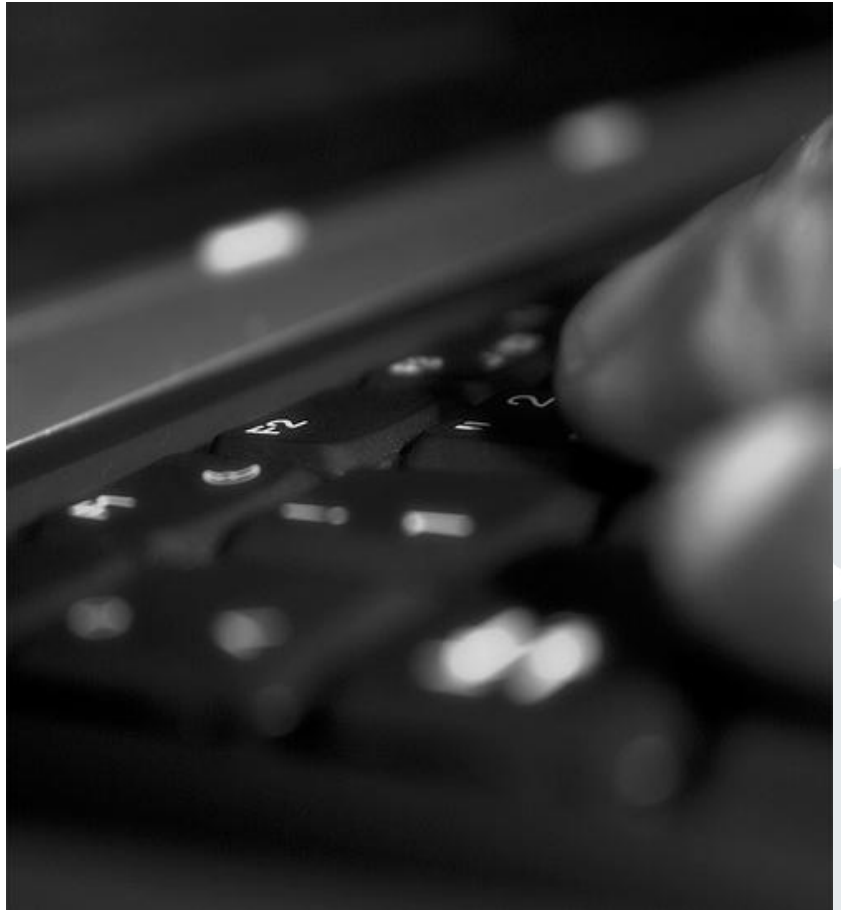


Lecture 13 Business Informatics 2 (PWIN)

Business Process Reengineering (BPR)

SS 2011

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Jenser (Flickr.com)

- Business Process Reengineering
 - Introduction
 - Redesign of Business Processes
- Process-Oriented Modelling
 - Event-driven Process Chains
 - Petri Nets

- Business Process, Business Transaction, Workflow, Process Chain, Operational Flow, ...
- Business Process Reengineering, Business Process Improvement, Business Process Innovation, Business Transformation, Business Engineering, Business Process Optimisation, ...

- **Working definition**

Amount of manual, semi-automated or automated business activities that are executed according to certain rules towards a particular goal.

- Activities are interlinked with each other, with respect to affected people, machines, documents, resources, etc..
- Activities are performed by human and non-human (machine) task managers.
- Tasks are intended as deliverables, as the performance of a task is performed by, performing one or more activities.
- A business process generates a profit of value for customers.
- A collaborative business process activities are run by at least two task managers.

Source: Davenport (1993)

- An insurance company processing a claim settlement
- A bank processing a loan application
- A tax office processing a tax declaration
- An employee requesting their travel authorisation
- A customer applying for a credit card via the website of a bank
- ...

- Two basic Approaches to optimise Business Processes

Process Improvement (e.g. Kaizen)

- Keep existing processes and attempt to continuously improve them



Process renewal (e.g. BPR)

- Radically rethink processes and redesign them from scratch

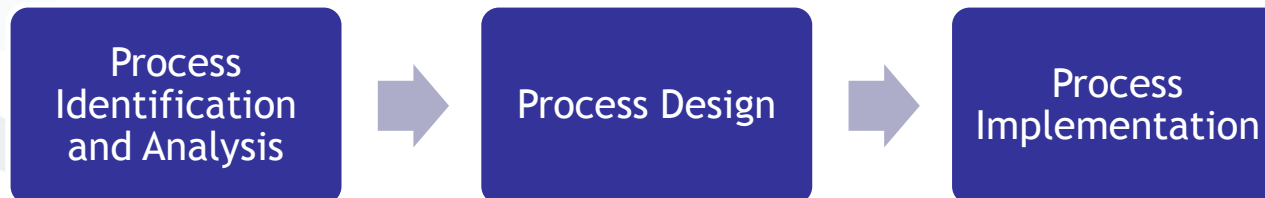


- **Definition:**

Business Process Reengineering is the **fundamental rethinking** and **radical redesign** of business processes to achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service, and speed.

- Information Technology (IT) is a significant enabler for reengineering Business Processes (e.g. workflow management systems, ERP, etc.).

