

Business Process Digitalization and Cloud Computing

1. Introduction

Andrea Morichetta, Phd

Computer Science Division

October 3rd, 2018



Who am I?

Education

- Bachelor and Master Degree in Computer Science
- Phd in Computer, Decision, and System Science

Main Interests

- IoT (energy-aware devices)
- Mobile Cloud Computing
- Business Process
- Formal Verification
- Blockchain Technology

Current Position

- Post-doc at University of Camerino

What we did?




pros.unicam.it

Table of contents

1. General Information
2. Introduction to Business Process
3. Business Process Lifecycle
4. Classification of Business Process

Course Overview

- **Teaching Hours:** Wednesday 09:00 - 11:00 (AB1)
Thursday 11:00 - 13:00 (AB1)
- **Office Hours:** After lesson or by appointment
- **Web site:** <http://didattica.cs.unicam.it/doku.php...> 
- **Email:** andrea.morichetta@unicam.it

Course Overview

Prerequisite knowledge:

Business process management and flexibility, BPMN, Choreography, Programming experience

Course Objectives:

The course introduce the student to the basic **knowledge of Business Process Management** and **workflow management system**.

The course aims at supporting business process within an **application software system** or between a set of application systems, effectively integrated in an enterprise software system architecture.

The course introduce the notions of **software oriented architecture (SOA)** and **Blockchain (Smart Contracts)** useful for the implementation of business process.

Learning Outcome

- Understanding the importance of **Business Process management system and workflow management system**.
- Know the most common techniques for **implementing** business process.
- Gain some familiarity with **software oriented architecture and blockchain principles**.
- Implement business process into a practical **case studies** using software oriented architecture.

- **Evolution of Enterprise Systems Architectures**

- ▶ Traditional Application Development
- ▶ Enterprise Applications and their Integration
- ▶ Workflow Management
- ▶ Enterprise Services Computing

- **Understanding SOA**

- ▶ Integration of Applications and Data
- ▶ Agility, Flexibility, and Alignment
- ▶ Architectural Principles and Practices
- ▶ What Is Service-Oriented Architecture?
- ▶ What Is a Service?

- **Designing SOA for business**

- ▶ Starting with the Business
- ▶ Designing Service Interfaces
- ▶ Designing Service Implementations
- ▶ Composing Services
- ▶ Using Services to Build Enterprise Solutions

- **BPM Platform Camunda**

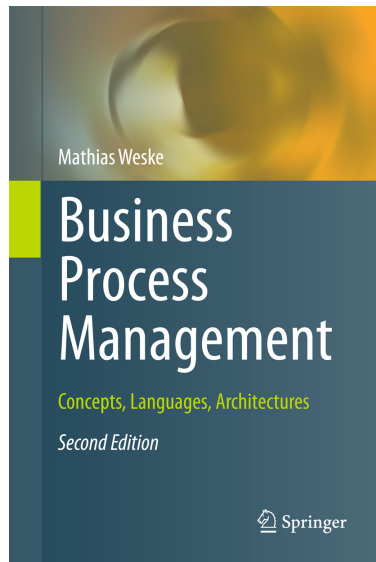
- ▶ Overview
- ▶ Architecture
- ▶ Modeler
- ▶ Engine
- ▶ Runtime
- ▶ Logging
- ▶ Security

- **Blockchain & Ethereum**
 - ▶ Theoretical Background
 - ▶ Ethereum
 - ▶ Smart Contracts
 - ▶ Remix IDE
 - ▶ Experiments

- **Business Process Management. Concepts, Languages, Architectures.**

Weske, Mathias 2007,
ISBN: 9780321155559.

