COMP2332:
Enterprise Healthcare Business Process Modelling

Business Process Modelling

Time: **Mon+Wed+Sat: 11:00-11:50**

Location: **Bamieh002**

Section: **1**

HiCure
Excellence in Health Informatics Integrated Curricula

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Business Process Modelling

- Introduction & Fundamentals
- Motivation
- BP: Life Cycle
- BP: Components
- BP: Modelling in EPC
- BP modelling languages

Business Process Modelling: What?

- Business process modelling (BPM) is:

the activity of representing processes of an enterprise, so that the current process may be analysed and improved.

- BPM is performed to improve process ***efficiency*** and ***quality***, typically by business analysts & managers
- Process improvements may or may not involve IT, but ***IT is a common driver*** behind modelling a business process.

BPM: For What?

- Business models are an *excellent communication tool*
- Business professionals can model alternative options
- Business models are key element for designing ***physical IT architectures***
- Helps to utilise ***IT*** for improving ***business outputs***
- BPM seeks to improve an organisation's process flow to be
  - more *effective*,
  - more *efficient* and
  - capable of adapting to *changing business needs*

- BPM is employed to reduce:
  - *miscommunication* between stakeholders
  - *human error* in process design and
  - define *clear roles for stakeholders* for each of the business processes.

BPM: Why?

- Business process modelling helps organisations:
  - To become more ***process-oriented***
  - To ***optimise*** *business processes* using process change management (i.e. long term planning, execution & control of processes)
  - To document and manage processes continuously
  - To ***simulate*** processes before enacting them
    - e.g. using Monte Carlo simulation & Discrete Event Simulation

BPM: How?

- Enables to answer key organisational questions :
  - Which steps are really **necessary***?*
  - **Who** should do them (i.e. defining Roles)?
  - Should they be kept **in house** or **outsourced**?
  - **How** they should be done?
  - What **capabilities** are needed?
  - What **results** do we expect and how will they be monitored?
- Without clear business processes, answers are often vague and different for different organisations

BPM: Benefits

- Formalize existing processes
- Identify needed **improvements**
- Facilitate **automated**, efficient process flow
- Reduce **time** by automating tasks
- Increase **productivity**, decrease wasting **resources**
- Helps to solve difficult **problems**
- Simplify regulations and compliance issues.

Motivation: Why Process modelling?

What...

- Does it represent a process that can eventually work in real-life?
- How is all information interconnected?
- How do we know which are the process requirements and responsibilities?
- How can we be sure an activity flow is correctly defined?
- How important an activity is and how is it efficiently executed?

How?

- Takes into account all parameters and simulates all alternatives
- Depicts and models the correlations
- Describes the resources needed with appropriate roles assigned
- Incorporates the business rules, the legal framework requirements and all supportive information to explain why everything is happening
- Defines priorities and intelligently routes the “traffic”

BPM is Important, because

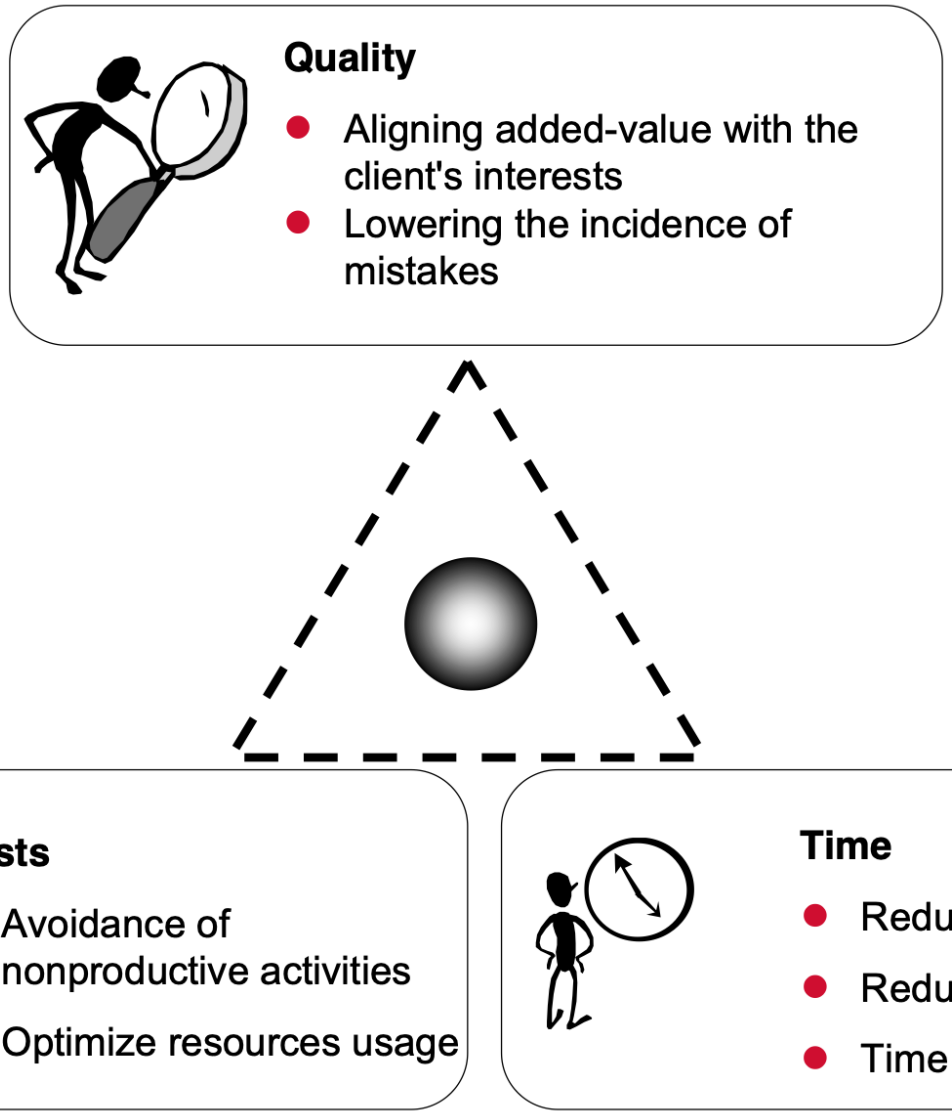
- For Economical reasons
  - Competition
  - Cost reduction
  - Merge/Acquisition
  - Performance
- For better IT decisions
  - Decentralized/centralized
  - Web services/BPML
  - Integration
  - Multiple platform

BPM Key objectives

- To describe business **processes** and business **data**.
- To model business processes beyond just functional **boundaries** and company boundaries
- To reveal **inefficiencies** in existing organisational process structure
- To define clear definition of **responsibilities**

=> Achieve transparency of business processes

BPM Key objectives

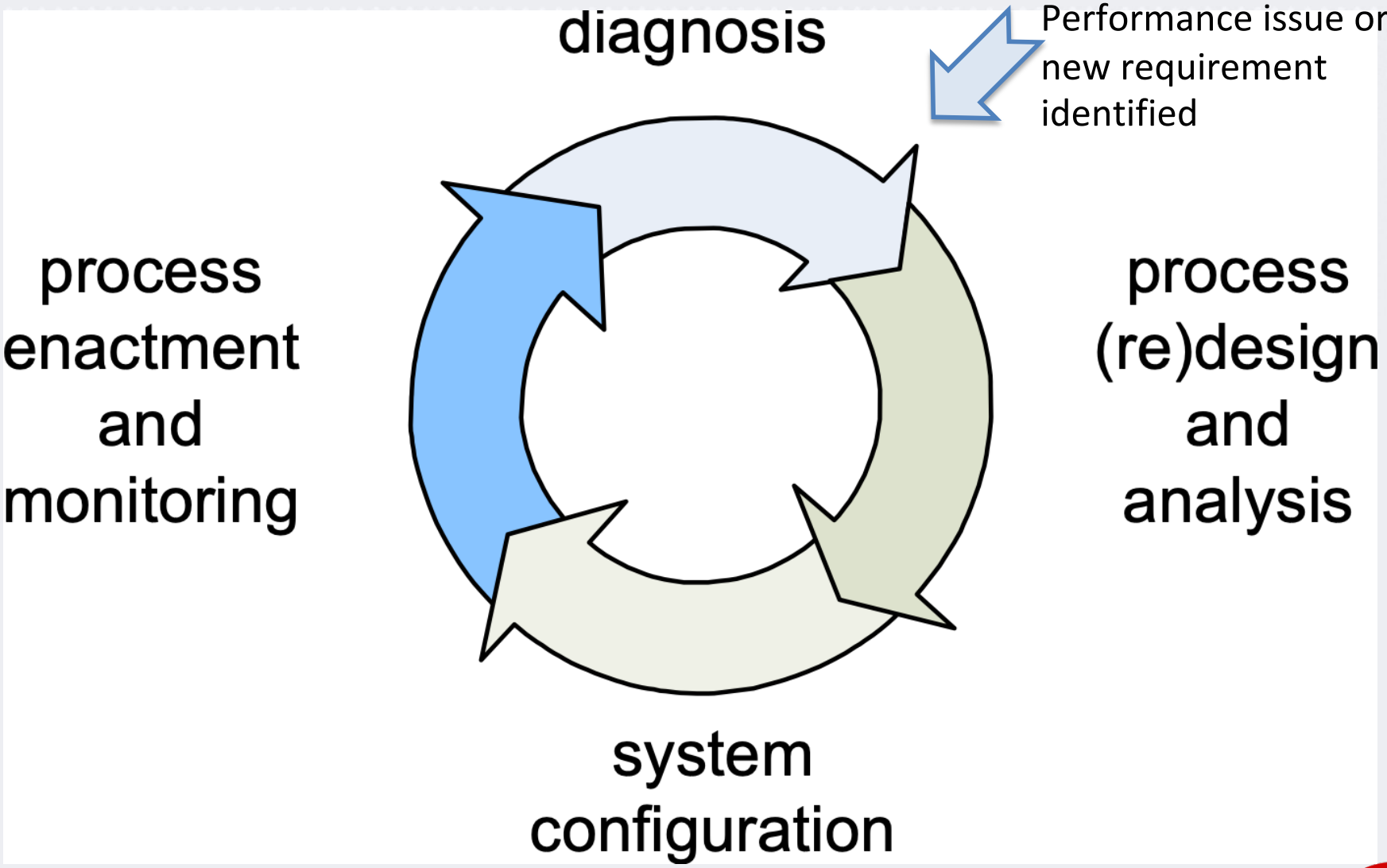


Business Process Modelling Life Cycle

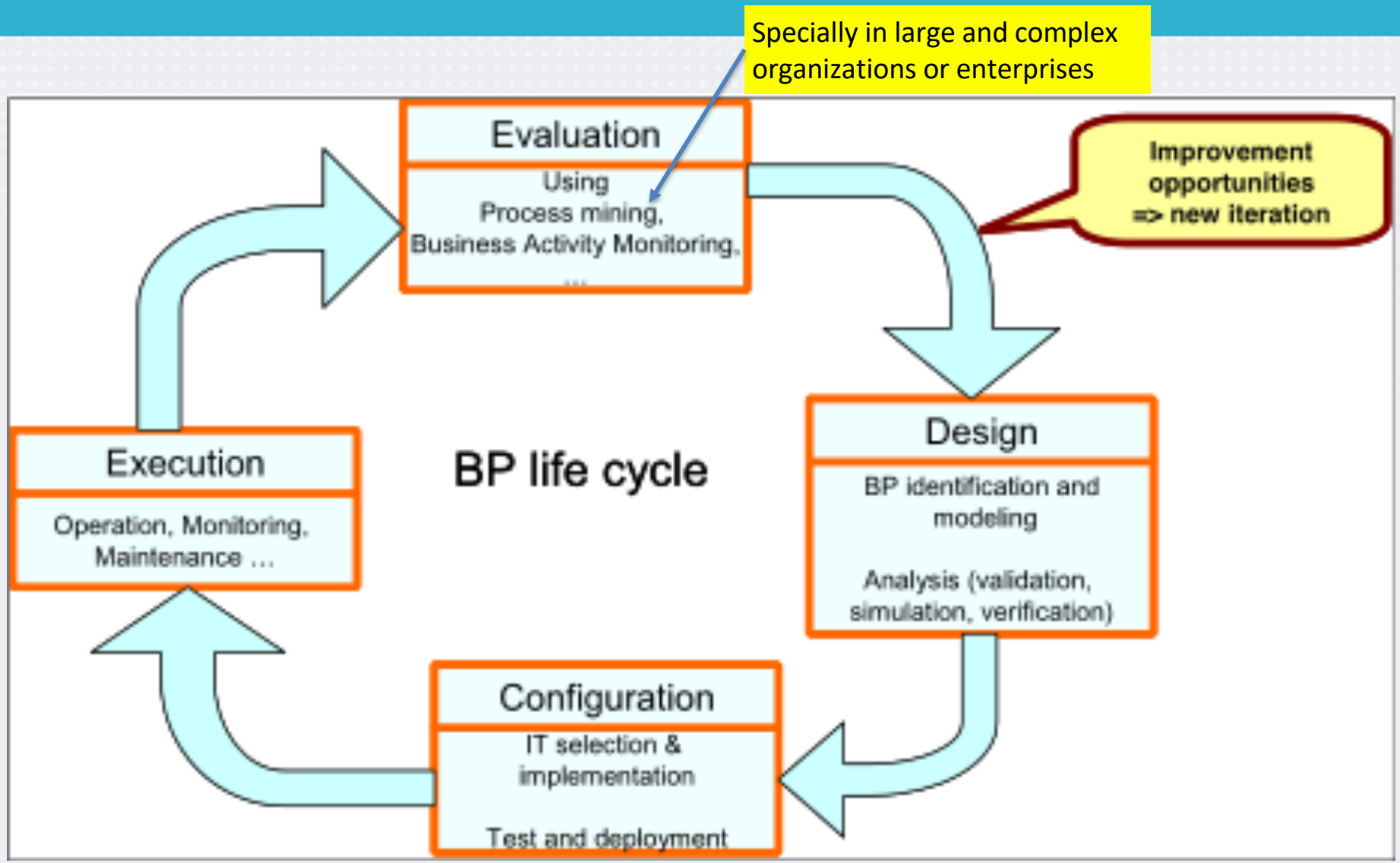
- **Design phase**: designs the process structure
- **Configuration phase**: creates/codes process model into organisational software systems.
- **Enactment** (execution) / **monitoring** phase: runs and monitors process execution, to see if the new design or the made changes improved efficiencies.
- **Adjustment** phase: adjusts processes based the previous phase outcomes.
- **Diagnosis**/requirements phase: evaluates the process and monitors new requirements (new policies, laws, etc.).

