Agile Long-term Workflows

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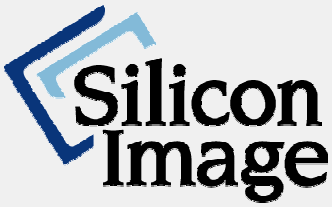
"***We could not employ a workflow system that is not adaptable to changes***."

S. Rackow

chip design expert from

Silicon Image GmbH, Hannover



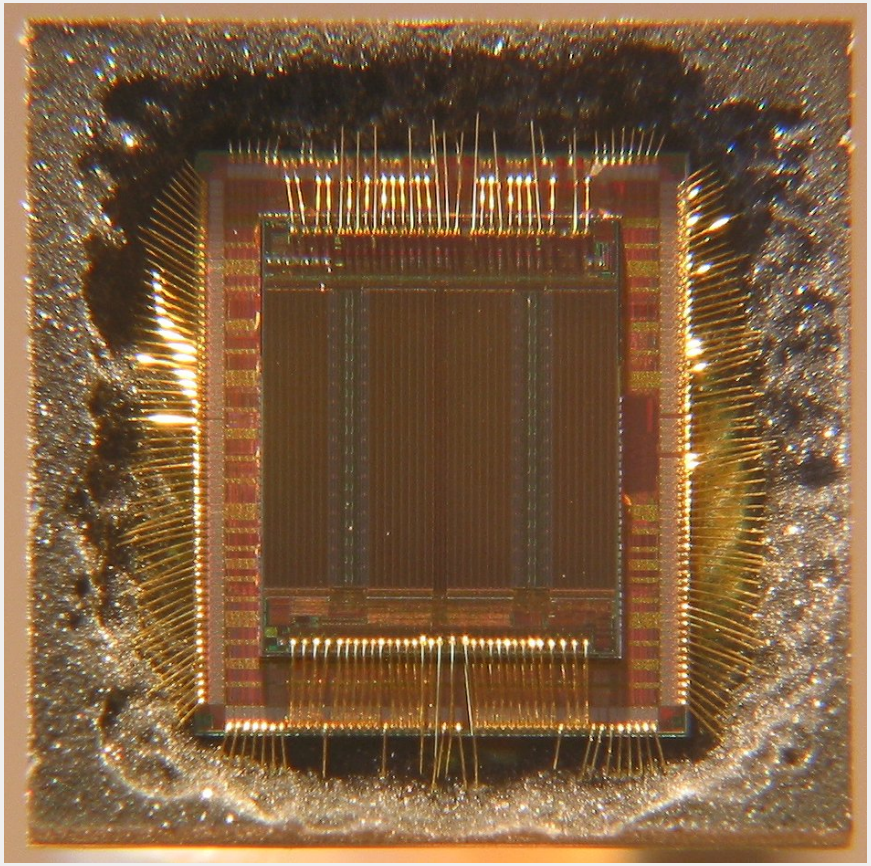
Motivation

Real world scenarios:

- Chip design
  - Dynamics of technology,
  - changes of the market
- Software development
  - Changing customer requirements
- Healthcare
  - Side-effects and other complications during the treatment of patients

→ Major deviations from the usual business processes at run time

Our approach: Agile workflows!