- Basic Steps for Business Process Reengineering:



Source: Hammer and Champy (1993)

Dramatically improve performance of business processes rather than merely “optimising” them, i.e.

- Improve **efficiency**, e.g. reduce time to market, provide faster response for customers
- Increase **effectiveness**, e.g. deliver higher process quality
- Achieve **cost saving** in the longer run
- Improve **financial performance**, e.g. in terms of sales, profits or profitability

Source: Kohlbacher (2010)

What does BPR constitute?

An integrated program of change that ...

- delivers **substantial, measurable** improvements, often **rapid ones**.
- usually involves **cultural** and **job/role** changes, which must be managed accordingly.
- is typically 'enabled' through **IS/IT**.
- involves creative thinking (breaking the 'old' rules).

What does BPR constitute? (2)

An integrated program of change that ...

- is sponsored by **top/senior management** rather than the IS/IT function.
- is rather driven **top down** than bottom up.
- begins and ends with **customer value**.
- applies to multiple business functions, departments and/or locations, i.e. it is **process-oriented**.

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BPR - Identification and Analysis of current Business Processes

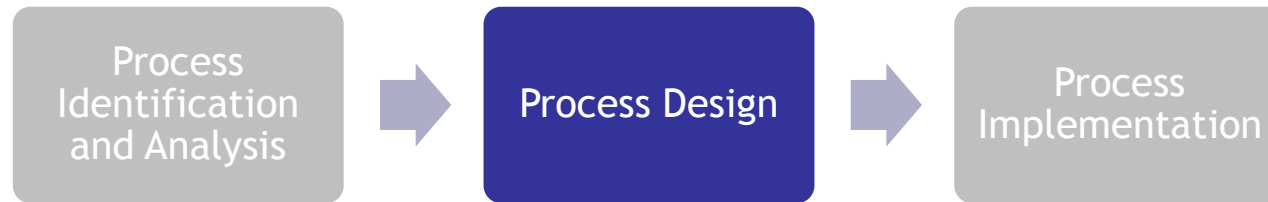


- Key activities by Davenport
 - Identification (modelling) of the current main processes
 - Definition of the process boundaries
 - Determination of the strategic relevance of the identified processes
 - Analysis of the needs for improvement of the current processes
- Output: Understanding of “As-is” processes

Source: Davenport (1993)



- **Process-Oriented Modelling**
 - Description of all relevant aspects of a business process in a specific description language
 - Description languages
e.g. Event-driven Process Chains (EPC) or Petri Nets
- **Purpose of Process-Oriented Modelling**
 - Understanding and documenting business processes
 - Reducing the complexity of business processes in order to enable a common understanding between stakeholders
 - Enable transparency for business processes



Problems:

- Little evidence about required new design, but many abstract metaphors (e.g. elimination, change of order, parallelisation, integration, avoiding media disruptions,...)
- Creative design process

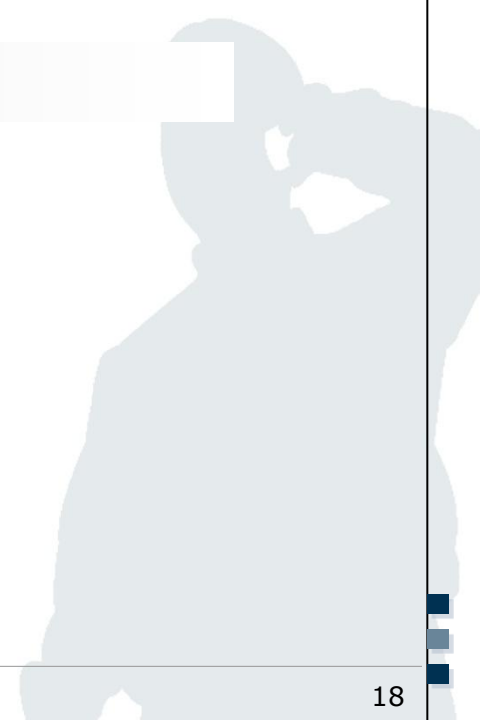




- **Organisational Bottlenecks**
 - People as a bottleneck of behavioural change (it takes time for people to change their behaviour)
 - Implementation barriers
 - Special role of top management
 - Coaching - the role of process owners
- **Information Technology Bottlenecks**
 - Island solutions
 - Duration of implementation period
 - Adaptation of Technology
- **Interaction between Organisation and Technology Bottlenecks**
 - Implementation of optimised processes without considering ICT aspects is suboptimal.

- Use of technology can be analysed and reproduced and adapted.
- The complex arrangement of technology, processes and people, which evolved in long learning processes is not easy to reproduce or adapt.
- BPR does not necessarily lead to dramatically performance improvements - compared to the Business Process Improvement approach

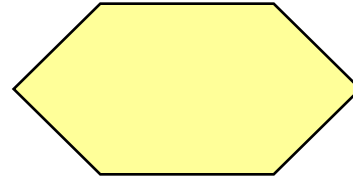
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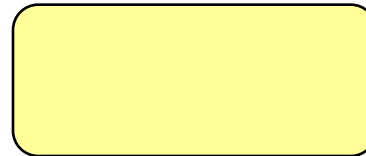
- History
 - Semi-formal, graphical description language
 - Developed in 1992 by Prof. Scheer (University of Saarbrücken) and staff.
 - High penetration rate in Germany of ARIS Toolset
- Application
 - EPCs describe processes, i.e. related activity and process sequences.
 - An “event” is defined as the occurrence of an object or as changing a specific object property.
 - Events and activities may be combined with various join operators: and, or, “exclusive or”