=> Poor performance or new requirements may require a new iteration of all the lifecycle.

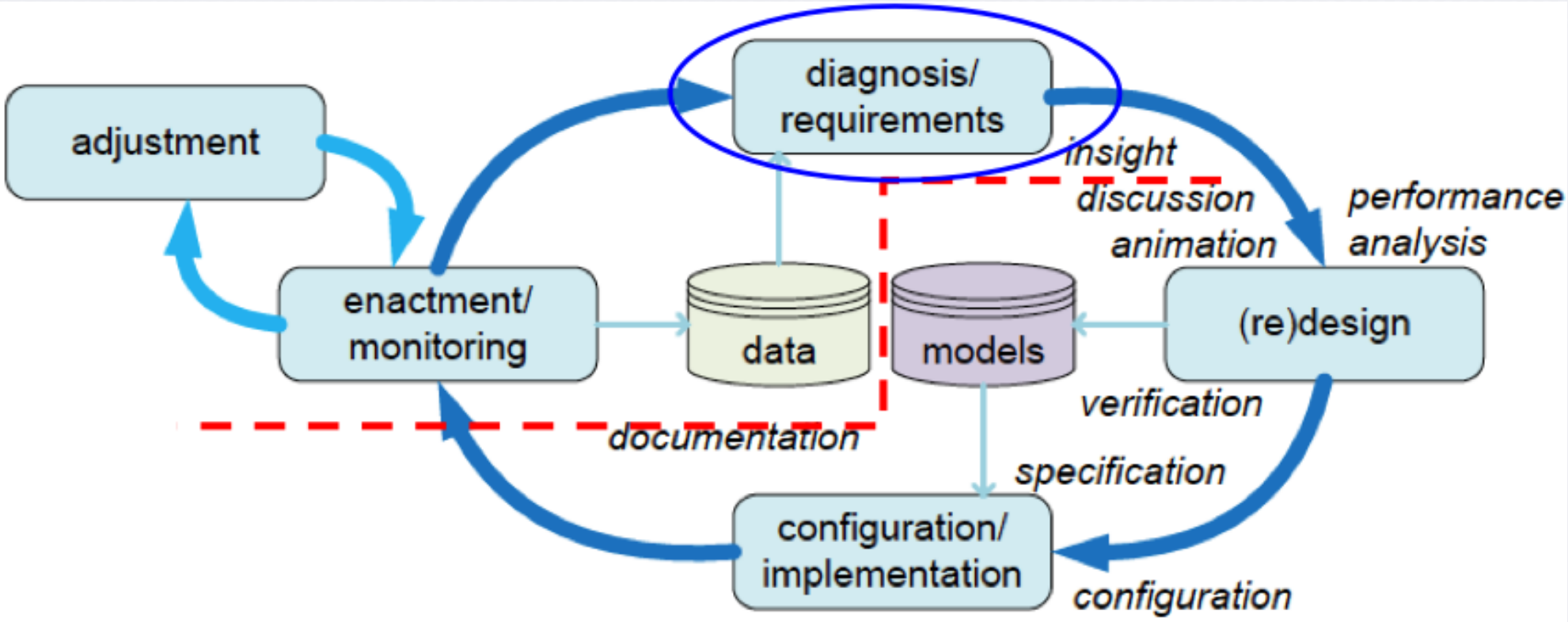
BP Model Life Cycle



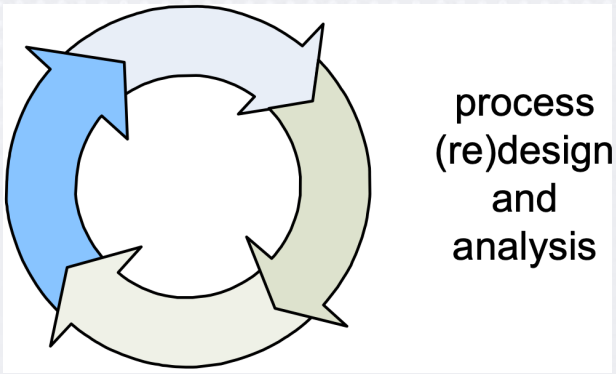
BP life Cycle



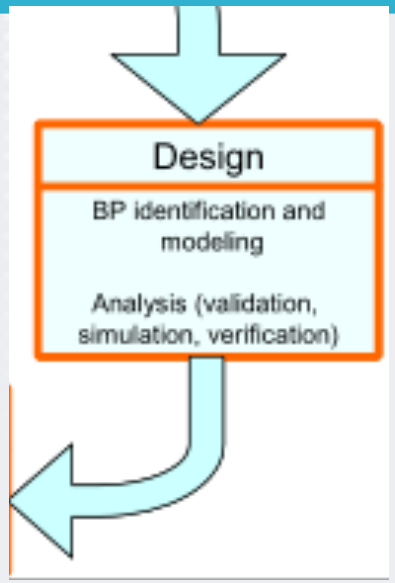
BP Modelling Life cycle



Modelling in EPC



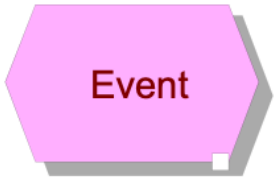
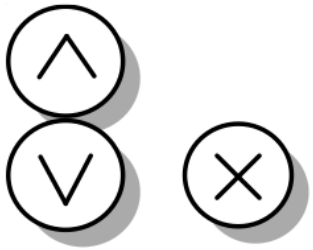
process (re)design and analysis



Design: Developing a business process Model

Modelling in Event-driven Process Chain (EPC)

Objects of EPC

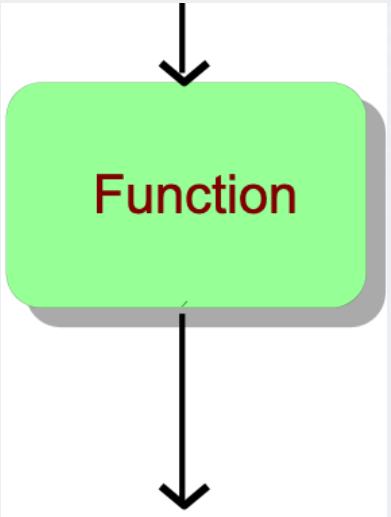
	Describes a specific state the process arrives at. Events can trigger further actions or describe results. An eEPC always has start and an end event.
	Describes an action which is executed because a certain state was reached and also triggers a new state. A purely manual action is depicted by a **green** function. Further objects may be connected to a function.
	Describes the interface to an up- or downstream process. Is named after the corresponding process and is also a type of function.
	Arrows connect objects.
	Connectors connect an object indirectly with other objects. As events and functions may only possess one ingoing and one outgoing arrow, connectors offer the possibility of connecting, for example, a function and two downstream events. The connector type describes which relationship exists between the events: Either only one of the events occurs or multiple events occur siloultaneously.

Rules for EPC Design

- Process chains always *start* and *end* with an *event* (or a process interface)
- Event name corresponds with state (for example: e-mail arrives)
- Function name corresponds with the given task (for example: answer e-mail)
- Set order: event → function → event
- ”Trivial events“(e.g. that do not trigger a function) may be omitted
- Functions and events always possess an entrance and an exit
- Connection via logical operators

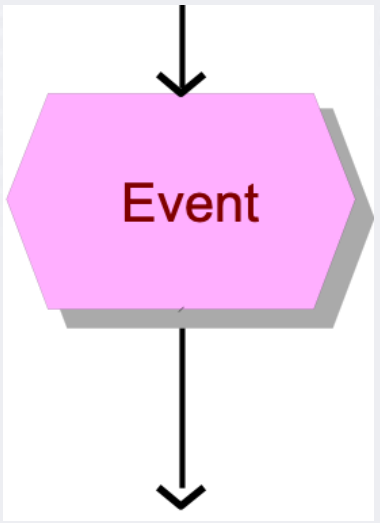
EPC Function

- " a ***Function*** is a task or action performed on a specific object in order to reach one or more business goals. A function is always time consuming"

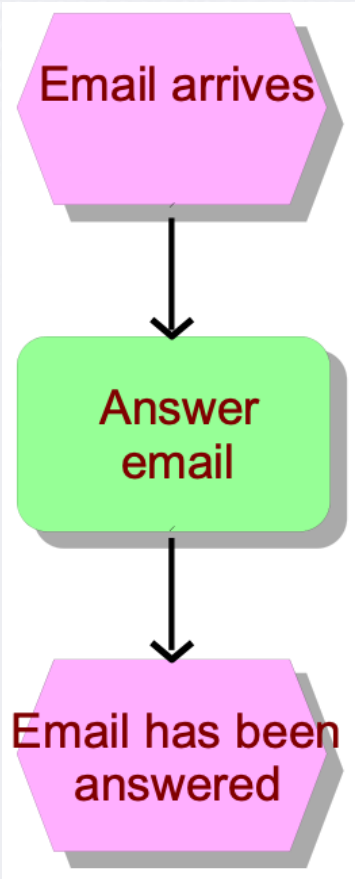


EPC Event

- An **event** is the occurrence of a business relevant state of an information object
- An Event steers or influences a business process.
- Events trigger functions and are in turn the results of functions.
- An event is always related to a point in time.



EPC Structure



- By connecting alternating events and functions so called event driven process chains arise.
- An event driven process chain shows the logical and temporal progress of a business process.

Types of Connectors

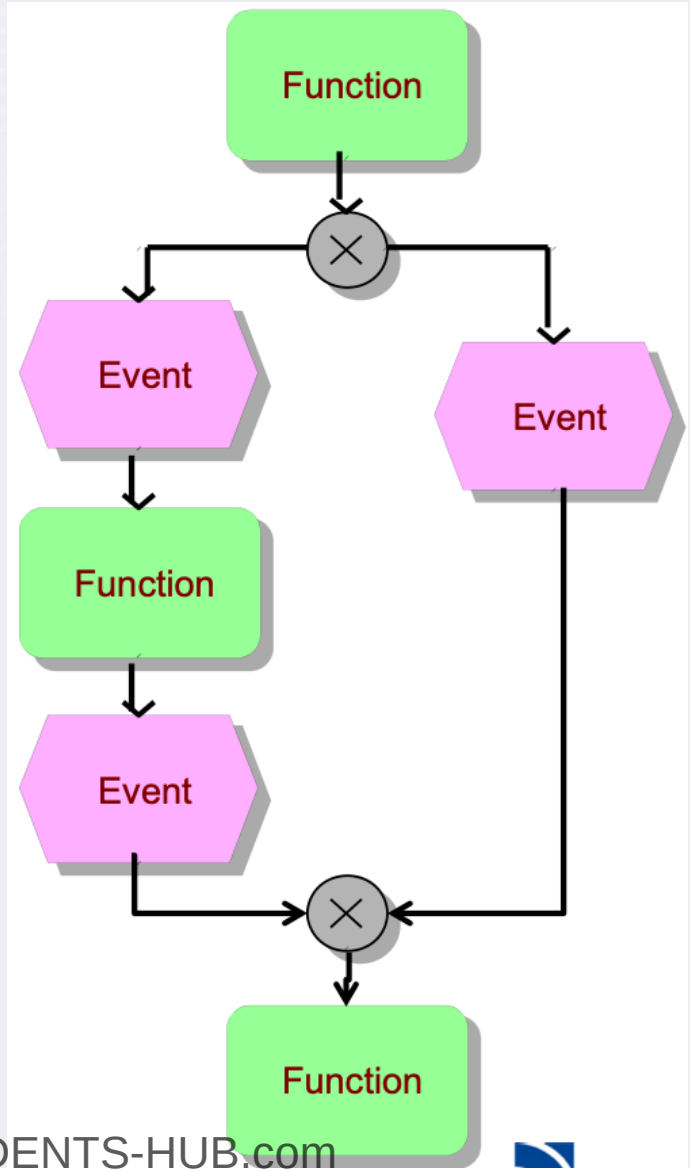
✓ OR (and/or – connector):
If it‘s raining or snowing i won‘t go out.