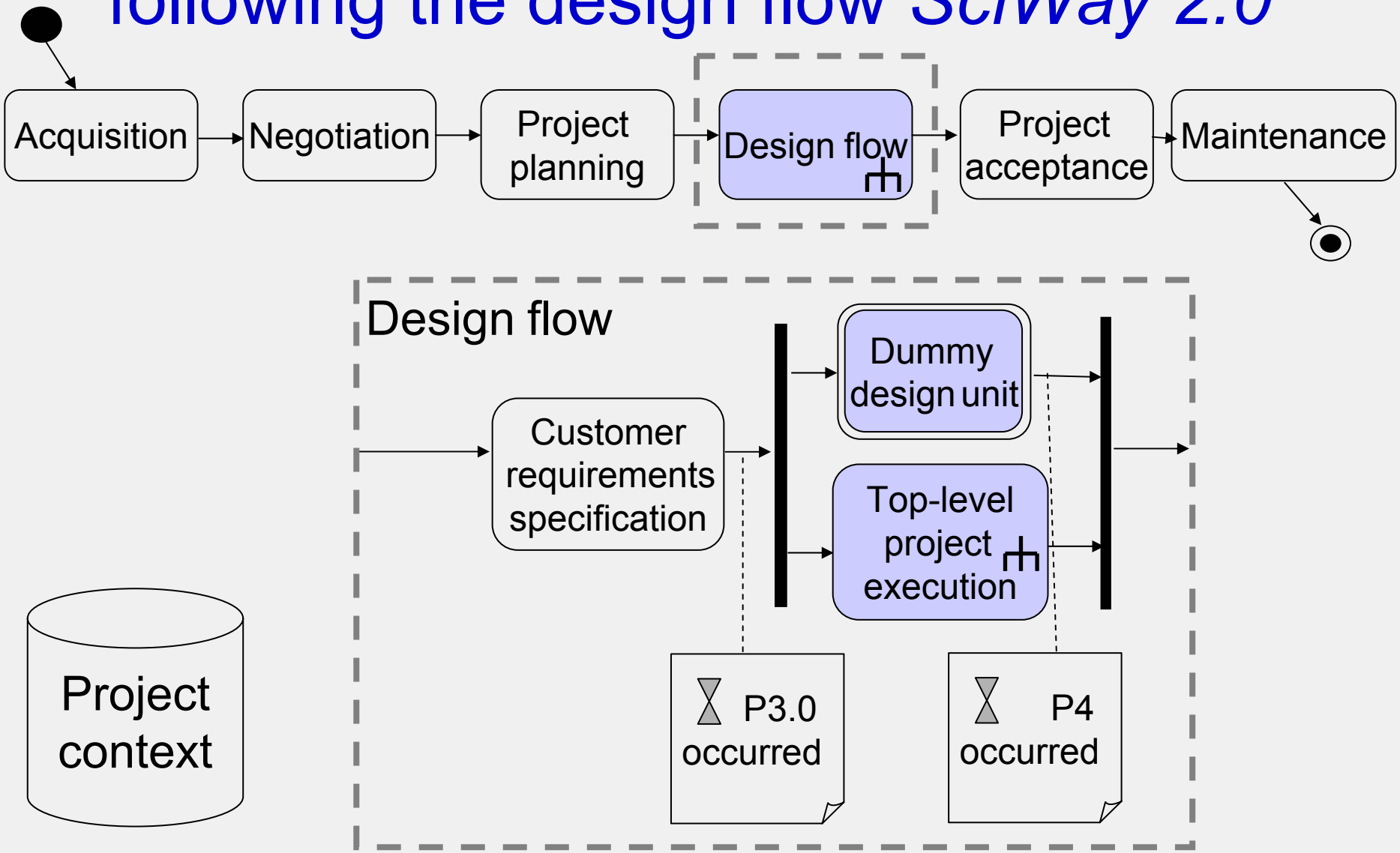


Agile workflows

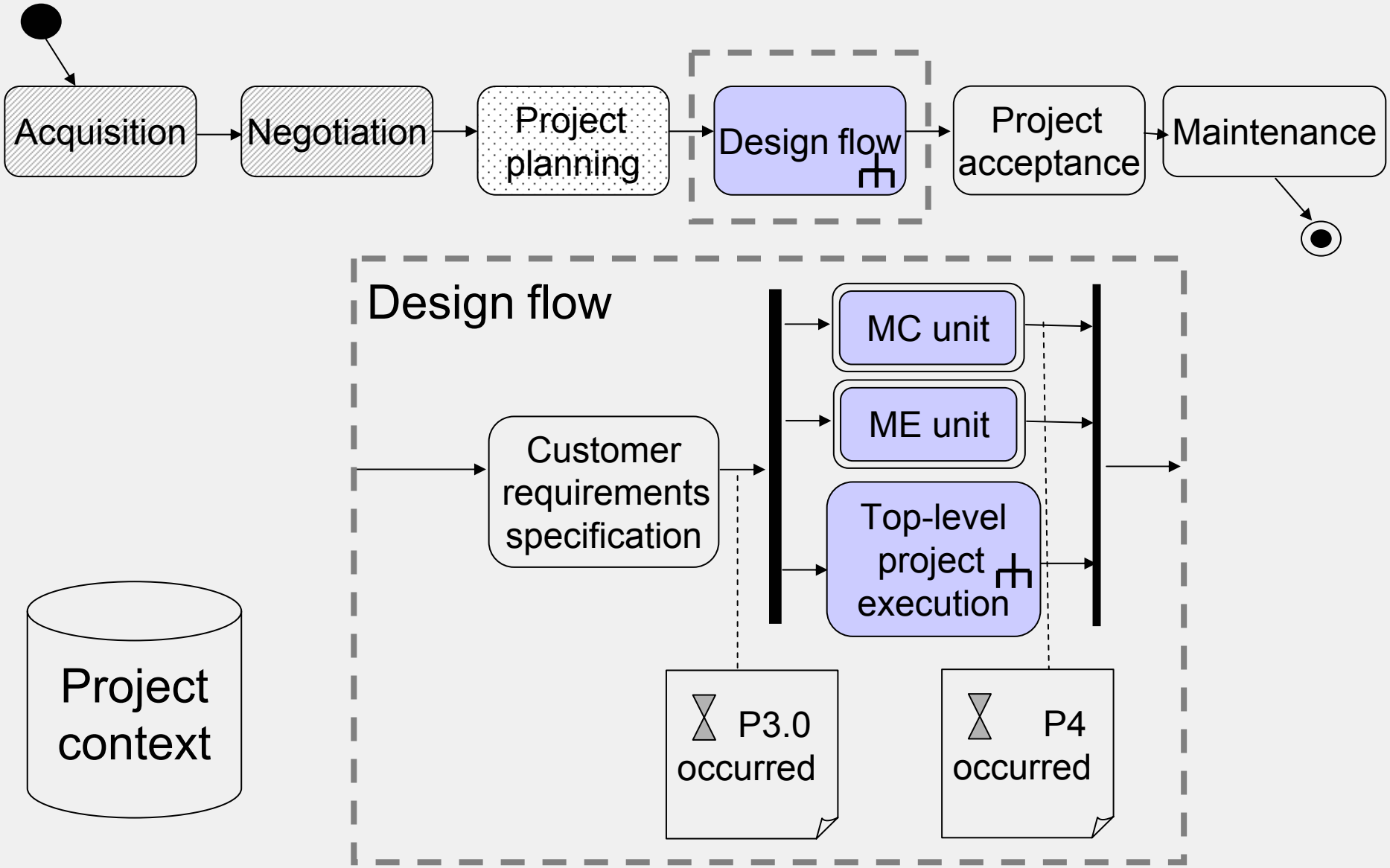
- For incremental and flexible modelling of processes at build-time **+ run-time**:
  - Workflow instances are derived from workflow definitions (WFD's, templates)
  - Adaptation of ongoing processes by
    1. Ad-hoc-changes of individual workflow instances
       e.g. [*Reichert et al. 2003, Weber et al. 2005, Bassil et al. 2004*]
    2. Modifications to a workflow definition that is already in use by instances
       e.g. [*Casati et al. 1998, Weske et al. 1999, Reichert et al. 2003*]
    3. Late-planning and hierarchical decomposition
       e.g. [*van Elst et al. 2003, Freßmann et al. 2005*]

    Our work fits in the first and third classifications.

