Visual Enhancements of Enterprise Models

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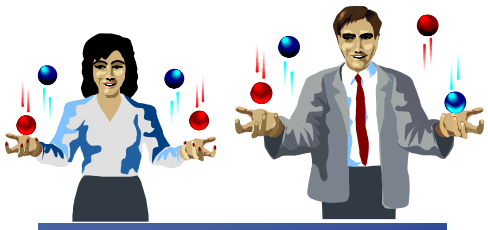
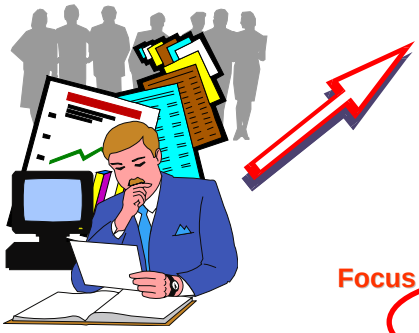
Agenda

Motivation



Knowledge Management

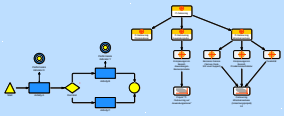


Information Overflow

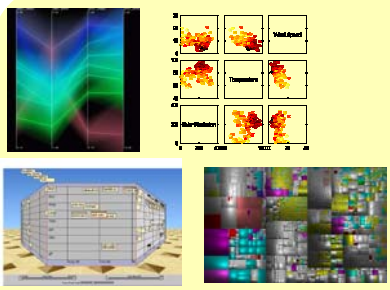
Technical	Organisational
- Data Mining - Information Retrieval - - Enterprise Modelling	...

Focus

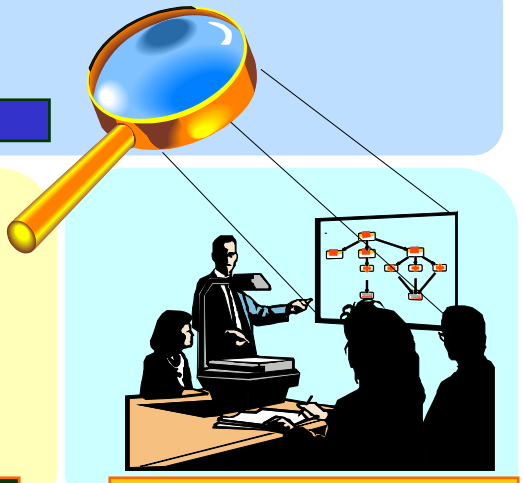
Visualisation – Enterprise Modelling



Enterprise Modelling

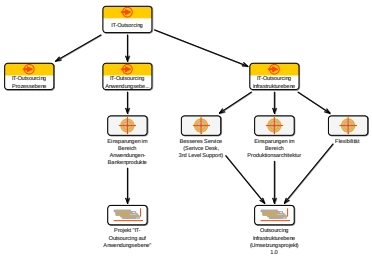


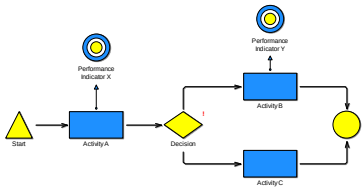
Information Visualisation

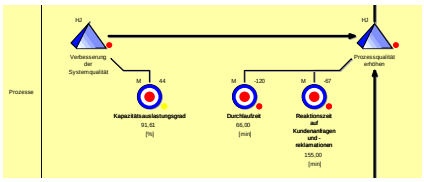


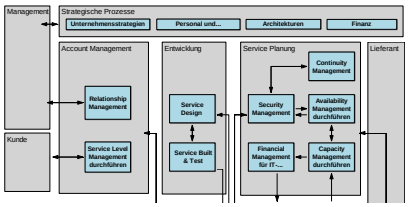
Knowledge Visualisation

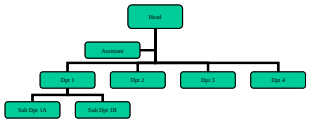
Examples of Enterprise Models











Basic Concepts of Enterprise Models

We see enterprise models as:

An IT-based management approach to represent organisational knowledge in the form of (graphical) models that are based either on a user-defined or standardised schema.