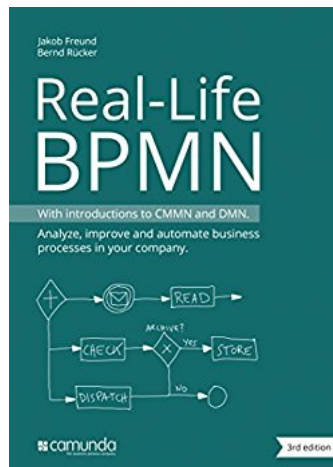
- **Chapter 2** - Introduction



- **Applied SOA service-oriented architecture and design strategies**
by Michael Rosen, Boris Lublinsky,
Kevin T. Smith, Marc J. Balcer,
ISBN: 0470223650.
- **Chapter** -



- **Real-Life BPMN:With Introductions to Cmmn and Dmn**
by Jakob Freund, Bernd Rcker
ISBN: 1541163443
- **Chapter** -



Software Project

Groups of maximum 2 people will have to choose an open problem or follow the assigned one, and provide a complete software solution with artifacts.

The **project proposal** need to be discussed with the teacher by mail, sending a small description of the requirements and final goal.

Oral exam + Project Presentation

A report have to be delivered before the oral part.

Exam Dates

- 06/02/2019 - 11:00
- 20/02/2019 - 11:00
- 05/06/2019 - 11:00
- 19/06/2019 - 11:00
- 10/07/2019 - 11:00
- 24/07/2019 - 11:00
- 11/09/2019 - 11:00
- 25/09/2019 - 11:00

Questions?

Business process management (BPM)

is a **systemic approach** for:

capturing,
designing,
executing,
documenting,
measuring,
monitoring
controlling

both **automated and non-automated processes** to meet the **objectives**
and **business strategies** of a company.

Why?

Companies achieve better results faster and more flexibly

BPMN is important for who wants:

- 1 to **improve a process** using information technology (IT)
- 2 **documentation** about company processes
- 3 to introduce entirely new processes
- 4 to automatically deploy and enact new processes system

Technical challenges

organizations are **distributed systems** that execute *many process instances concurrently* in an *uncertain environment* that includes human intervention and decision making.

- **Problems:**

- ▶ **failures** and **exceptions** occur frequently and re-planning must be integrated with execution

- **Solution:**

- ▶ Need **automated tools** that not only instantiate process templates, but also have the ability to generate **dynamically executable process** templates,

Business Processes

Business process

consists of a set of **activities** 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 other organizations.

Business process model

consists of a set of **activity models** and execution constraints between them.

Business process instance

represents a **concrete case** in the operational business of a company, consisting of activity instances. Each business process model acts as a blueprint for a set of business process instances.

Business Processes Management

Business process management

includes **concepts**, **methods**, and **techniques** to support the design, administration, configuration, enactment, and analysis of business processes.

Business process management system

is a generic **software system** that is driven by explicit process representations to coordinate the **enactment** of business processes.

Workflow Management

Workflow

is the **automation** of a business process, in whole or in 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

is a software 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 figure

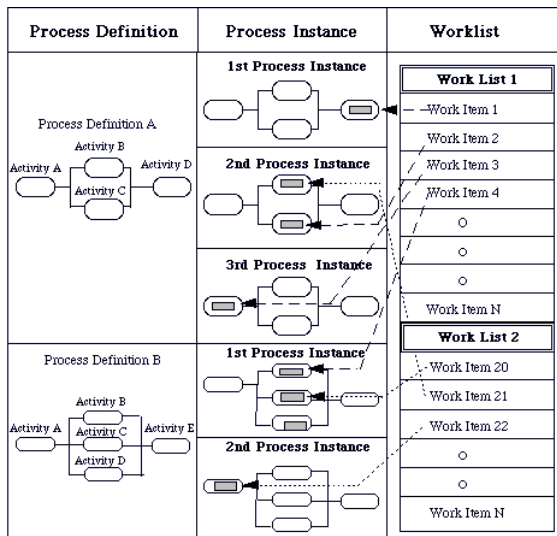
- **Participant** A resource which performs the work represented by a workflow activity instance. This work is normally manifested as one or more work items assigned to the workflow participant via the worklist.
- **Item** The representation of the work to be processed (by a workflow participant) in the context of an activity within a process instance.
- **Worklist** A list of work items associated with a given workflow participant (or in some cases with a group of workflow participants who may share a common worklist). The worklist forms part of the interface between a workflow engine and the worklist handler