EPC - Basic Graphical Symbols

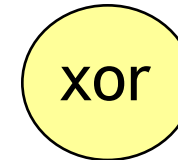
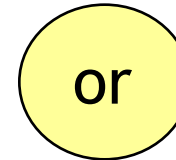
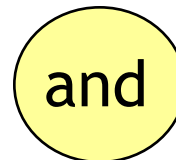
Event



Activity

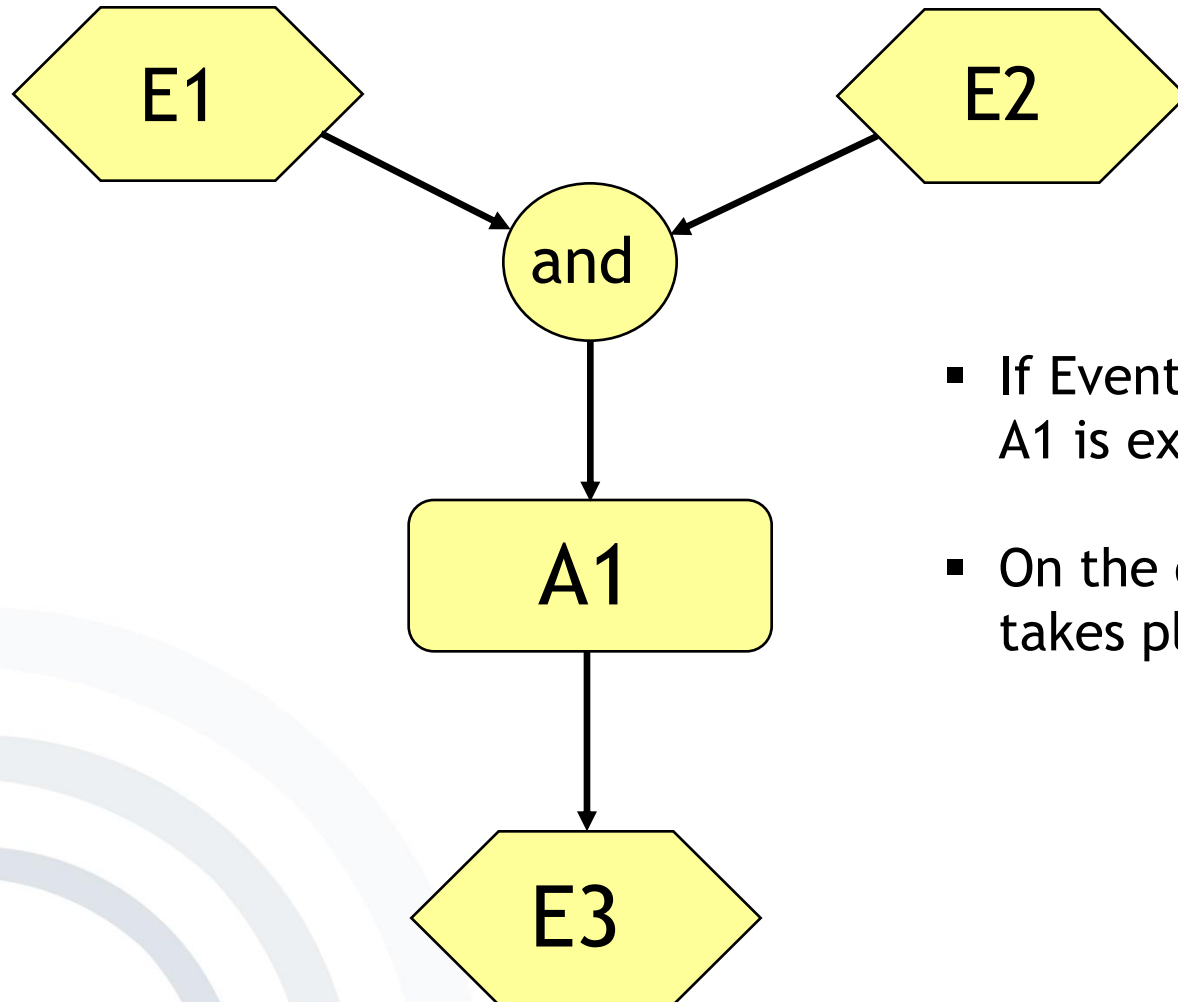


Join operators

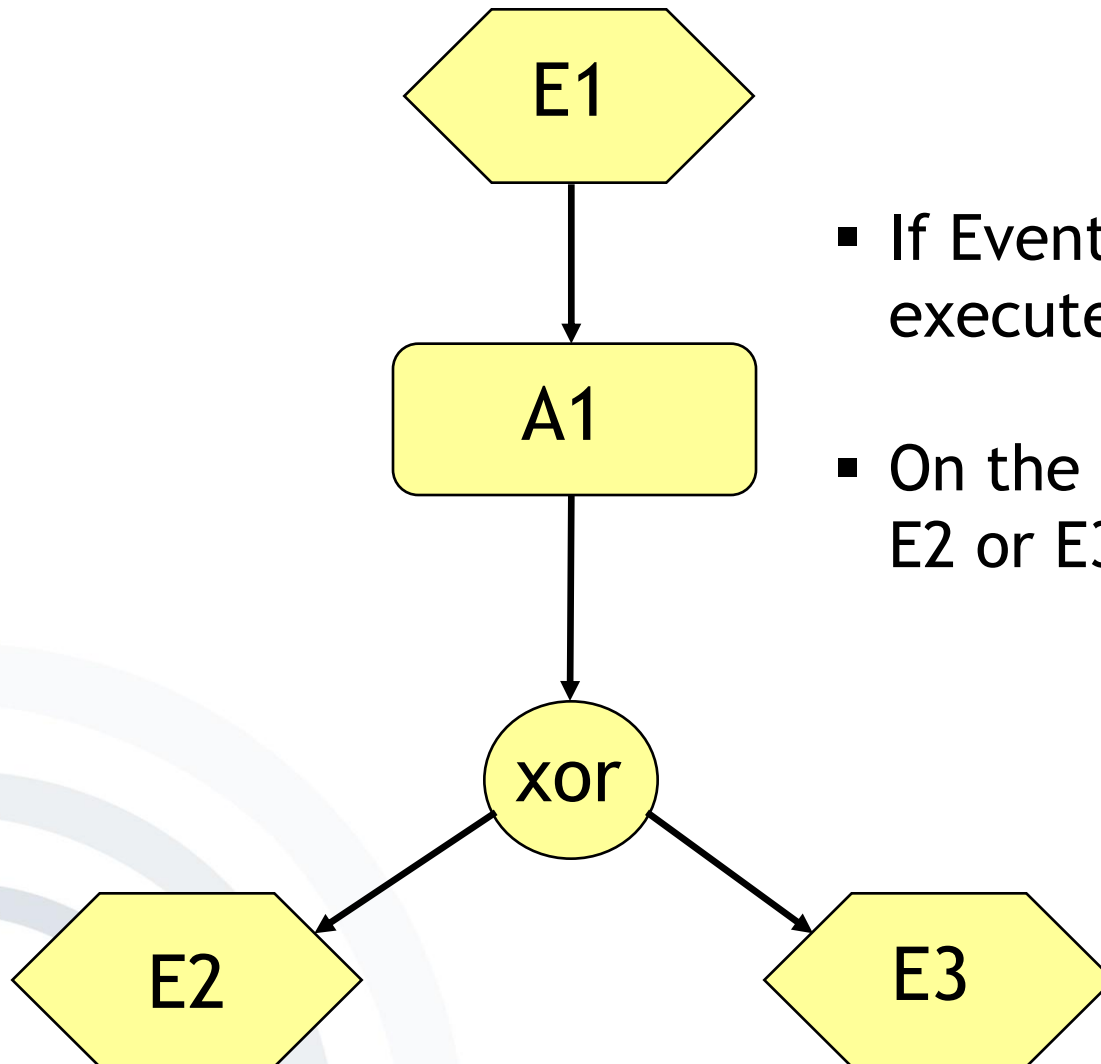


Dependency between
Event and Function



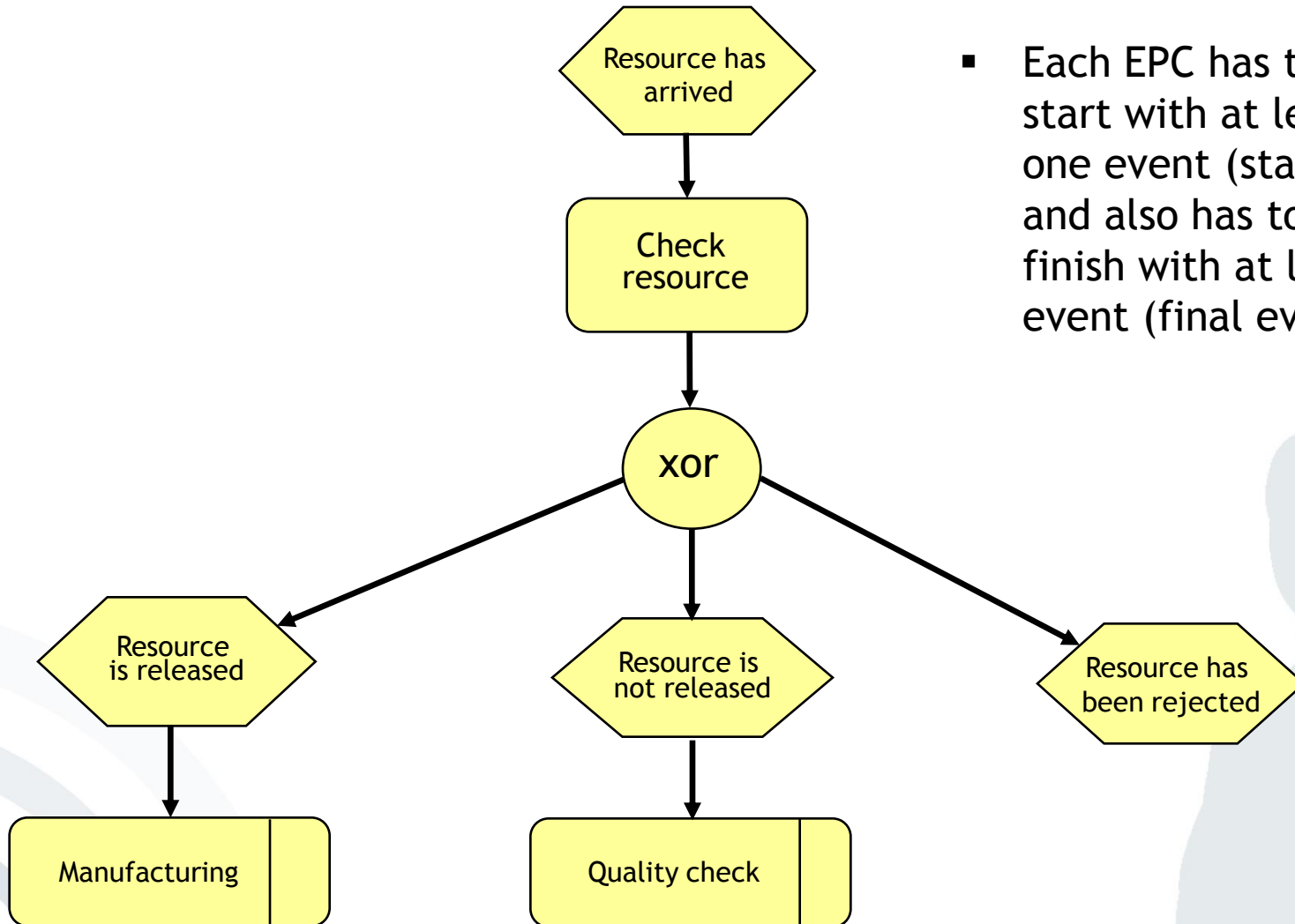


- If Event E1 and E2 occur, activity A1 is executed.
- On the occurrence of A1, E3 takes place.



- If Event E1 occurs, Activity A1 is executed.
- On the occurrence of A1, either E2 or E3 takes place.

EPC - Start and Final Event



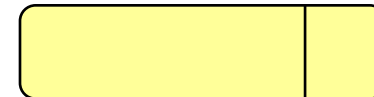
- Each EPC has to start with at least one event (start event) and also has to finish with at least one event (final event).

- Activities can be refined hierarchically and associated with entrusted organisation units or incoming and outgoing data objects.