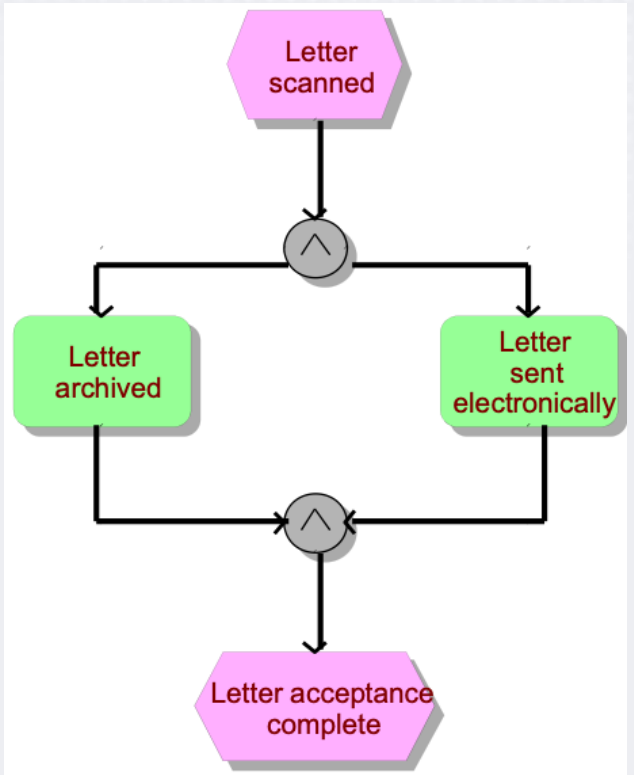
✓ AND (Parallelisation of actions):
Mail is sent and electronically archived.

✓ X-OR (exklusive or: either – or):
Request is conveyed either via mail or by telephone