Activities

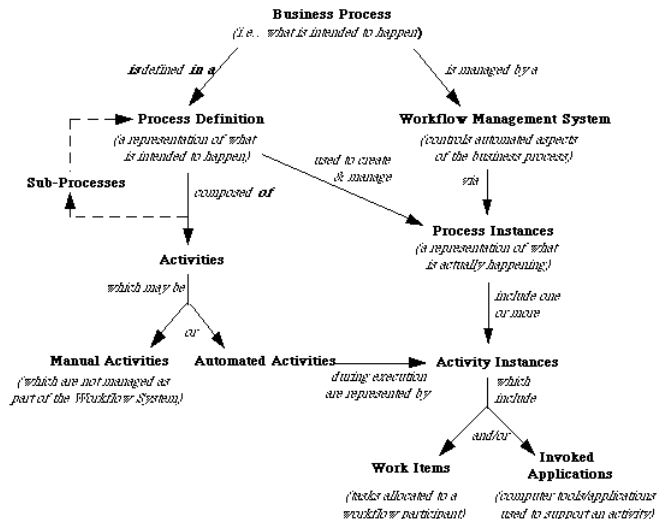
- **Activity** A description of a piece of work that forms one **logical step within a process**. An activity may be a **manual activity**, which does not support computer automation, or a **automated activity**.
 - ▶ **Manual Activity** An activity within a business process which is not capable of automation and hence lies outside the scope of a workflow management system. Such activities may be included within a process definition, for example to support modelling of the process, but do not form part of a resulting workflow.
 - ▶ **Automated Activity** An activity which is capable of computer automation using a workflow management system to manage the activity during execution of the business process of which it forms a part.

- **Process Instance** The representation of a single enactment of a process.
- **Activity Instance** The representation of an activity within a (single) enactment of a process, i.e. within a process instance.