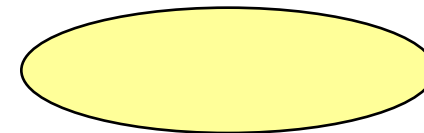
Data object / Object



By EPC defined Activity



Organisation Unit

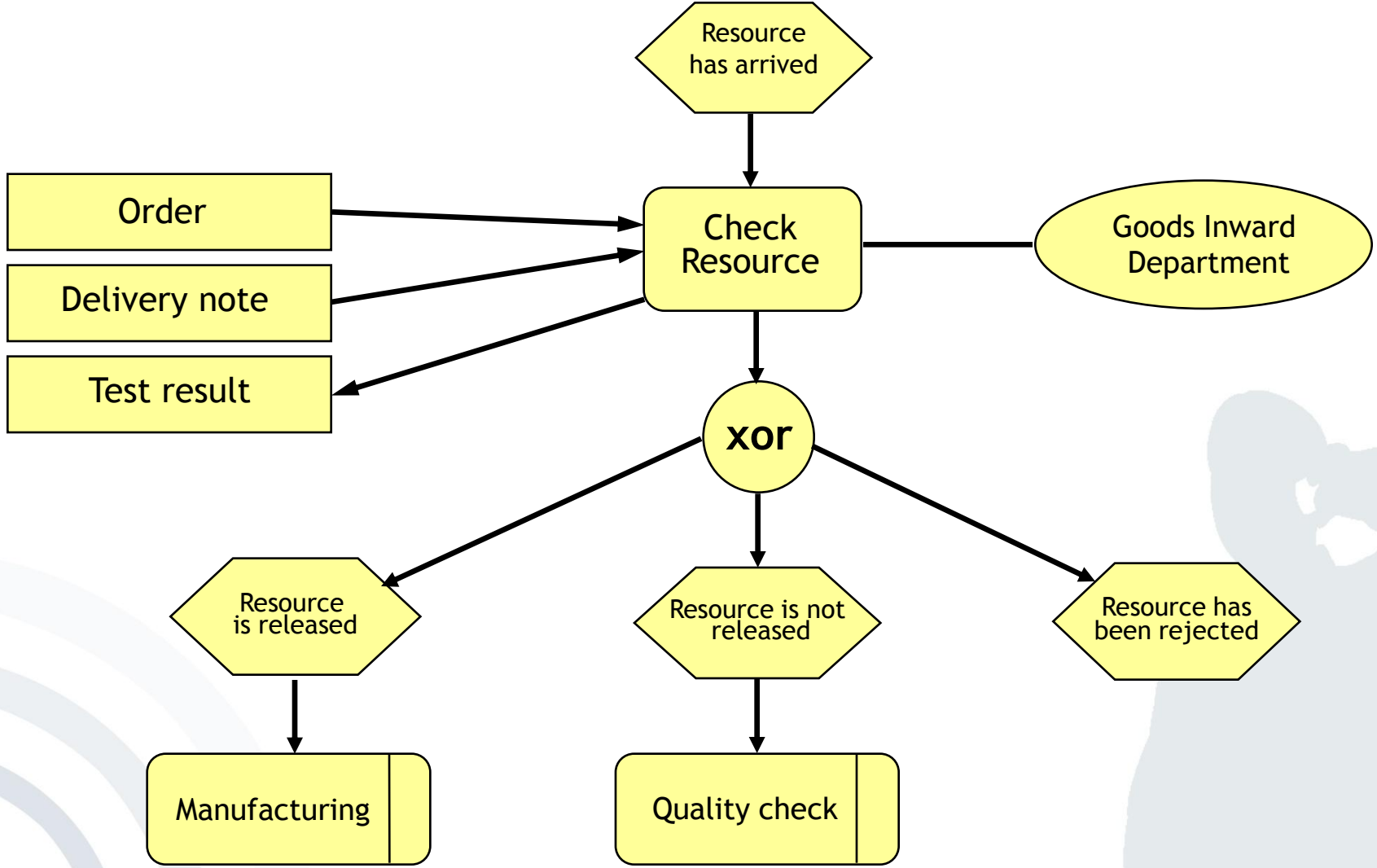


Information-/Material flow

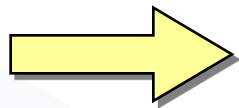


Assignment to Organisation Unit



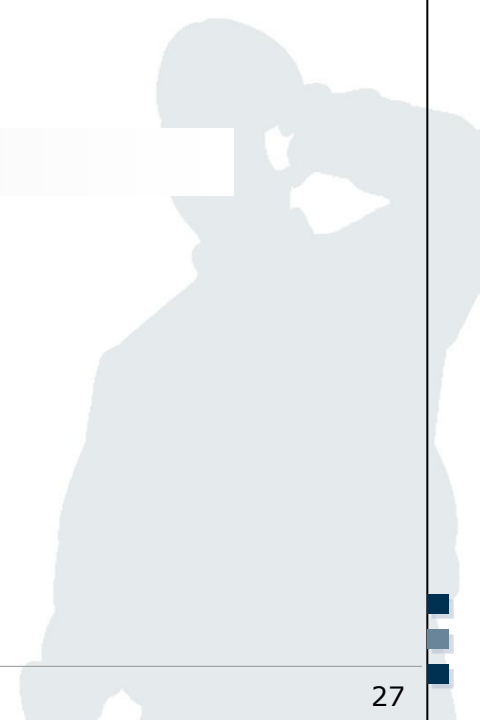


- Simple graphical presentation
- No precise meaning of each symbol so no formal analysis possible
- Interrelations between objects and activities are often too inadequate for data modeling.
- Fails to distinguish between type and impact of a process



Not directly executable

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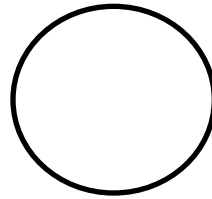
- Developed by C.A. Petri (1962)
- The graphical presentation of a Petri net is a bipartite graph.
- There are two kinds of nodes
