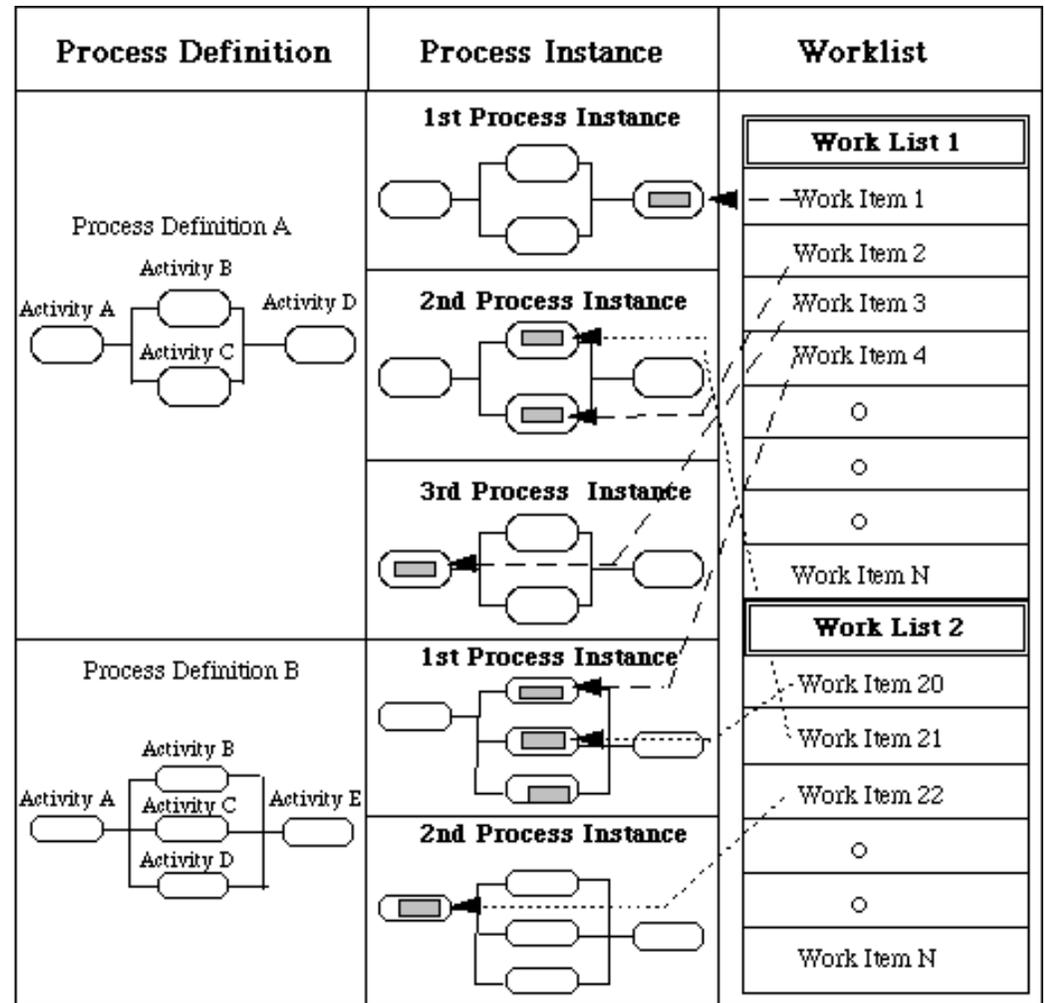


# Workflow Execution

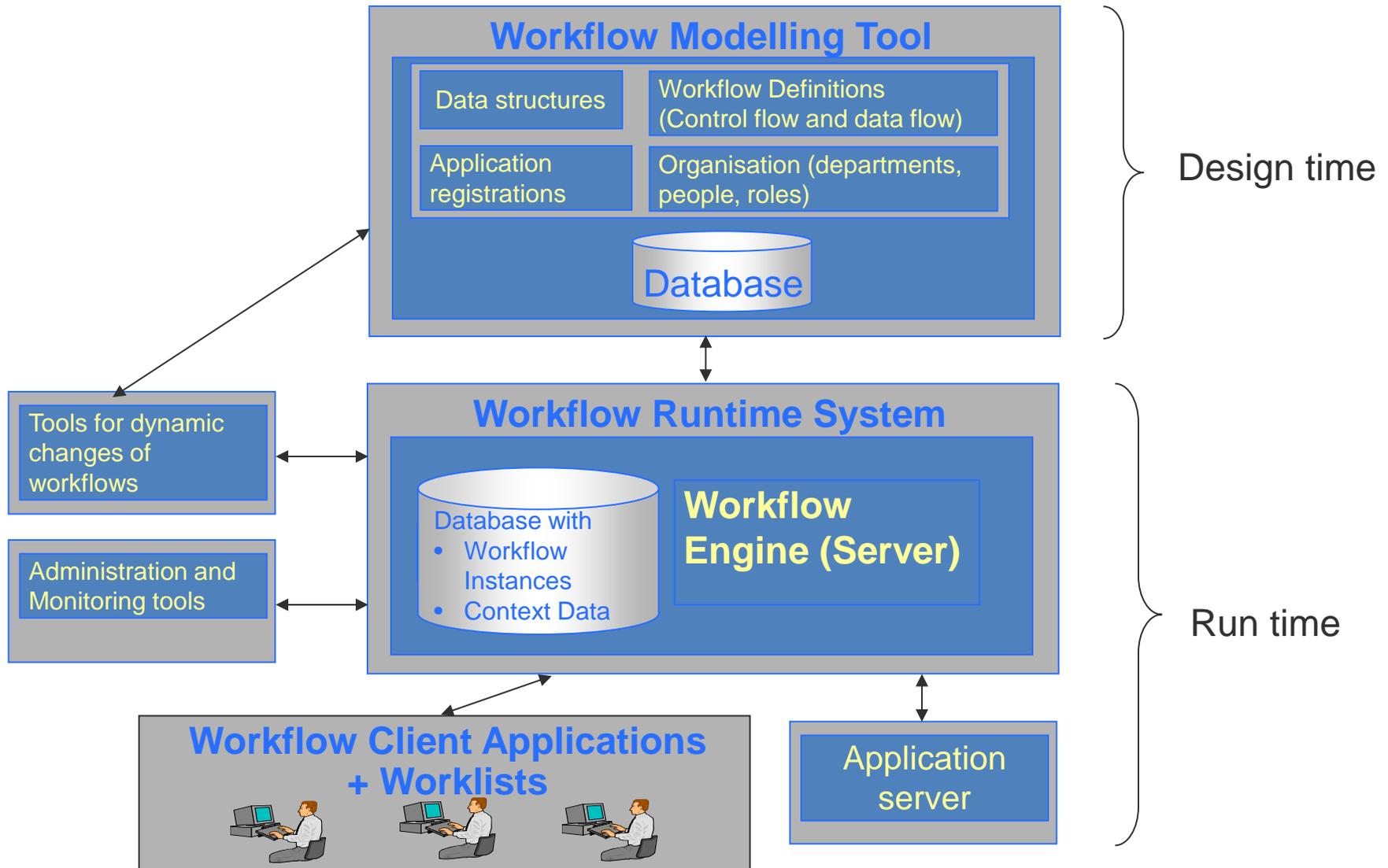
- Control Flow
  - ◆ Determines next activities
  - ◆ Evaluation of conditions in gateways
  - ◆ Start of applications for automated tasks
  - ◆ Add manual activities into worklist of responsible people
  - ◆ Start activities selected by worker
  - ◆ Maintain worklist: Notification of deadlines etc.
  
- Data flow
  - ◆ Dataflow between activities
  - ◆ Data flow from/to applications and external databases

# Run-Time: Creation and Control of Workflows

- Create instances of workflow models
- Execute workflow instances
- Maintain status execution of workflow instances
- Assign tasks to workers subject to role descriptions (role resolution)
- Management of worklists



# Generic Architecture



# Interface Reference Model of the WfMC