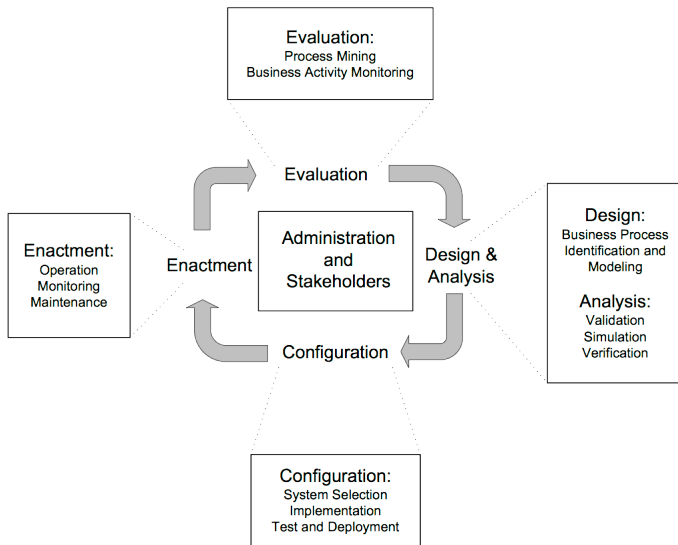
Business Process Relationships



Business Process Relationships

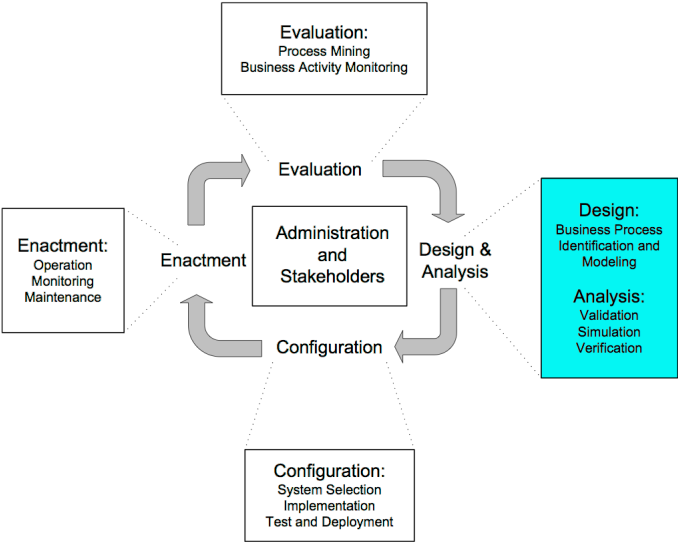


Business Process Lifecycle



M. Weske: Business Process Management,
© Springer-Verlag Berlin Heidelberg 2012, 2007

Business Process Lifecycle



M. Weske: Business Process Management.
© Springer-Verlag Berlin Heidelberg 2012, 2007

Design

- Involves **designing, modeling, evaluating, simulating, modifying** and **optimizing** processes.
- One must define, for each basic product or service the organization offers, the **activities involved**, the **relationships** among them, their **resource requirements** etc.
- Design decisions are usually made based on **experience** and analogy to previous designs, depending on the **nature** of business, its goals, standards, legacy, infrastructure etc

Validation

Workshops checking that model captures all possible instances. (Check if all valid process instances are reflected by the business process)

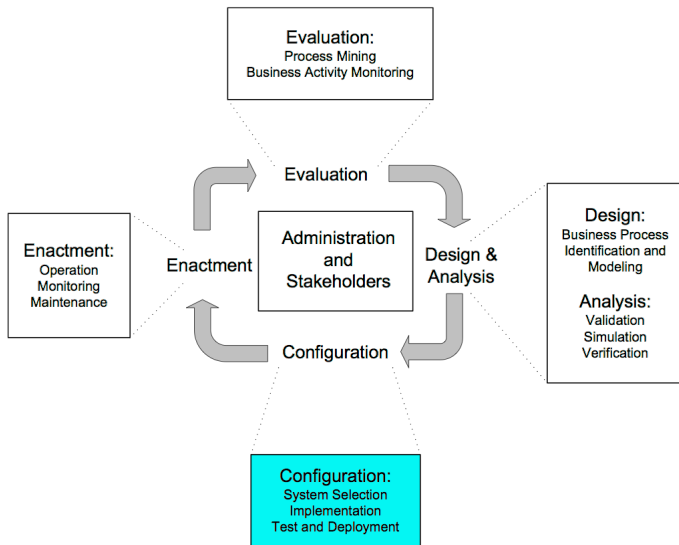
Simulation

allow stakeholders to **walk through the process** step-by-step and check if it exposes the **desired behavior** or **deficits**.

Verification

is used to check for the satisfaction of particular properties (e.g., no deadlocks)

Business Process Lifecycle



M. Weske: Business Process Management,
© Springer-Verlag Berlin Heidelberg 2012, 2007

Configuration

Business process needs to be implemented:

- set of **policies** and **procedures** (without any support by a dedicated business process management system)
- dedicate **software system**. The system should be configured according the organizational environment:
 - ▶ **interaction** (employees & system)
 - ▶ **integration** (existing software & BPMS)
- **transaction aspects** like atomicity, consistency, isolation and durability (to system failure).