 - Places: Typically represent resources or partial state of the system
 - Transitions: Represent state transitions and synchronisations
- Arcs in Petri Nets are directed and always connect nodes of different types.

A **Petri Net graph** (also called *Petri net*) is a 3-tuple , where

- (i) S, T are finite sets
- (ii) $S \cap T = \emptyset$
- (iii) $S \cup T \neq \emptyset$
- (iv) $F \subseteq (S \times T) \cup (T \times S)$

- The elements of S are called *places*, the elements of T are call *transitions*. Places and transitions are also called nodes.
- F is the "flow relation", which constitute a set of arcs.

- Place:



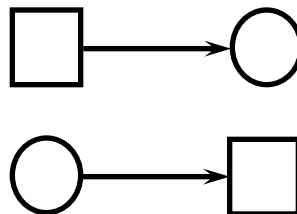
Interpretation:
State

- Transition:



Interpretation:
Activity

- Directed Arc:



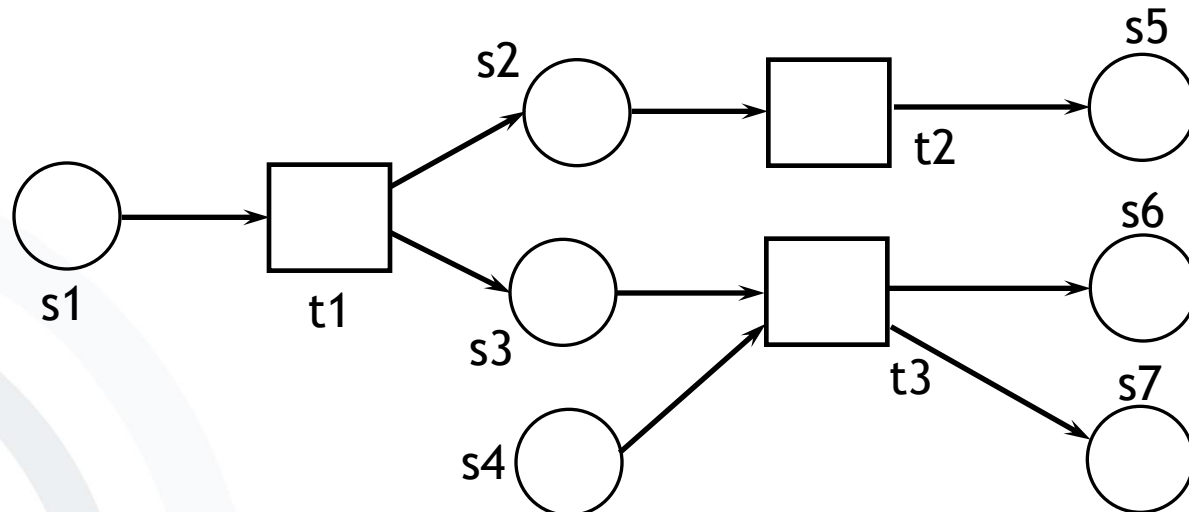
Interpretation:
Input- / Output-Relation