Requirements for enterprise modelling techniques:

- Definition of a modelling language (including syntax, semantics, notation)
- Definition of a procedure model for applying the modelling language

Specification of Modelling Languages

Two state-of-the-art approaches:

- Ontologies
- Meta-models

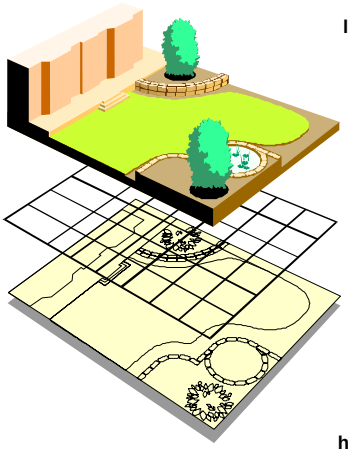
Common properties:

- Specification of basic entities and their attributes of an application domain.
- Specification of the relations between these entities.
- Availability of internationally aligned standards for both approaches (e.g. OWL/RDFS, MOF)

Possible distinguishing feature:

- Degree of abstraction from the real world

Meta-Model vs. Ontology



low

high

Abstraction

Ontology

Meta-Model

Foundations of Visualisation of Enterprise Models

By reverting to the field of visual language theory and benefiting from the similarities to meta-model/ontology concepts:

- State *S* of an application domain *AD* for a visual language, described by objects *O*, attributes *A* and relationships R^n: $S = \{O, A, R^n\}$
- Visual language *VL* composed of a set of visual sentences *VS*. Vocabulary *V* of *VS* composed of a set *P* of visual primitives with visual dimensions *D*, and a set of visual relations V^n: $V = \{P, D, V^n\}$
- Possible visual dimensions according to (Bertin, 1982): Position (X,Y for 2D), Size, Brightness, Texture, Colour, Orientation, Shape
- Specification of the semantics of *VL* by mapping e.g.: $O \leftrightarrow P$, $A \leftrightarrow D$ and $R^n \leftrightarrow V^n$

Application to Business Process Modelling I

- Application domain Business Process Modelling *BP* is described by one start object *S*, at least one or more activities *AC*, zero or more decisions *DEC*, zero or more start points of parallel flows *SPAR*, zero or more unions of parallel flows *EPAR*, exactly one end object *E* and successor relations SR^n between the objects:
  $BP = \{S^1, AC^+, DEC^*, SPAR^*, EPAR^*, E^1, SR^n\}$
  All objects have a name as an attribute, activities have a range of attributes such as costs, duration, actors, input and output documents etc.

Application to Business Process Modelling II

- A graph-based Visual Language for Business Processes consisting of six primitives $SYM_{1..6}$, one relation *ARR* and an actual set *SET* of the visual dimensions* size ψ, brightness λ, texture τ , colour χ, orientation ω, and shape σ for the primitives and the relation

$VL^{ADONIS} = \{SYM_1, SYM_2, \ldots, SYM_6, SET, ARR)$
$SET (P \vee V^n) = \{\psi, \lambda, \tau , \chi, \omega, \sigma\}$

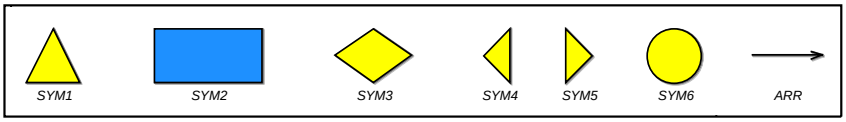
***Position dimension left out as determined by graph layout**

Application to Business Process Modelling III

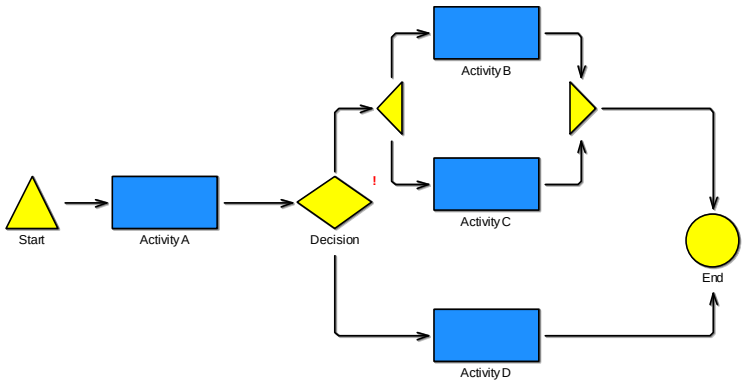
- Semantic Mapping between *BP* and VL^{ADONIS} then takes place as follows:

$S \leftrightarrow SYM_1$, $AC \leftrightarrow SYM_2$, $DEC \leftrightarrow SYM_3$, $SPAR \leftrightarrow SYM_4$, $EPAR \leftrightarrow SYM_5$, $E \leftrightarrow SYM_6$, $SR^n \leftrightarrow ARR$

- Except for the name the attributes of the *AC* elements are not mapped to the visual attributes



Example of a Business Process in *VL ADONIS*



Application to Business Process Modelling IV

- Central question: Can the remaining attributes be used for additional visualisation purposes?
- Path of analysis:
  - Which attributes are concerned in *BP* and *VL*^{ADONIS}?
  - Does a change in a *SET* result in a change of the semantics?

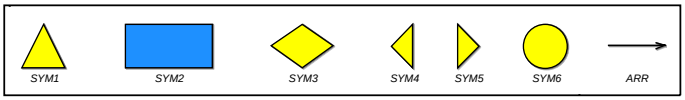
$SET_A(SYM6) \neq SET_B(SYM6)$
$\rightarrow SYM6_A \neq SYM6_B$
$\rightarrow \{E \leftrightarrow SYM6_A\} \veebar \{E \leftrightarrow SYM6_B\}$

- Hypothesis 1: Not all types of changes in a *SET* directly lead to a change in the semantic mapping.
- Hypothesis 2: Semantic mapping is influenced by context.
- Hypothesis 3: There is one dominant dimension in the visual language so that other dimensions can be used to code additional information.

Analysis of *VL*^{ADONIS}

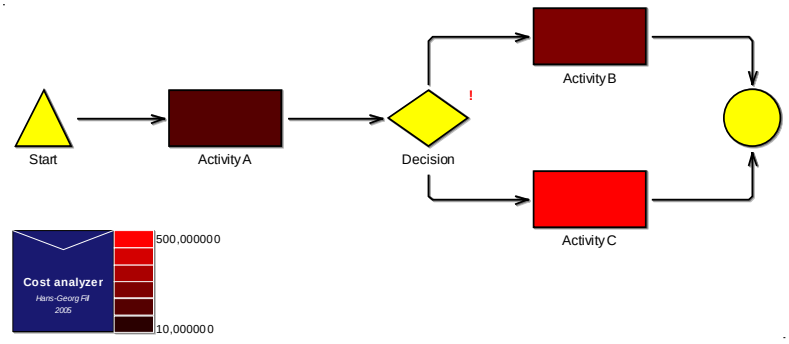
- Influence of visual dimensions on distinctiveness:

	Relevant for Distinction in ADONIS	*Number of Elements affected*
Size	☒	0
Brightness	☒	0
Texture	☒	0
Colour	☒	0
Orientation	☑	3
Shape	☑	3



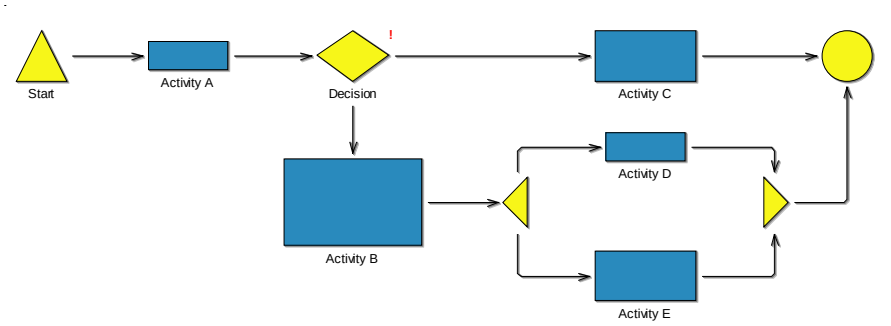
Examples of Visual Model Enhancements I

Colour-coded business process model:



Examples of Visual Model Enhancements I

Size-coded business process model:



Thank you for your attention!

Questions, Discussion

Selected References for the Presentation

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