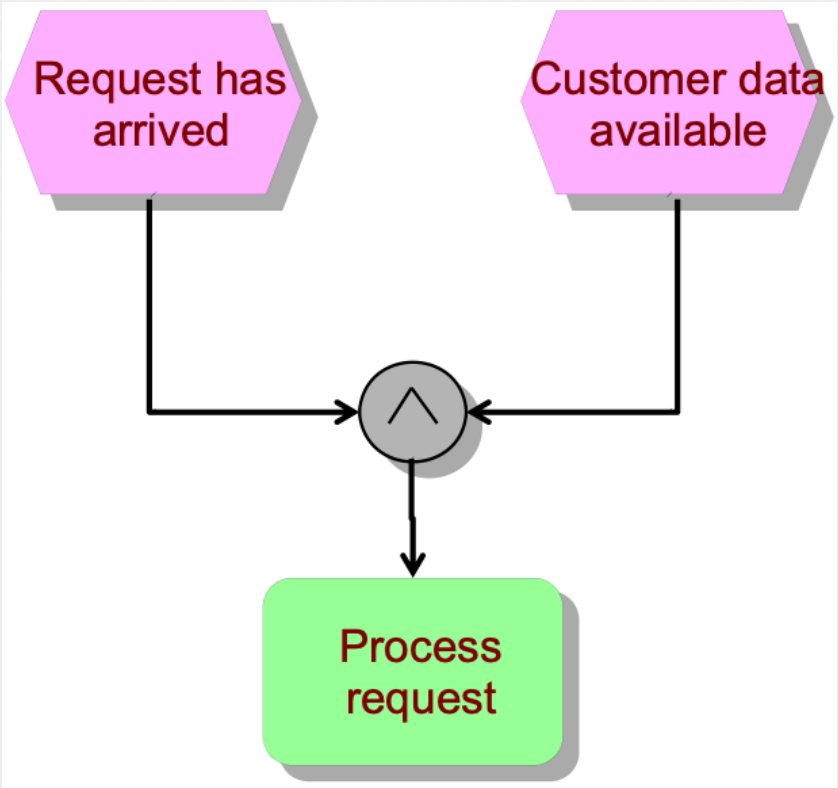
Connectors

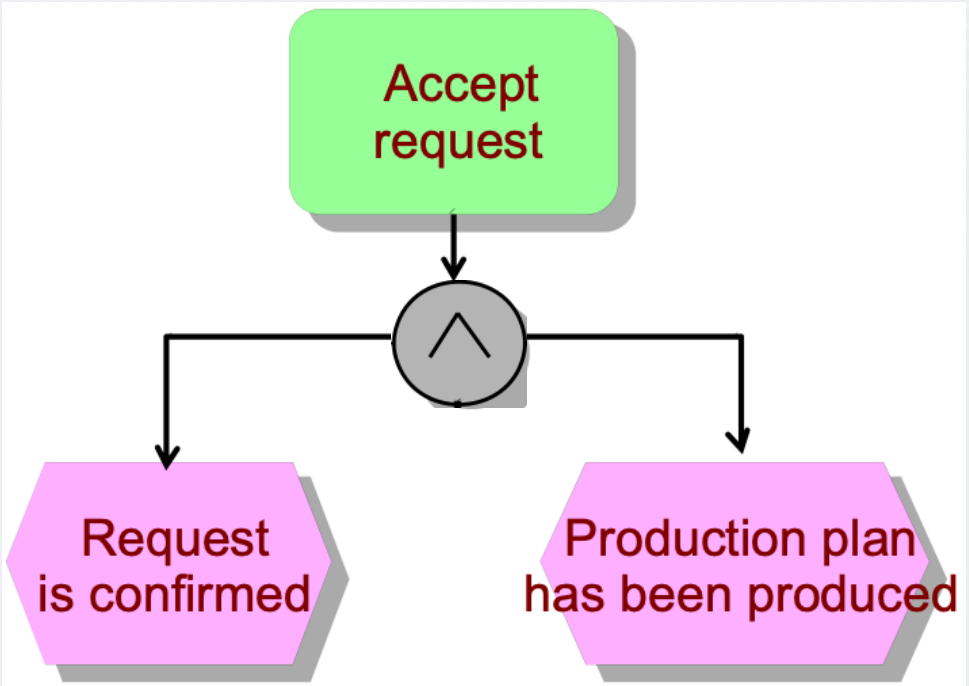
- Opening and Closing connectors



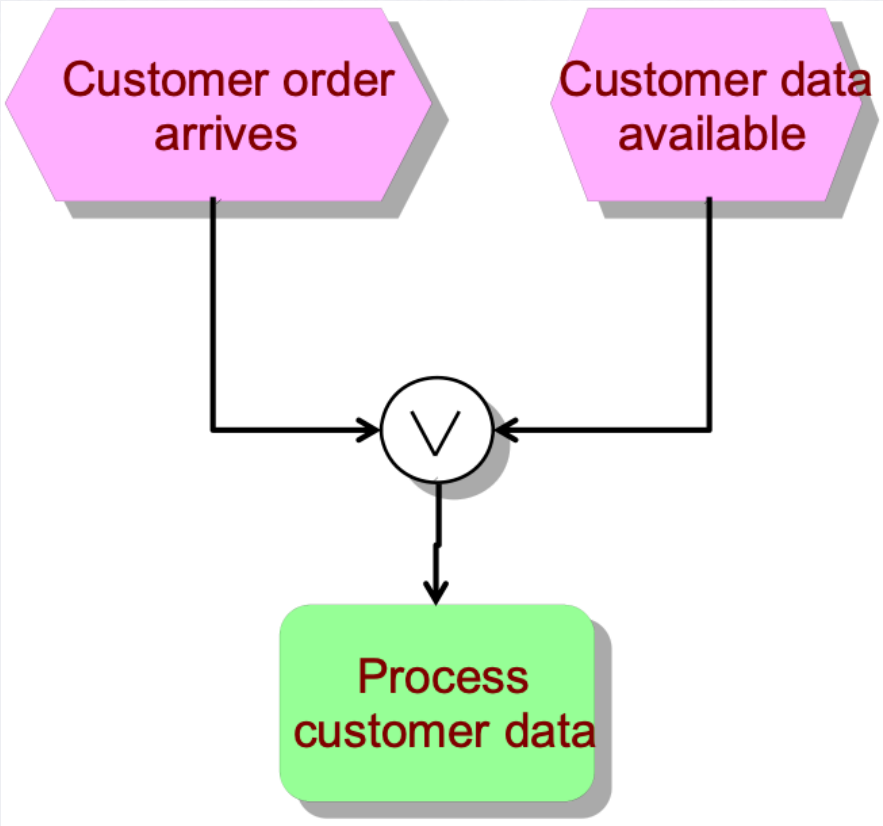


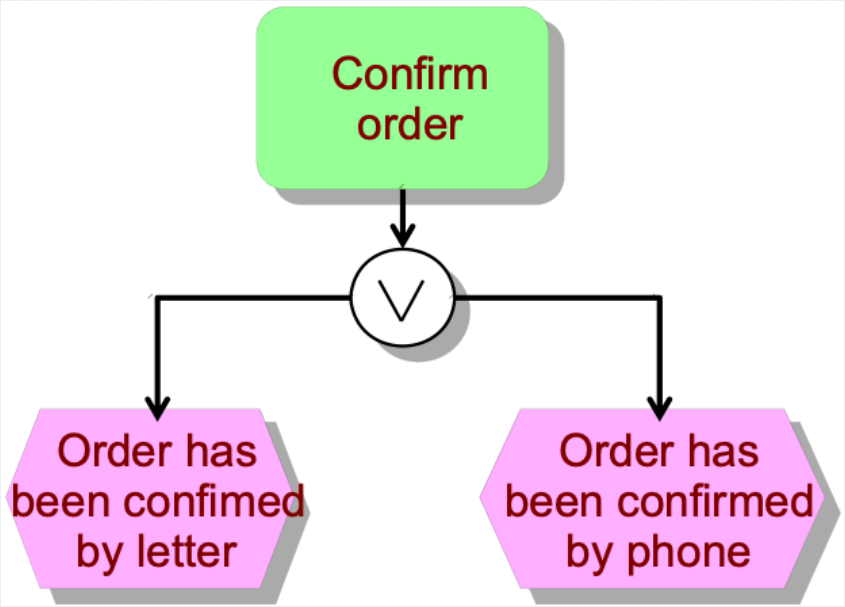
AND connector



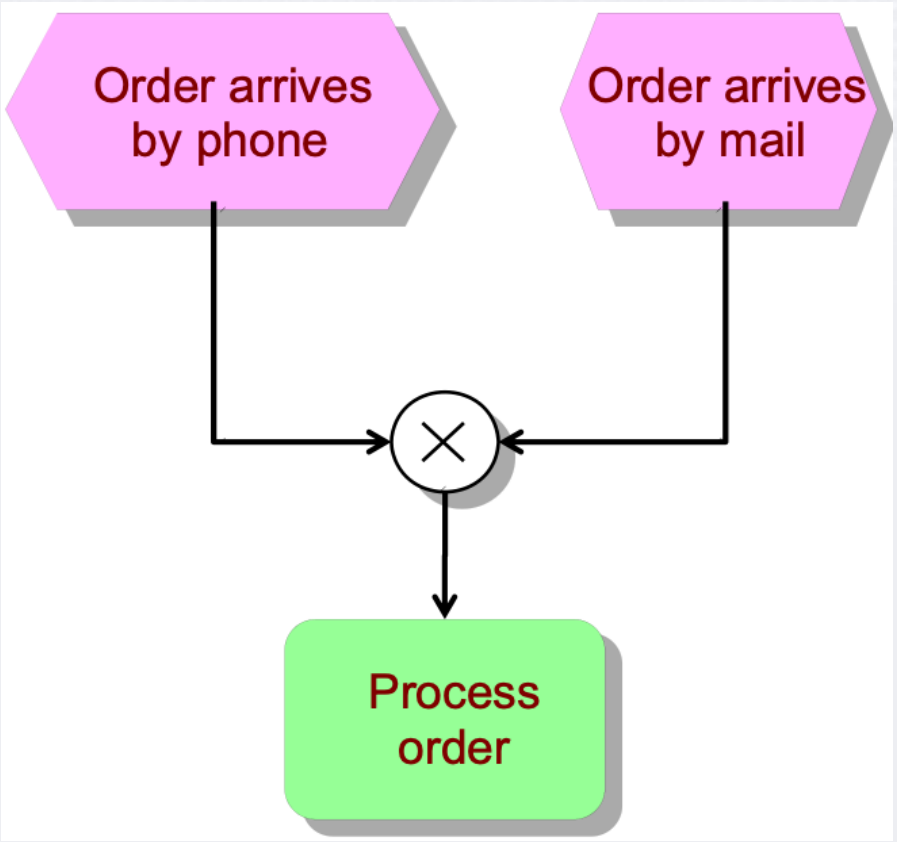


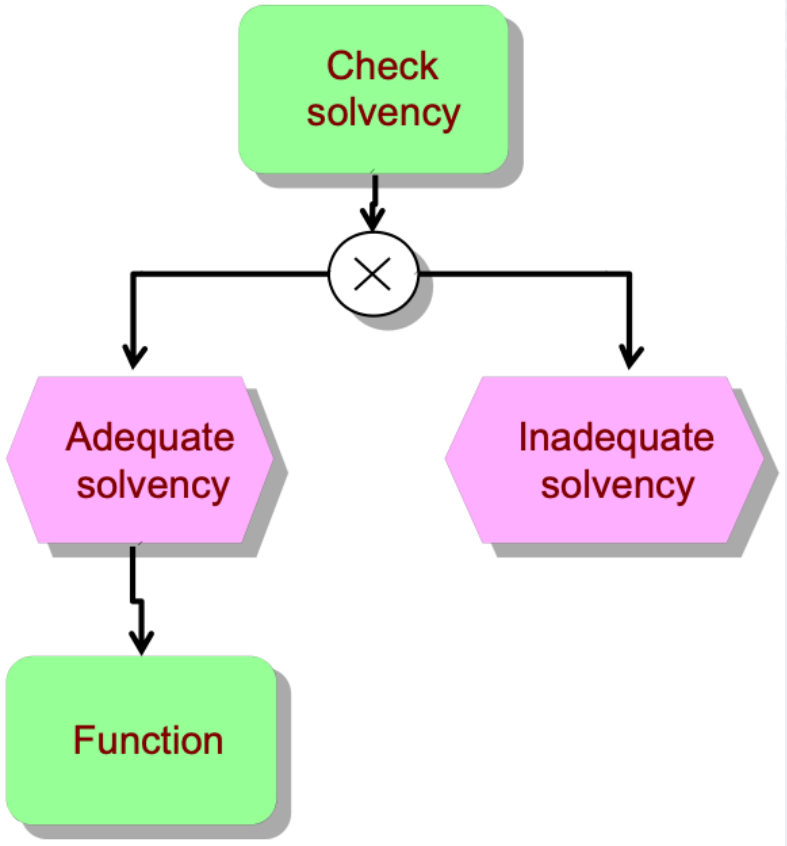
OR connector





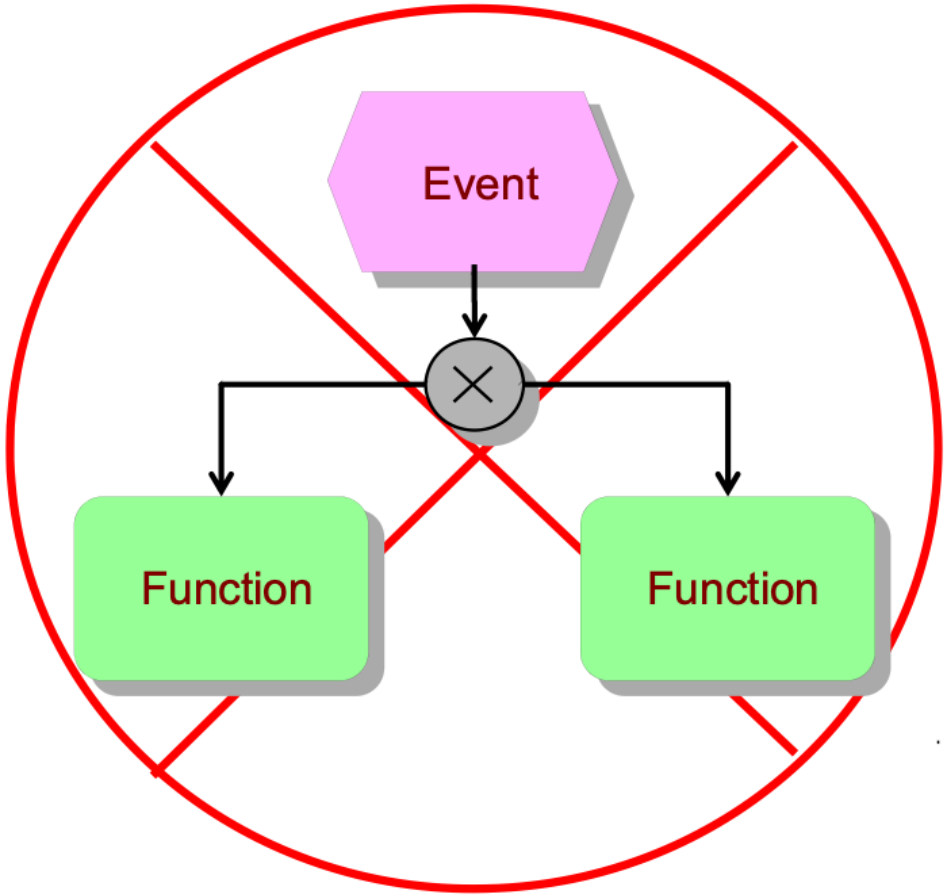
XOR connector

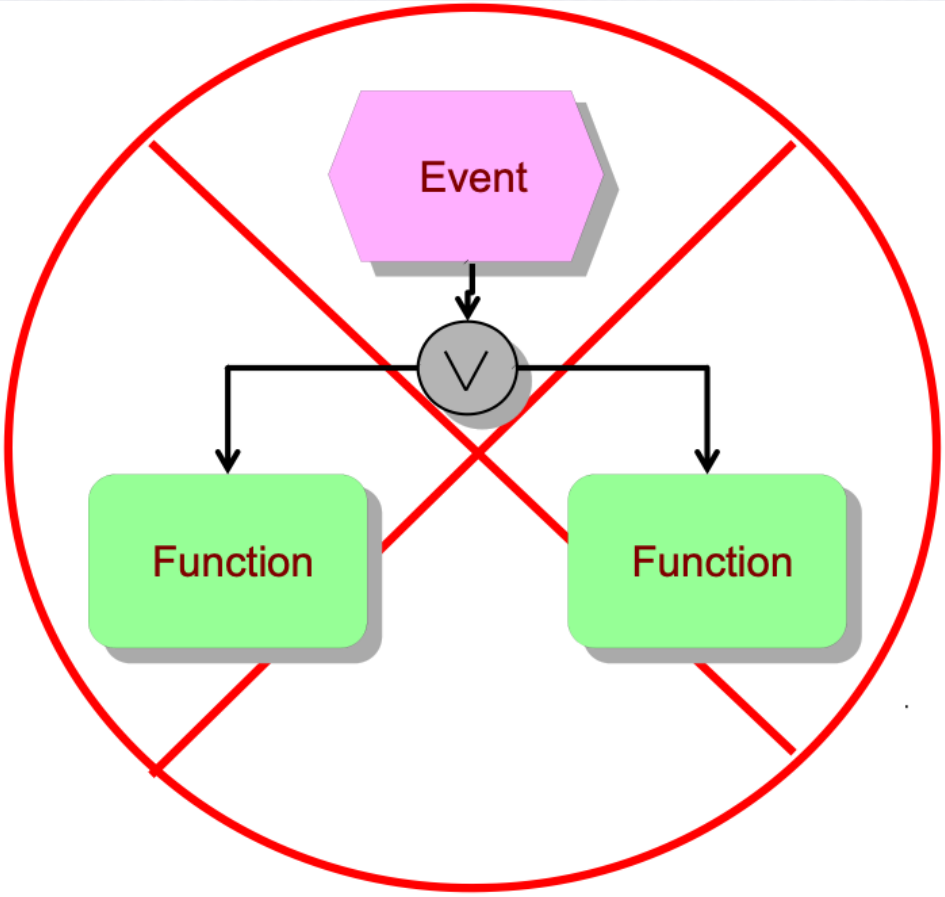




Wrong Connectors

- Wrong XOR, OR connectors, e.g.



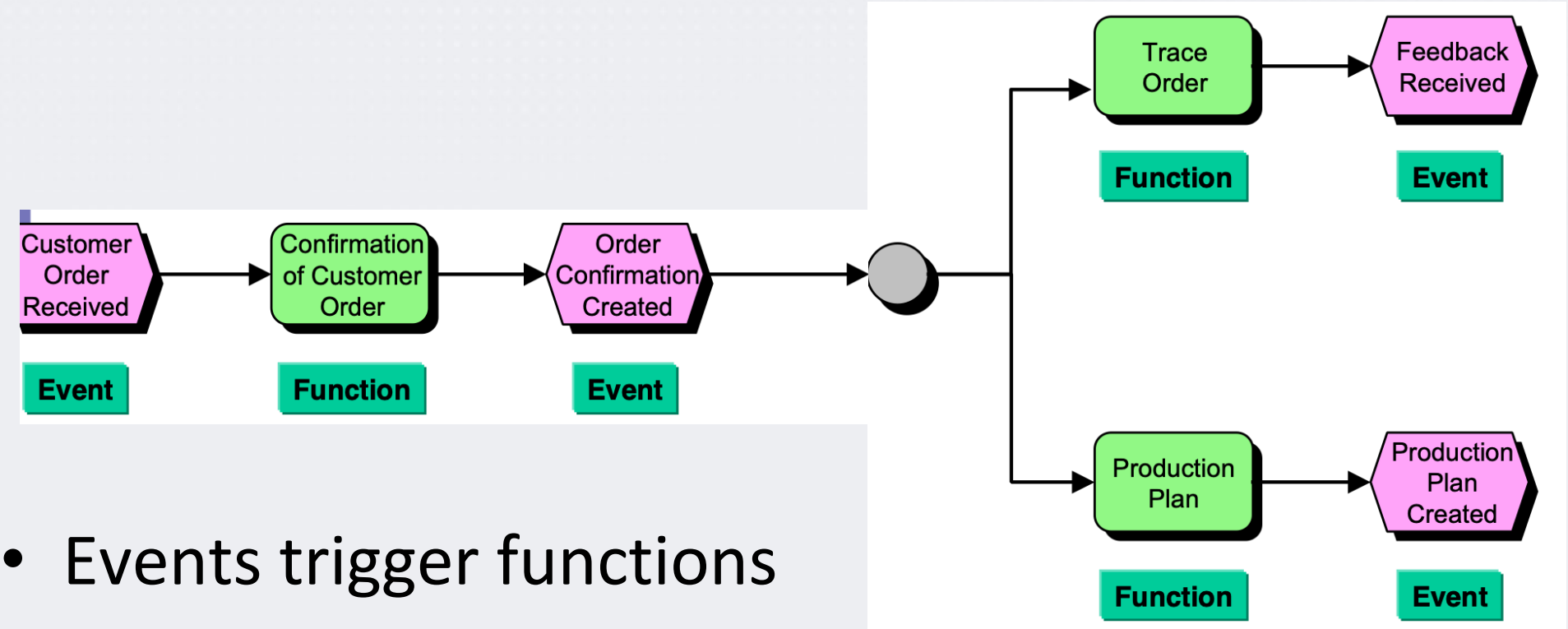


EPC Modelling Example

- EPC can generate complex models
- Complete EPC model must include:
  - Event process chains: Events and functions
  - Required/generate data
  - Employees/Roles undertake functions
  - Organisational units that include Employees/Roles

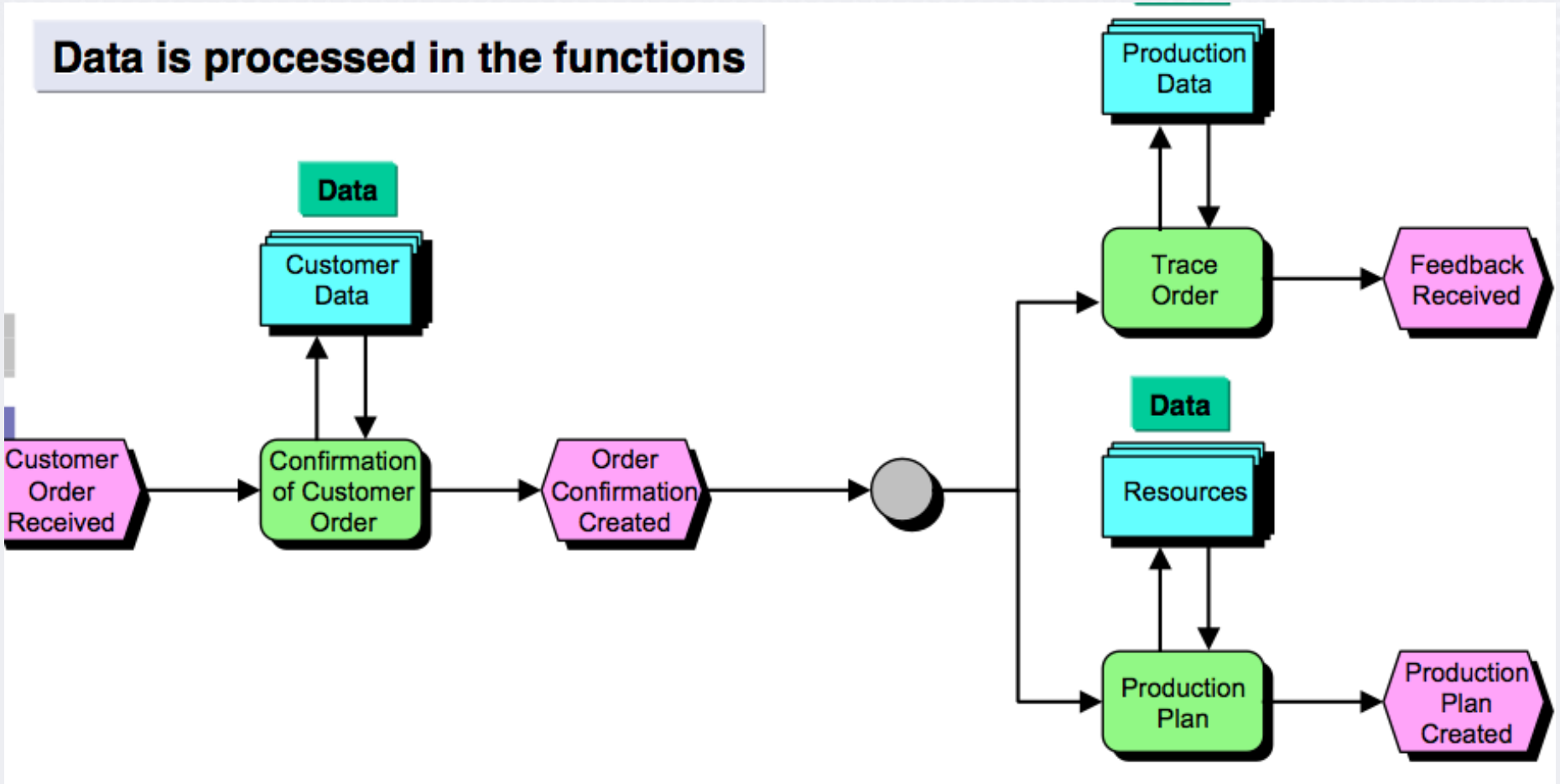
BPM life cycle: BP Components identification and Building