The following figure shows the graphical representation of a network
 $N = (S, T, F)$

$S = \{s1, s2, s3, s4, s5, s6, s7\},$

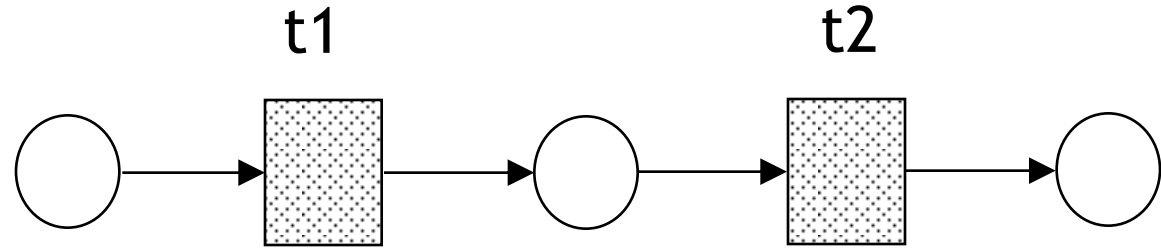
$T = \{t1, t2, t3\}$ and

$F = \{(s1,t1), (t1,s2), (t1,s3), (s2,t2), (t2,s5), (s3,t3), (s4,t3), (t3,s6), (t3,s7)\}$