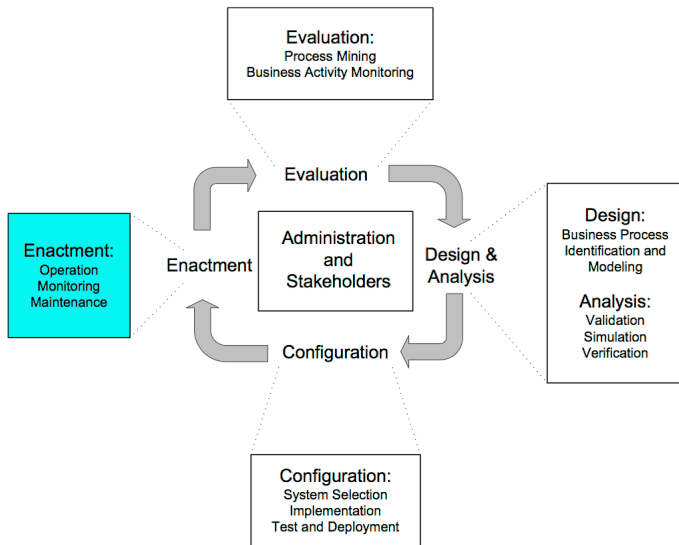
Configuration: Test

- 1 Implementation then needs to be **tested** to detect potential runtime problems:

Integration & performance tests

- 2 Finally, the business process system is **deployed** in the target environment
- 3 Additional steps might be required, such as:
 - ▶ **Training** of personnel
 - ▶ **Migration** of process data to the new applications

Business Process Lifecycle



M. Weske: Business Process Management,
© Springer-Verlag Berlin Heidelberg 2012, 2007

Enactment: operation

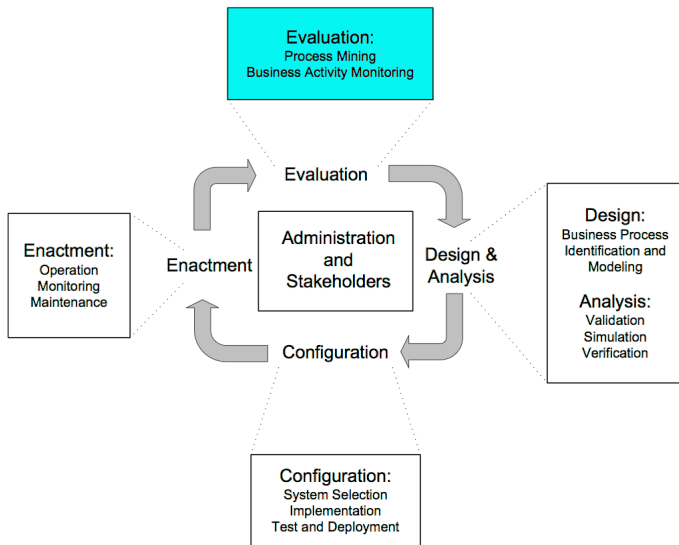
Business process instances are **initiated** to fulfil the business goals of the company.

- **Initiation** usually follows a defined **event** (e.g. receipt of an order)
- Activities have to be **orchestrated** to ensure **correct sequencing** specified in the process model and that **compatible variants** of the activities are performed
- Coordination takes place via mechanisms such as events, **message passing**, **document transfer** etc.

Process monitoring provides accurate **information** (e.g., notification about completed tasks, delays, interrupts) on the **status** of process instances (the state in particular) & **statistics** on process performance.

- Log data consist in a set of **log entries** indicating **events** that have **occurred** during the process execution

Business Process Lifecycle

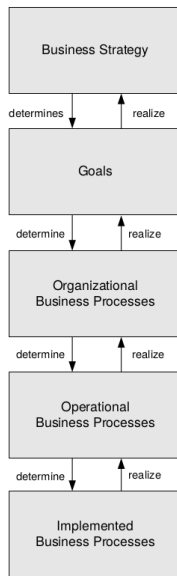


M. Weske: Business Process Management,
© Springer-Verlag Berlin Heidelberg 2012, 2007

Evaluation uses information available to **evaluate** and **improve** business process models and implementation, by means of **process mining** and **analytics**.

- **Quality** of business process models
- **Adequacy** of the execution environment

Organization vs Operational



Classification

- Degree of Automation
- Degree of Repetition
- Degree of Structuring

Questions?