- Event-Driven Modelling: Event Process Chain

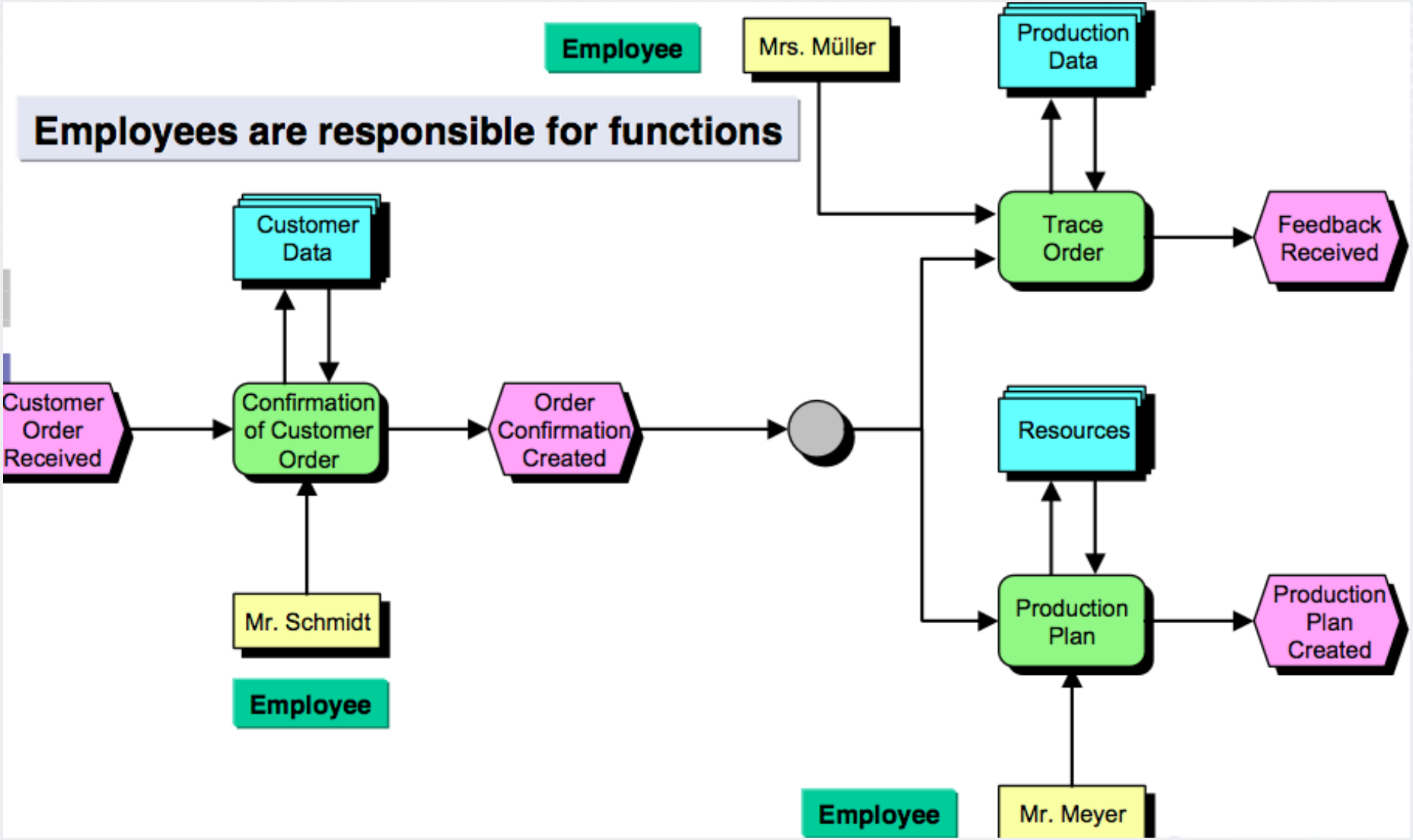


- Events trigger functions
- Functions generate Events

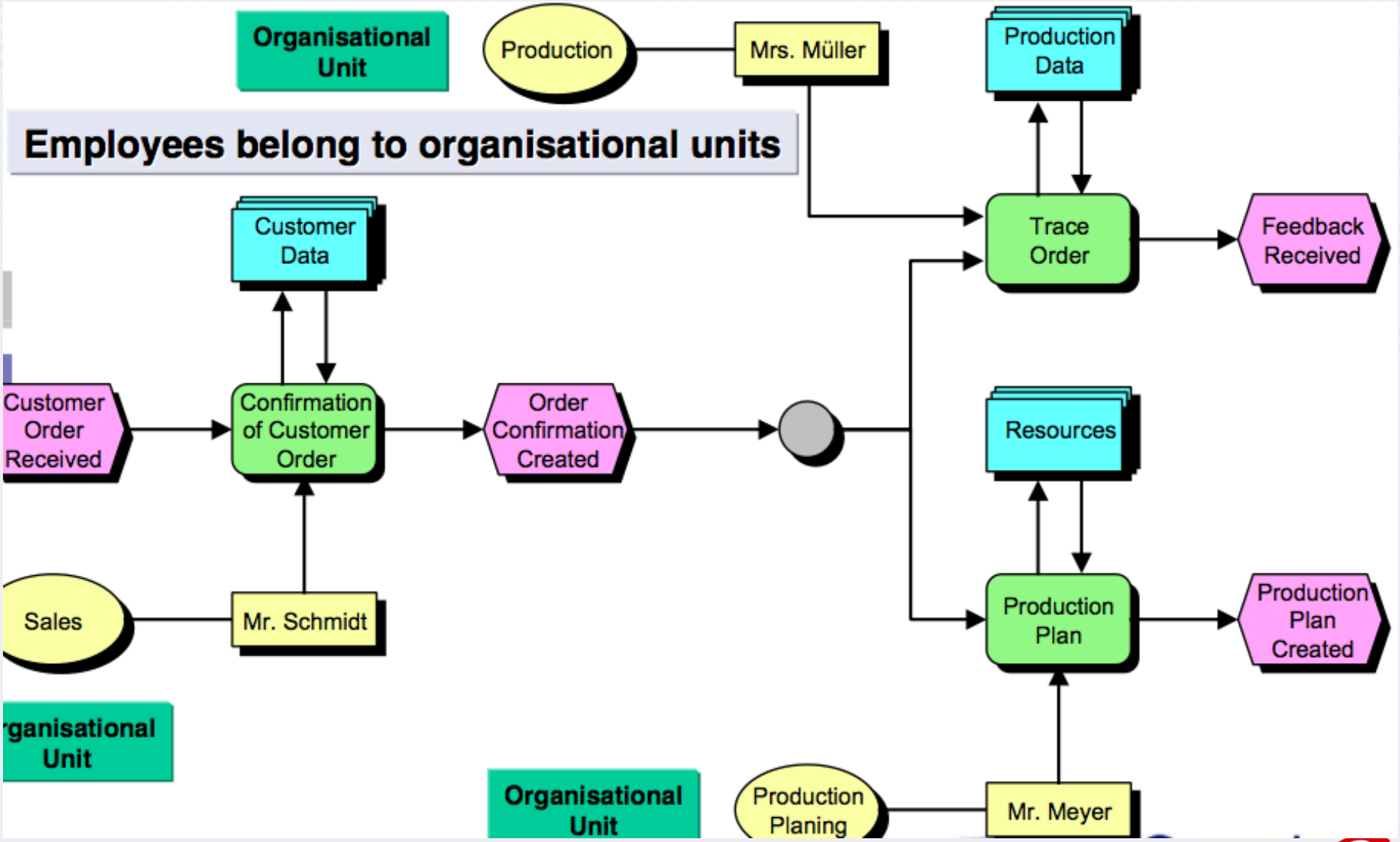
BPM life cycle: BP Components identification and Building



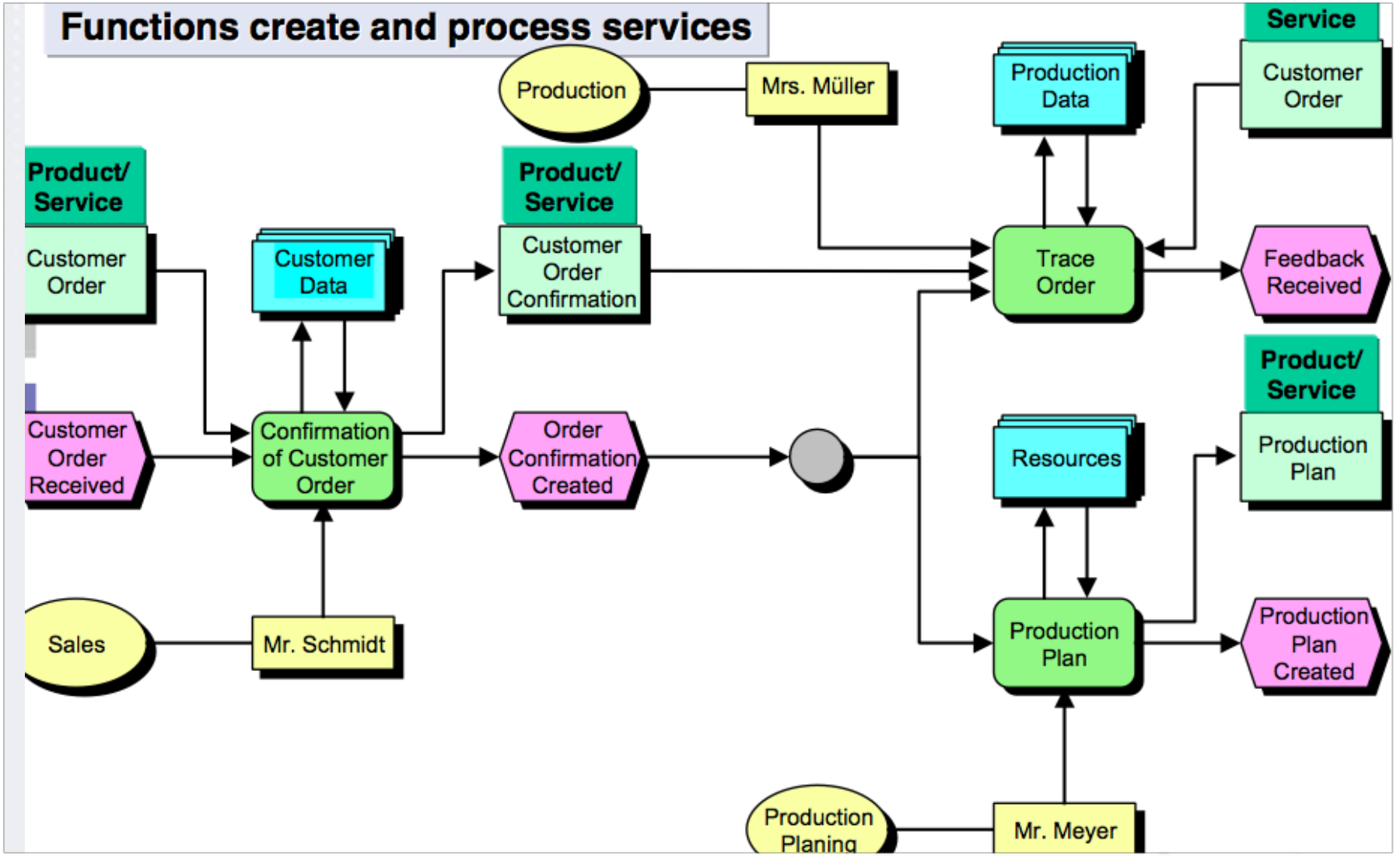
BPM life cycle: BP Components identification and Building