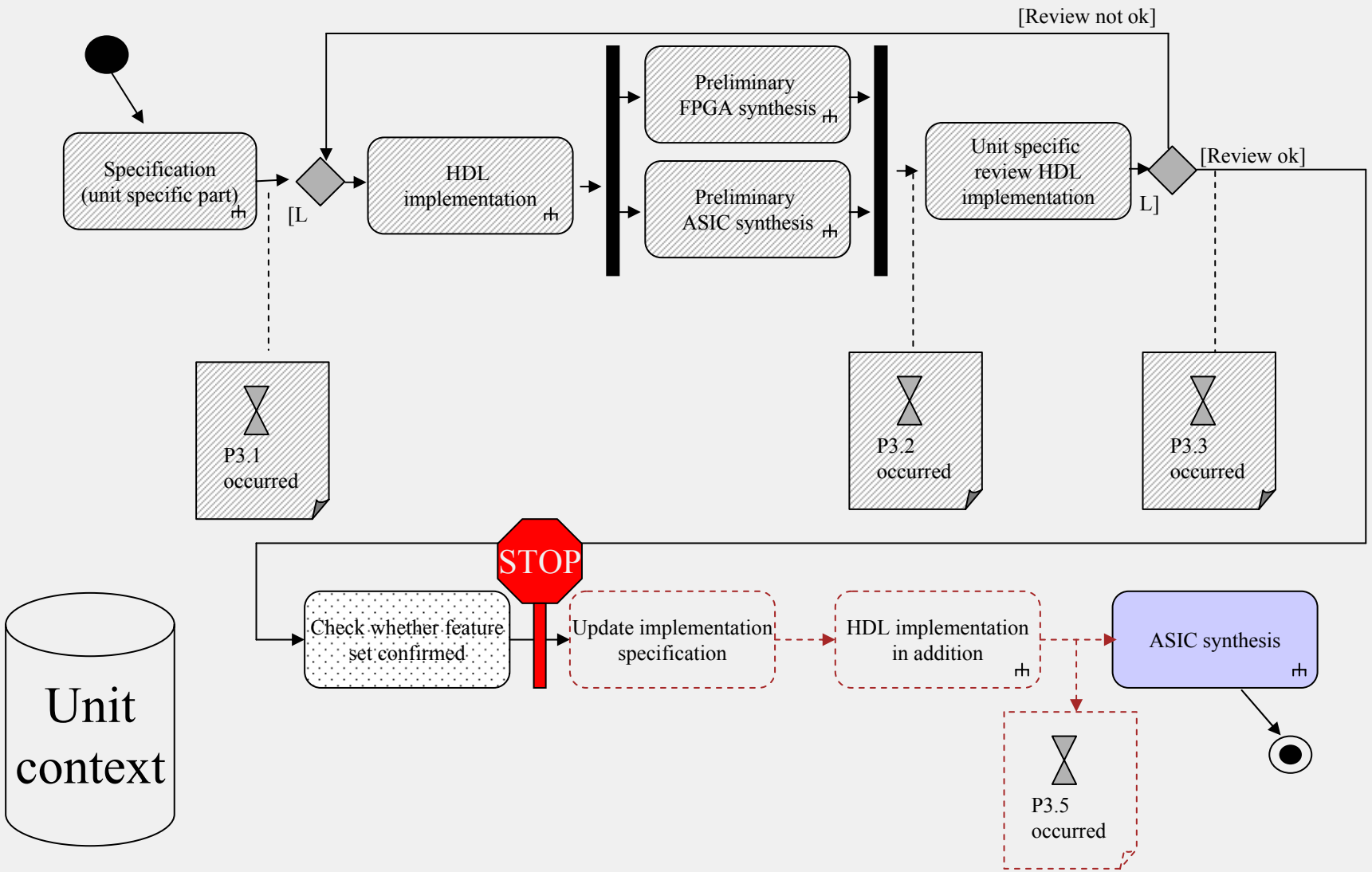
Top level WFD for chip design projects following the design flow *SciWay 2.0*