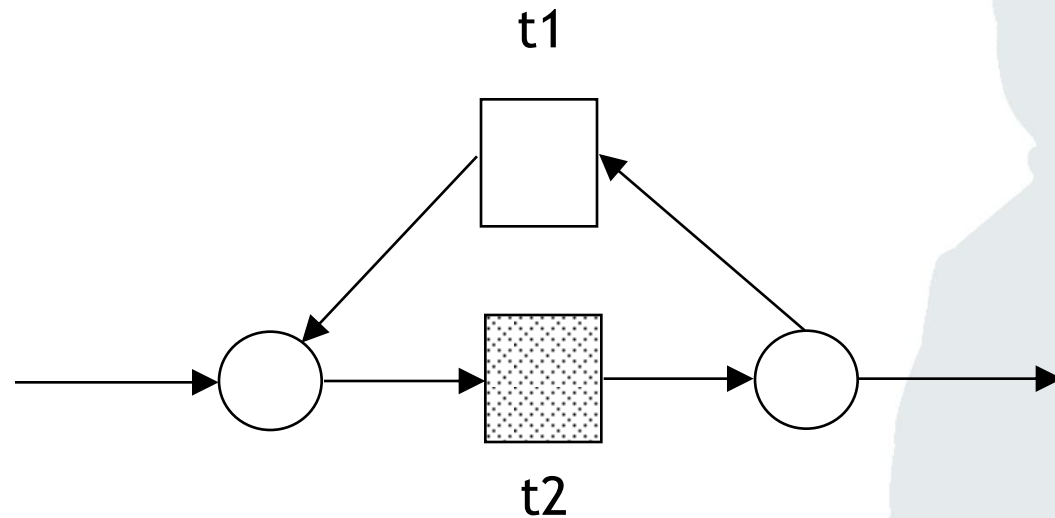


Petri Nets - Process Structures

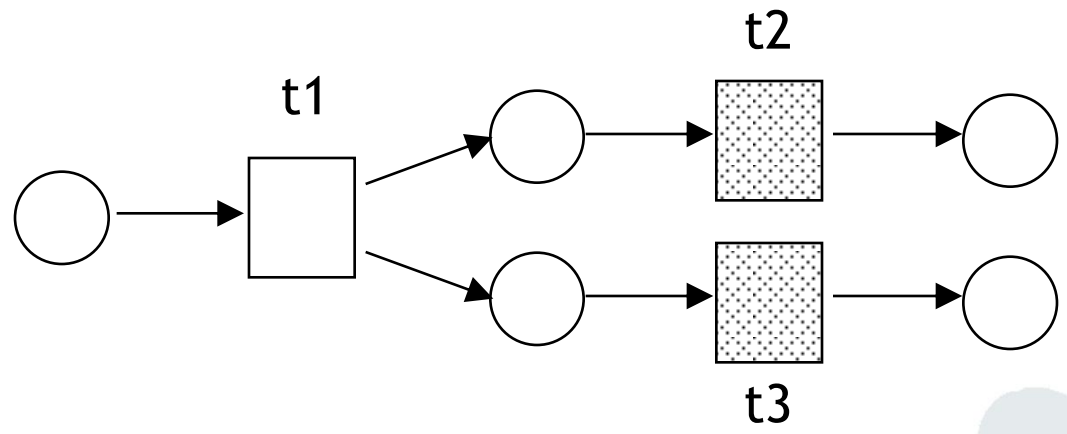
Sequence



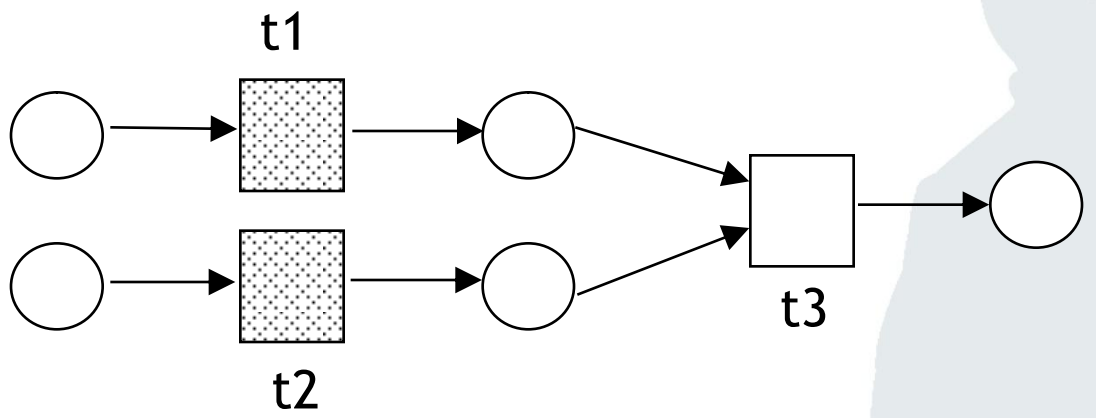
Iteration



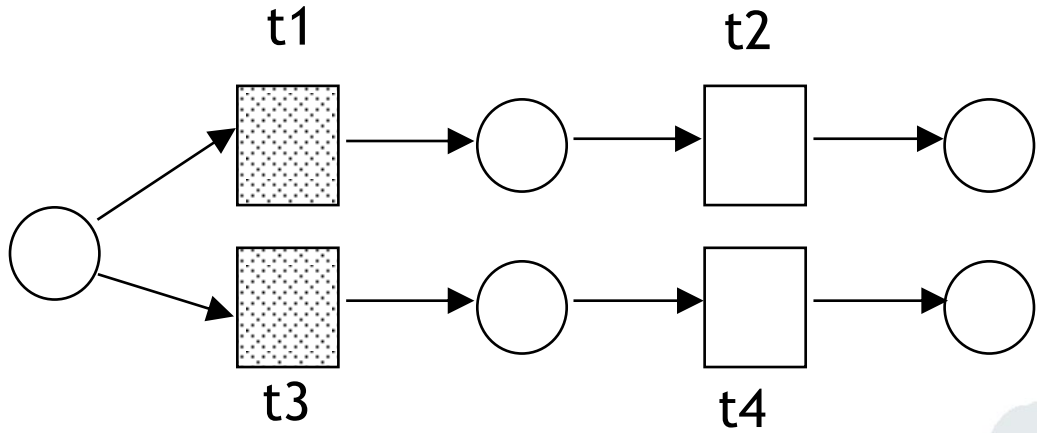
Concurrency



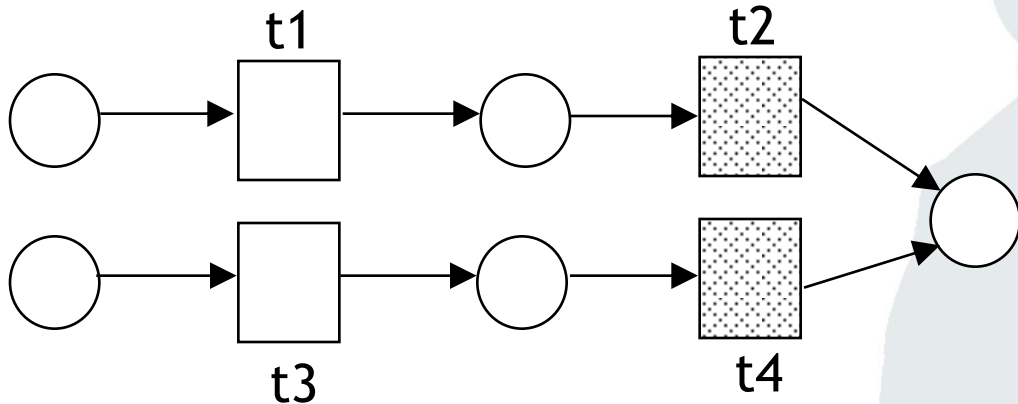
Synchronisation



Selection
(Forward conflict)



Backwards conflict



- Integration of object-related aspects
- Directly executable (Simulation)
- Allows gradual formalisation
- Mathematically based, can be formally analysed



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