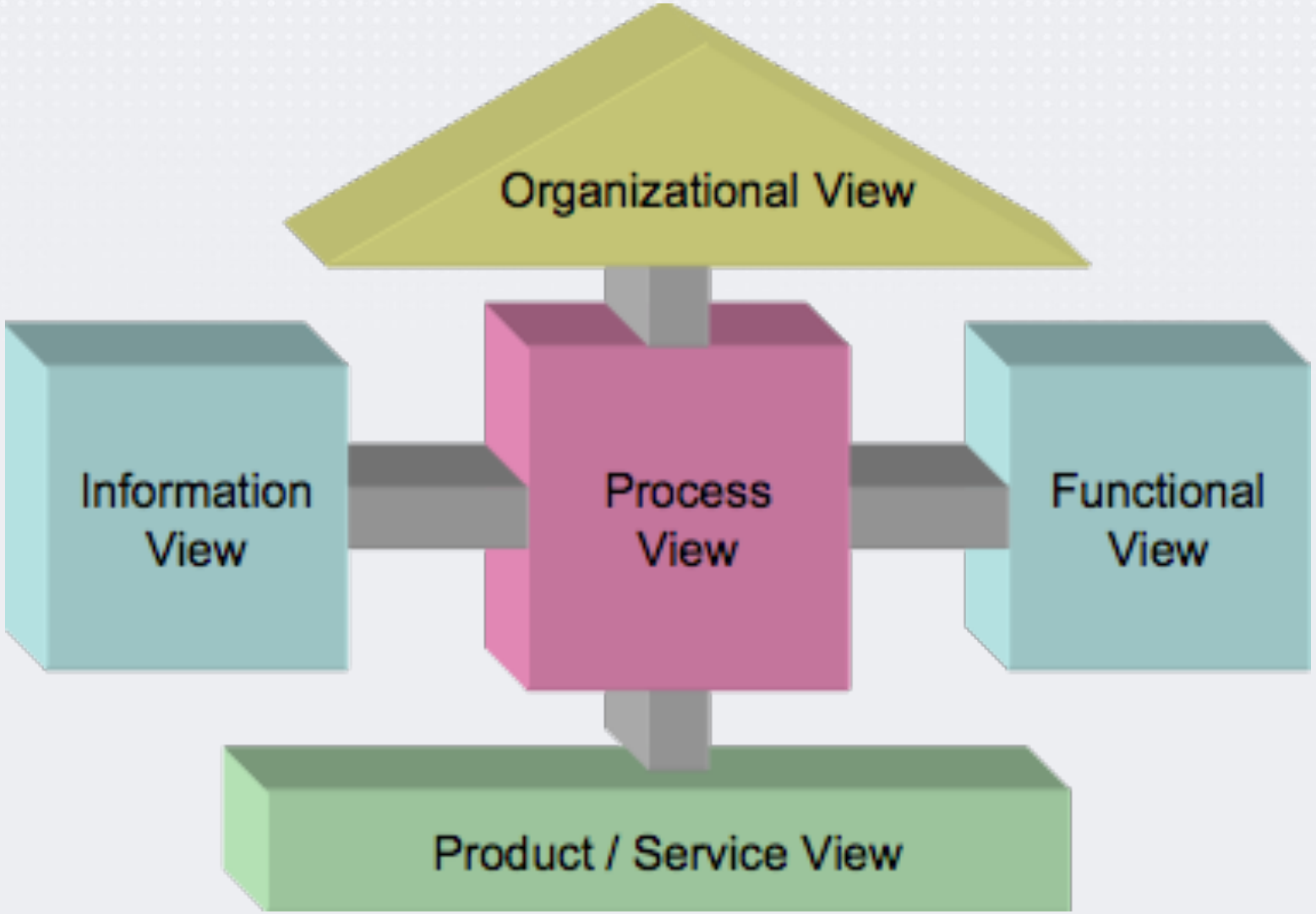
BPM life cycle: BP Components identification and Building



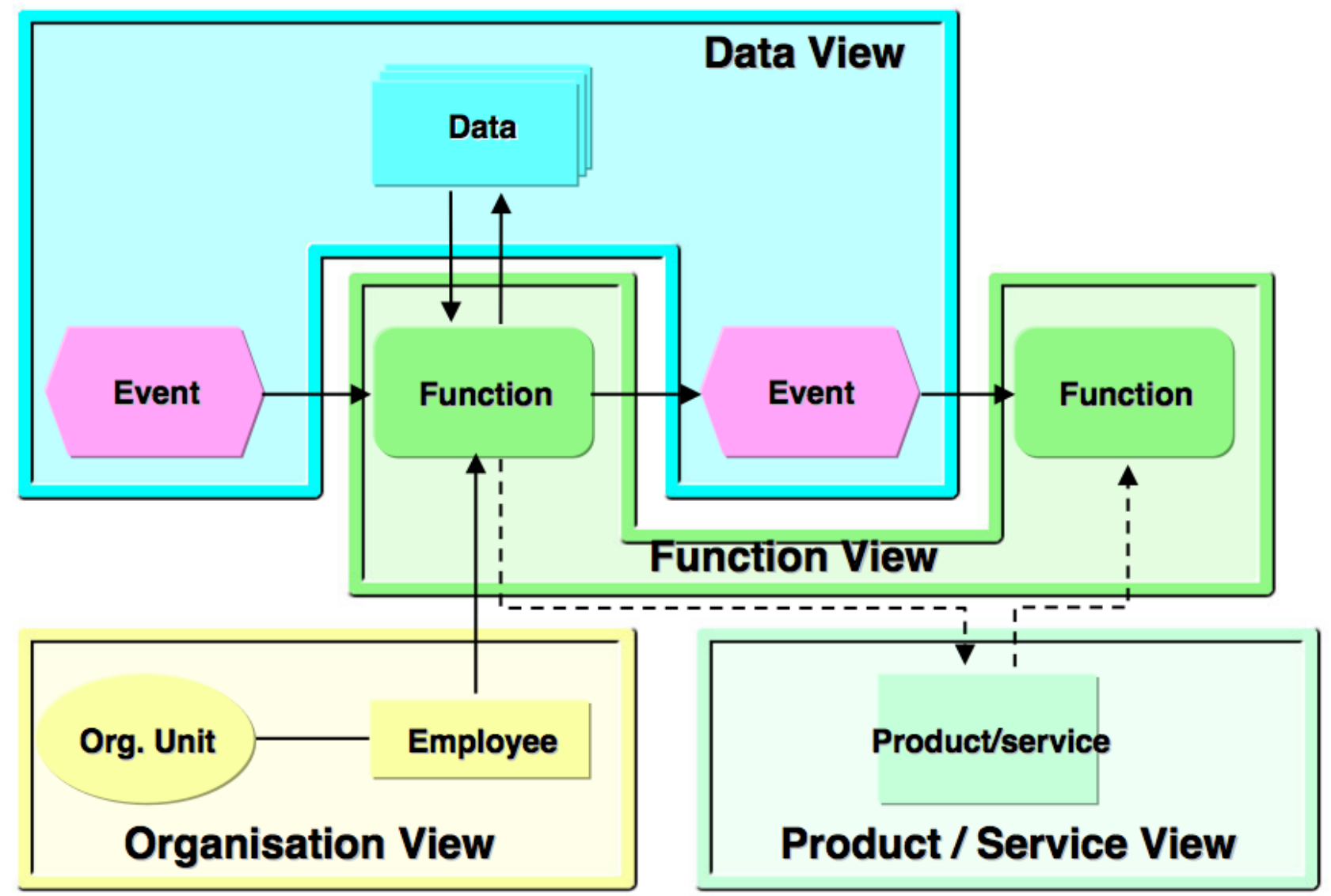
BPM life cycle: BP Components identification and Building



BP reduces complexity: through views

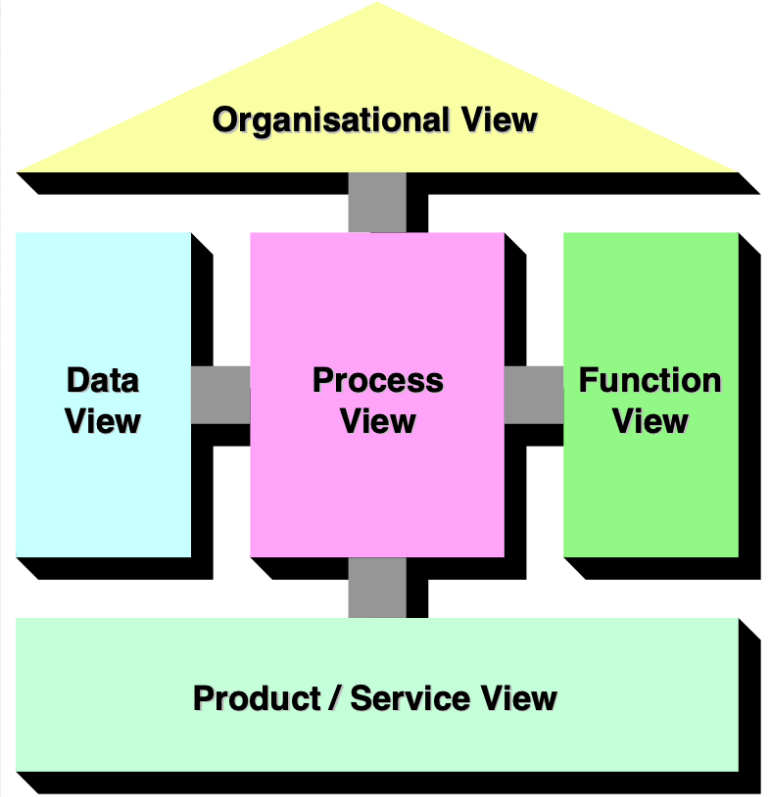


Reduced Complexity, through Views



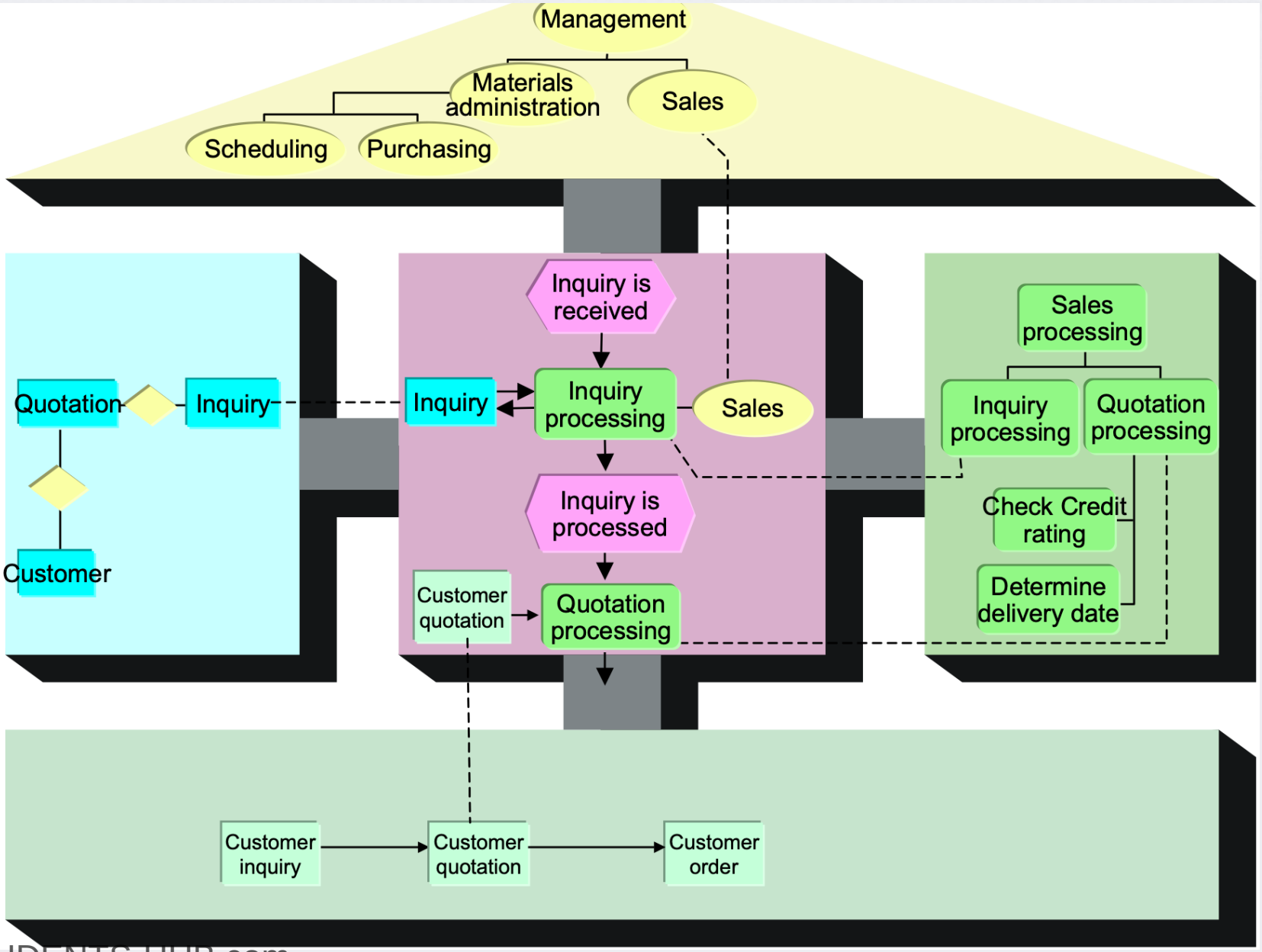
Simplified View

- Data View
  What information is important? (ie.: Customer, Supplier, Product, Material Calculation)
- Function View
  Which functions will be performed? (ie.: Production Plan Creation, Order Processing)
- Organisation View
  Which organisational units exist? (ie.: Purchasing, Sales, Accounts)
- Process View
  The relationship between data, functions and organisational units
- Product/Service View
  Which products/services are important? (ie.: checked order, customer invoice)