Sample top level instance



Sample instance for design unit MC



Workflow modelling language

- ***Process modelling language*** is based on the notation of workflow patterns in [van Aalst et al. 2003]:
- Control flow elements
  - 5 basic elements: *Sequence, AND-split, AND-join, XOR-split, XOR-join*
  - *LOOP-join*, *LOOP-split* for structured cycles with one entry point and one exit point
  - *Breakpoints*
  - *Placeholder tasks for sub-workflows*

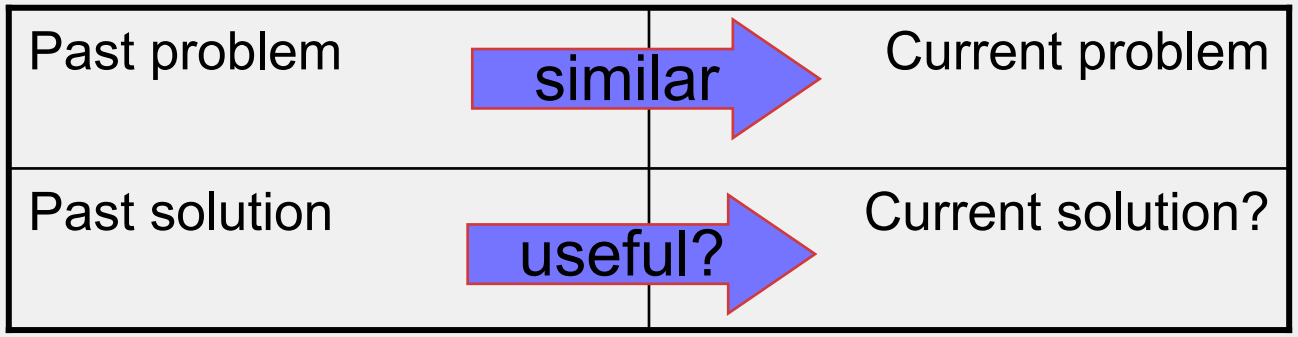
  } *for reasons of adaptability*
- Further workflow elements
  - *Tasks, start symbols, end symbols*
  - *Milestones*
  - *Placeholder tasks for sub-diagrams*

  } *modelling and monitoring only*
- ***Context modelling language*** for influence factors is ontology-based

Tool Demonstration

Case-based authoring support

- Basic idea of case-based reasoning (CBR):



- Employment of CBR to workflow modeling: Reuse of experience knowledge how to adapt workflow instances
- Development of a suitable representation and similarity assessment for workflow instances

Similarity measure for workflow instances

1. Context: conventional similarity function according to the local-global principle, e.g. weighted sum
2. Control flow: similarity function based on graph edit distance, e. g. [Bunke, Messmer, 1993]:

   x, y be directed, labeled graphs,

   o's be atomic edit operations (insert node, insert edge, delete node, delete edge, change node label, change edge label),

   c(o) ∈ [0,1] be a cost function:

$$\delta(x,y) = \min\{\sum_{i=1}^{k} c(o_i) \mid (o_1,...,o_k)\ transforms \quad x \quad to \quad y\}$$

Overall similarity of two cases: aggregation of the values of 1. and 2.

Overview research topics/projects

- CAKE: Collaborative, agile knowledge engine
- Agile long-term workflows *URANOS BMBF project*
- Authoring support / change reuse
- Collaboration patterns *AMIRA EU project*
- Workflow enactment tracking *rjm business solutions*
- Reference models for agile workflow systems
- (partial) transformation of agile workflows to and from BPEL
- Medical workflows *cooperation with Uniklinik Greifswald*

Thank you!

Questions?
Remarks?