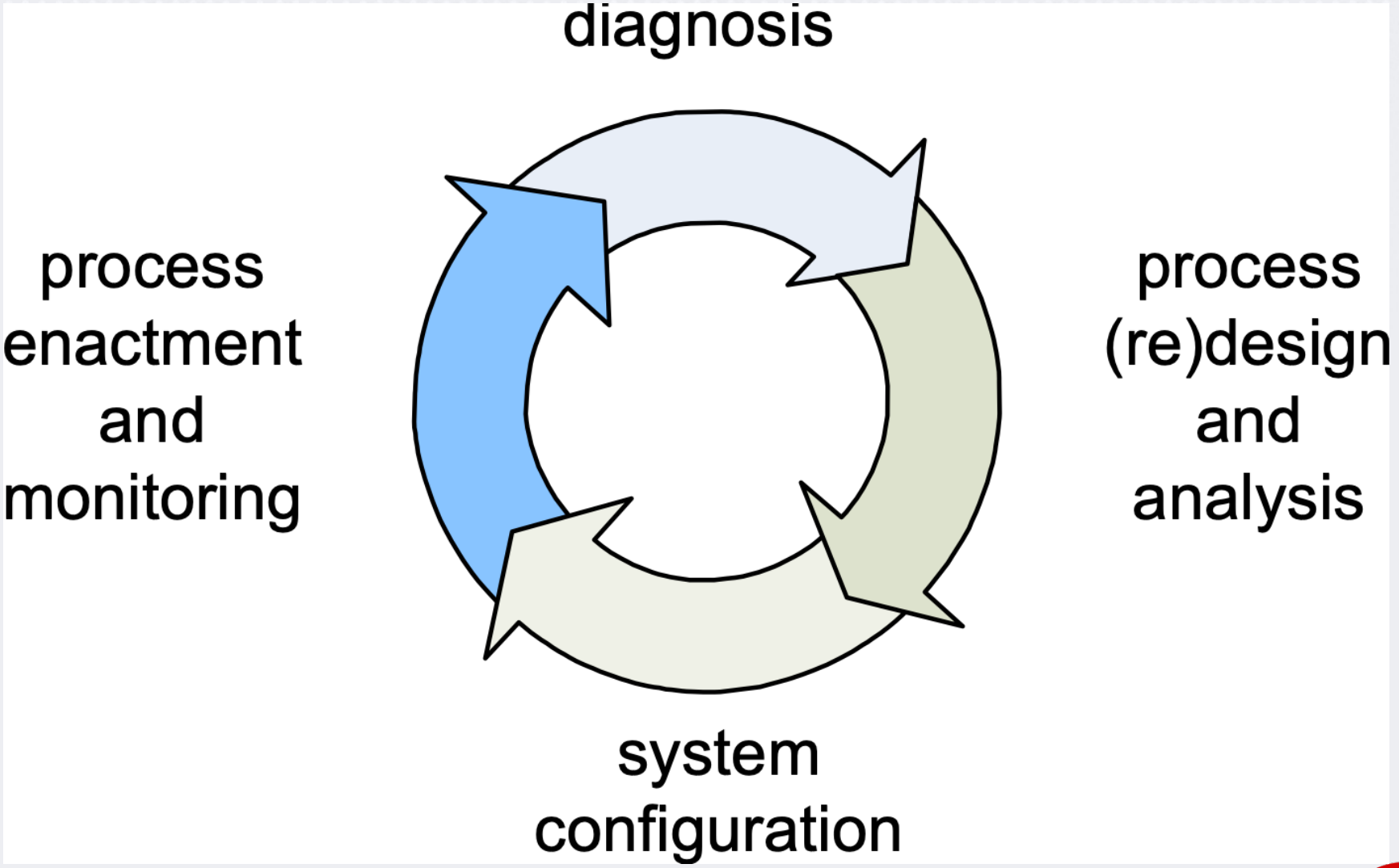
ARIS = Architecture of Integrated Information Systems

Integrated View

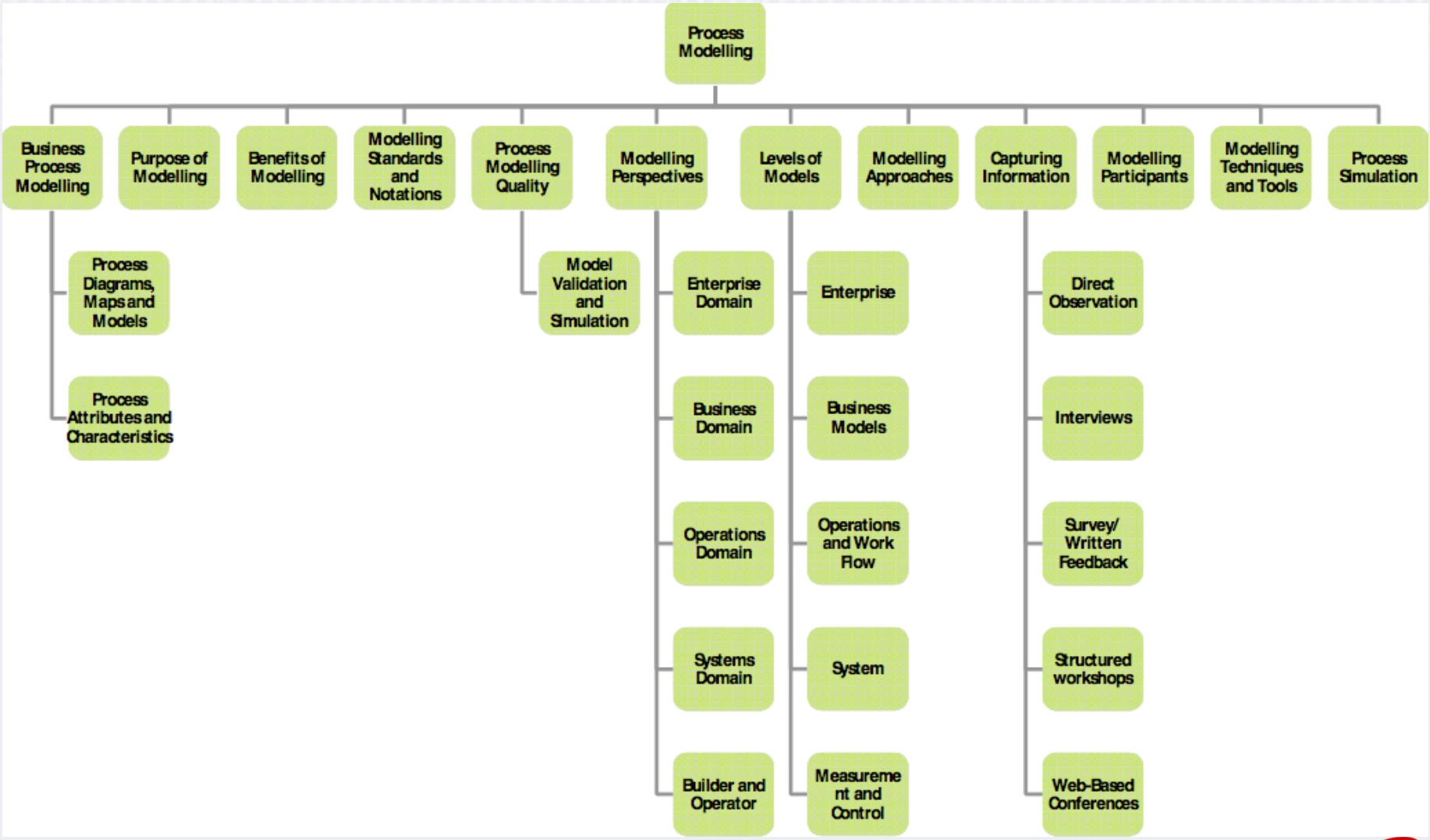


- ARIS framework

Business Process Model Life Cycle: Exercise



Process Modelling: Scope



AS-IS vs TO-BE Business Models

- Both models provide an end-to-end perspective of an organisation's:
  - **primary processes:** core process to the business function/services
  - **supporting processes:** secondary processes to support business services
  - **management process:** that are concerned with the overall business management

AS-IS vs TO-BE Business Models

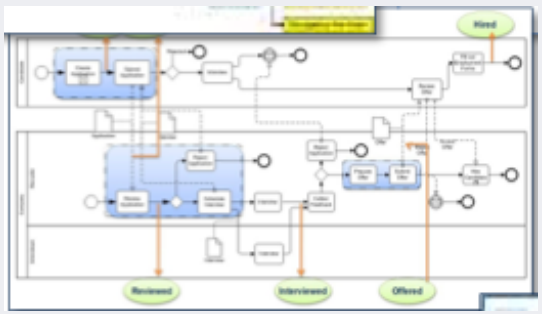
- **Two Types of Models**
  - **AS-IS model**: defines representations of an existing business process
  - **TO-BE model**: defines representations of a proposed (to-be) business process

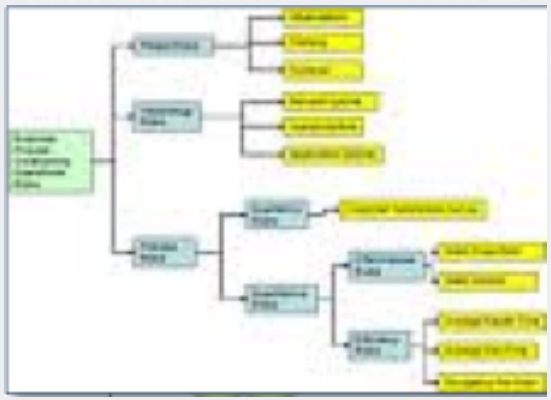
=> Modelling is only a means to an end and not an end in itself – i.e. we model to get results and reach conclusions not just to create a model

How to Model/Represent Processes?

- How to model and represent business processes?
  - Verbal, textual descriptions
  - Visual diagrams
  - Execution instructions

1. Starting with a customer placing an order **(the customer need)**
2. send IT-based information to the warehouse
3. stock picking
4. packing and recording
5. sending the appropriate IT-based information to the distribution hub
6. sending IT-based information to the accounts department
7. generation of an invoice
8. allocation and organisation of shipment for the vehicle drivers
9. delivery of the item and invoicing **(the customer need fulfilled).**





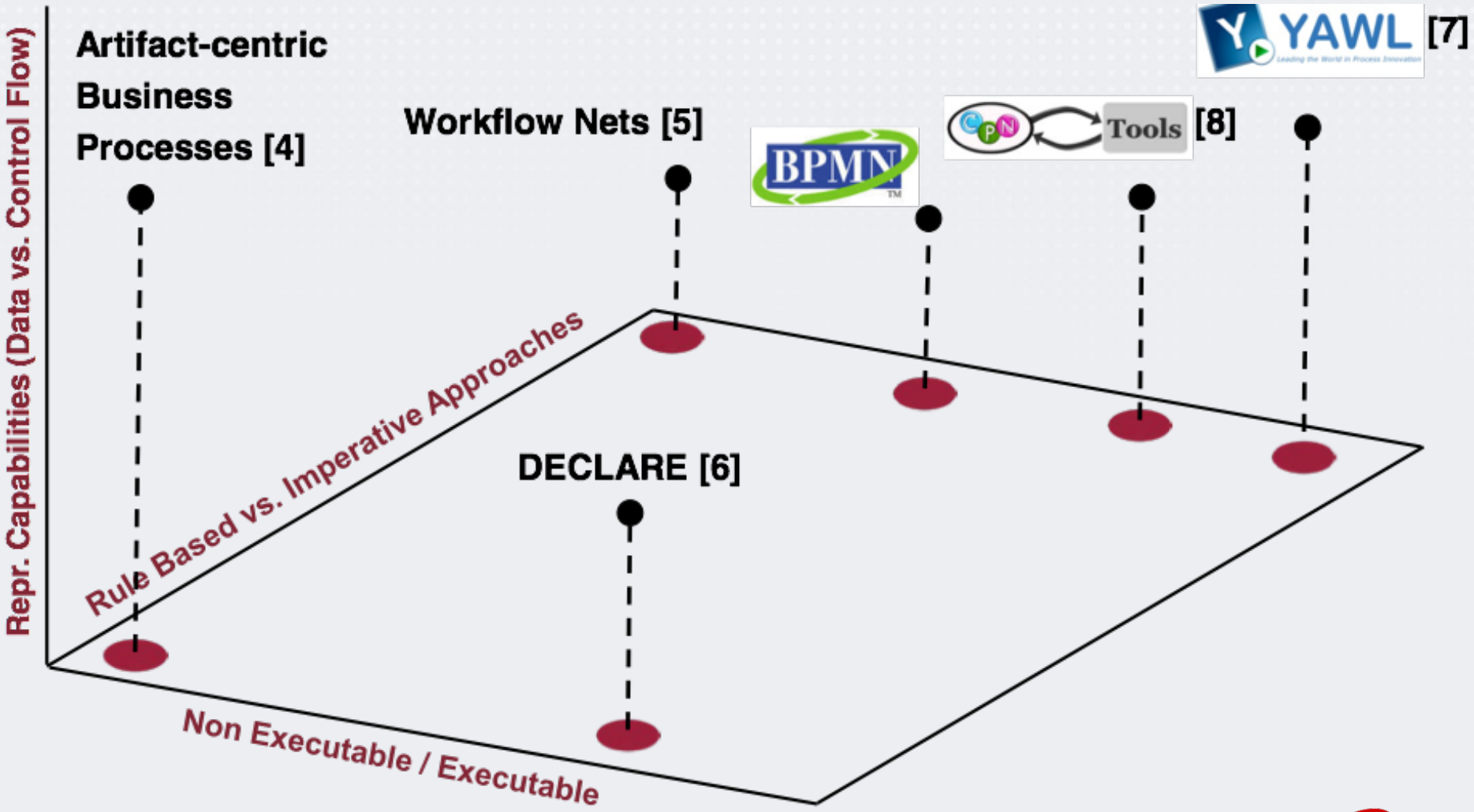
Modelling Languages for Business Processes: Modelling Approaches

- The **OASIS** group's BPEL standard (Executable model)
  - BPEL: Business Process Execution Language
  - invokes web services and can be invoked as a web service
- **BPMI** (Business Process Modelling Initiative) developed
  - BPML: Business Process Modelling Language
  - BPMN: Business Process Modelling Notation
    - BPMN has BPEL mapping, not BPML!
- The **OMG's** Model-Driven Architecture (MDA) specifications Q

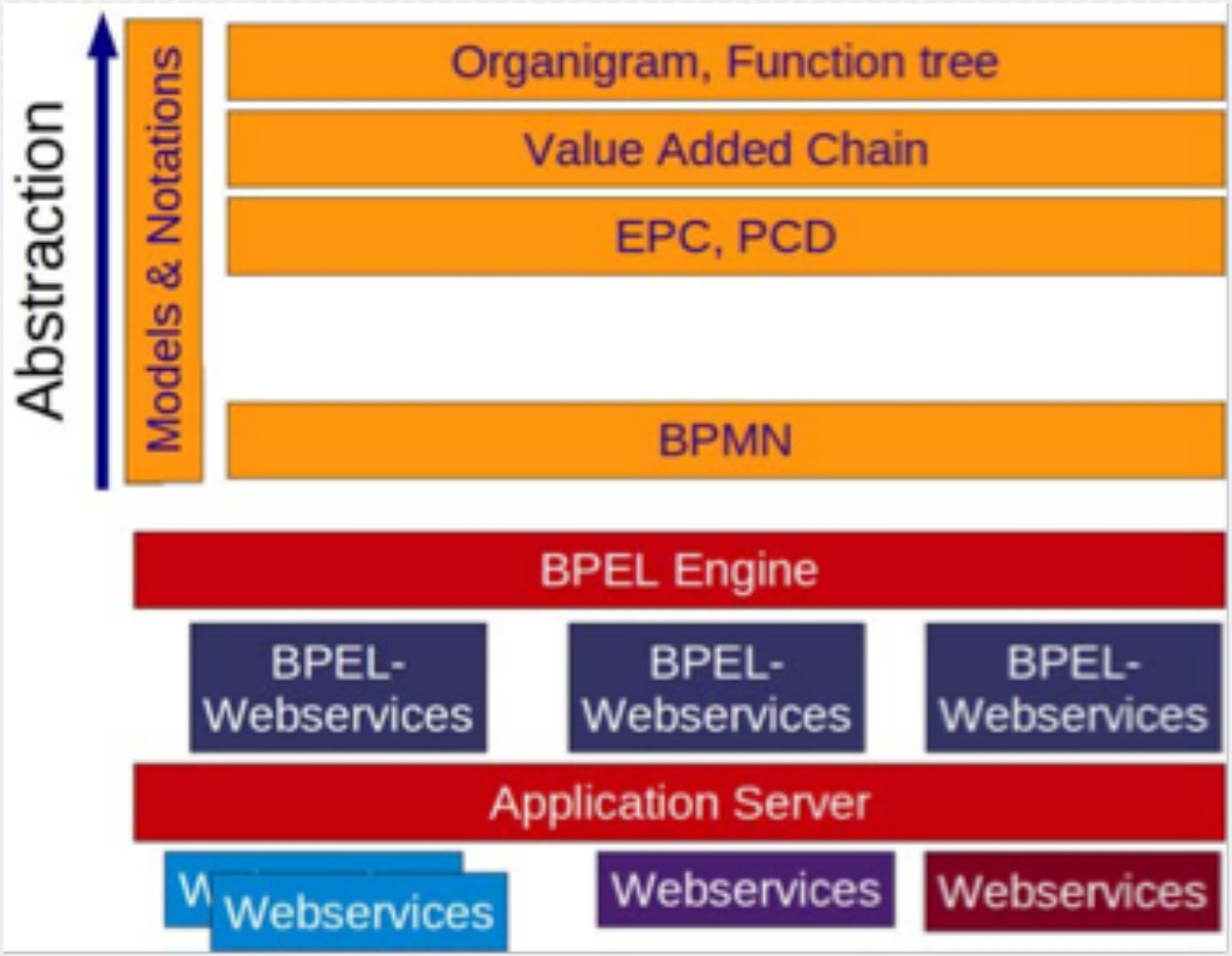
Modelling Languages for Business Processes: Workflow Approaches

- YAWL modelling language
  - YAWL: Yet Another Workflow Language
  - A Workflow definition language
- The various W3C choreography standards
- The WfMC's reference model
  - The Workflow Management Coalition (**WfMC**)
  - It is an architecture of workflow system with supporting tools
- The OASIS BPSS language
  - Business Process Simulation Software (BPSS)
  - It is a business-to-business (B2B) collaboration

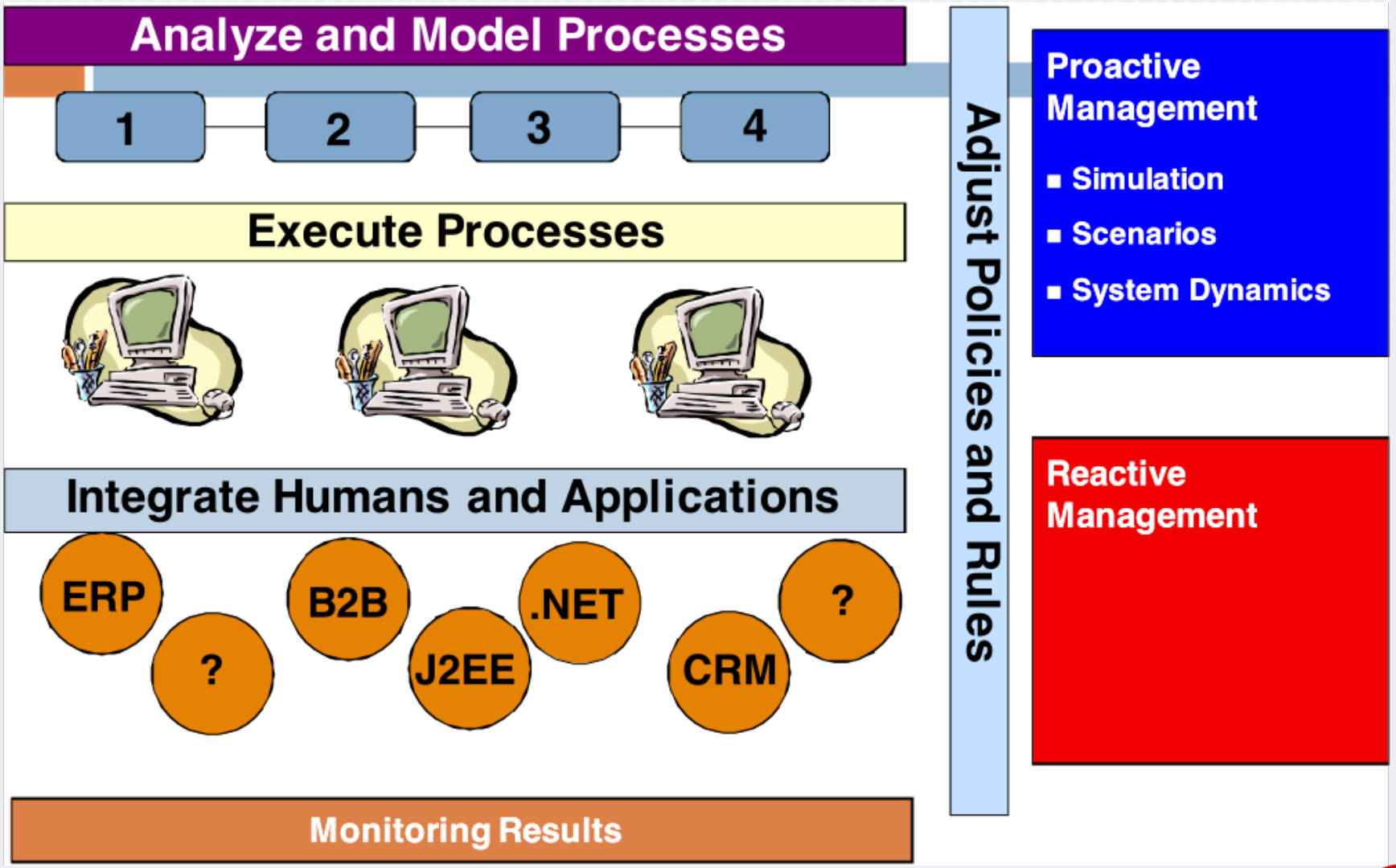
Modelling Languages for Business Processes



Abstraction and Execution Levels



BPM Taxonomy



Workflow approaches

- **Workflow is the flow of work, encompassing the exchange and enrichment of information:**

  The classical workflow paradigm can be seen as a river that carries the flow of work from port to port and along the way value gets added. Workflow defines the operations that must be visited along the way and what needs to be done when exceptions occur.

- **Document-centric heritage**
  documents captured state and then was used as a token

Workflow Basics

- A workflow system deals with cases:

  For example, in a process that handles insurance claims, a case is a particular claim; or issuing an air ticket is a case (i.e. an instance) of the process of issuing air tickets.

  - Cases are classified in characteristics:
    - Cases are always handled similarly (e.g. cases handled in a similar way).
    - A case has an identity, i.e., a case that can be univocally identified.

- The central component of a workflow is the task or activity.
  - A task is a logical, indivisible unit of work. If anything goes wrong when performing a task, it must be rolled-back. (similar to atomicity in DBMS)

Workflow Basics: Three main Components

- **Process**
  - A procedure followed to handle a particular case type. Processes can be part of other ones - denoted sub-processes.

- **Routing**:
  - Refers to the way in which a process is carried out, in the sense that it defines the order of the tasks that compose a given process. Routing can be sequential, parallel, selective, or iterative.

- **Enactment**:
  - Triggering a task. Can be triggered by a resource initiative, by an external event or action (like a message), or by time signals.

YAWL (Yet Another Workflow Language)

- Defined by Wil van der Aalst and Arthur ter Hofstede in 2002
- Purpose: to provide comprehensive support for the workflow patterns.
- Inspired by Workflow nets, but with direct support for
  - Cancelation.
  - Multiple executions of the same task in the same process instance.
  - Synchronisation of active paths only (OR-join).

- YAWL has a support environment (Development started in 2003)
  - Editor.
  - Analysis.
  - Verification.

YAWL (Yet Another Workflow Language)

- Comprehensive approach for the Workflow Patterns
  - Original control-flow patterns, resource patterns, and exception handling patterns.
- Formal semantics
  - Original definition of YAWL: state-transition system.
  - Later: CPN (Coloured Petri Nets) interpreter.
  - This removes ambiguity and allows verification.
- Flexibility support, e.g., through handling exceptions.

=>See www.yawlfoundation.org

Executable Process Models

- Executable Process Models carry the instructions on how work should happen, who should do it, links to the other systems, etc.
- They provide a ***direct method of translating strategical and tactical intent into operational processes***.
- To be executed, process models have to meet very strict demands, because they are not converted into a computer program by a human being, but **directly processed by a machine**.
- Sone standards for executable process descriptions have been established, for example:
  - **XPDL** (XML Process Definition Language)
  - **BPEL** (Business Process Execution Language)

but such descriptions have no graphical notations, and the main range of application is the definition of automatic processes.

BPMN

- BPMN (Business Process Modelling Notation) one of the most widely used to model BPs.
  - Supported by most vendors.
  - Established by BPMI, standardised by OMG.
  - BPMN aimed at:

    (a) being acceptable and usable by the business community

    (b) being constrained to support only the concepts of modelling applicable to BPs

    (c) describing clearly a complex executable process.

BPM vs. workflow approaches

- Message correlation vs. process ID
  - message correlation – content of message identifies receiving process instance
  - process ID – identifies receiving process explicitly
- Service end-points vs. central enactment engine
  - choreography of loosely coupled services
  - monolithic and closed workflow system

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Thanks!

Any questions?

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