Business to IT Transformations Revisited

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The semantic gap

Semantic gap between

- business requirements expressed in a business process modelling language (BPML) . . .
- . . . and technical implementation expressed in an executable process language

The semantic gap

Manual mapping vs. automatic transformation

- error-prone, time-consuming, cost-intensive . . .

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- . . . synchronism, unified implementation strategy, platform independence, separation of jobs,

The semantic gap

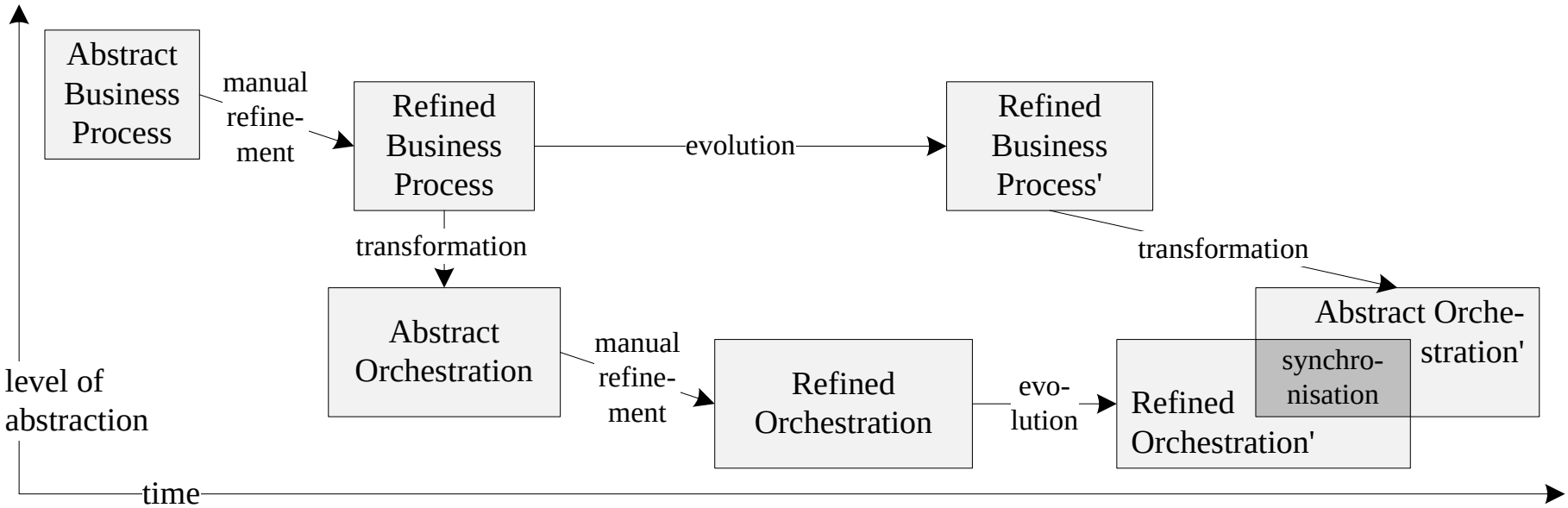
Manual mapping vs. automatic transformation

- error-prone, time-consuming, cost-intensive . . .
- . . . synchronism, unified implementation strategy, platform independence, separation of jobs,
- but complex task, lots of issues

Outline

Outline

The transformation process



Variation points

Business process modelling language

SOA implementation

Process representation schema

Variation points

Business process modelling language

- BPMN
- EPC
- UML AD

SOA implementation

Process representation schema

Variation points

Business process modelling language

SOA implementation

- BPEL
- XPDL
- YAWL

Process representation schema

Variation points

Business process modelling language

SOA implementation

Process representation schema

- graph-structured
- block-structured

Issues of transformation approaches

Complexity reduction strategy

Transformation power

Transformation process

Issues of transformation approaches

Complexity reduction strategy

- new language constructs
- domain-specific patterns
- multi-perspective modelling

Transformation power

Transformation process

Issues of transformation approaches

Complexity reduction strategy

Transformation power

- transformed perspectives
- granularity of entities
- tolerated extend of ambiguity, incompleteness and inconsistency of input models
- readability of output models

Transformation process

Issues of transformation approaches

Complexity reduction strategy

Transformation power

Transformation process

- adaptability and extensibility of the transformation
- synchronization/reconciliation of co-evolved artifacts

Transformation classification

Transformation implementation strategy [Mens/van Gorp 2005]

Level of abstraction [Visser 2001]

Refinement strategy [Czarnecki 1998, Greenfield/Short 2004]

Transformation classification

Transformation implementation strategy [Mens/van Gorp 2005]

- Imperative
- Functional
- Relational
- Graph-based
- Template-based

Level of abstraction [Visser 2001]

Refinement strategy [Czarnecki 1998, Greenfield/Short 2004]

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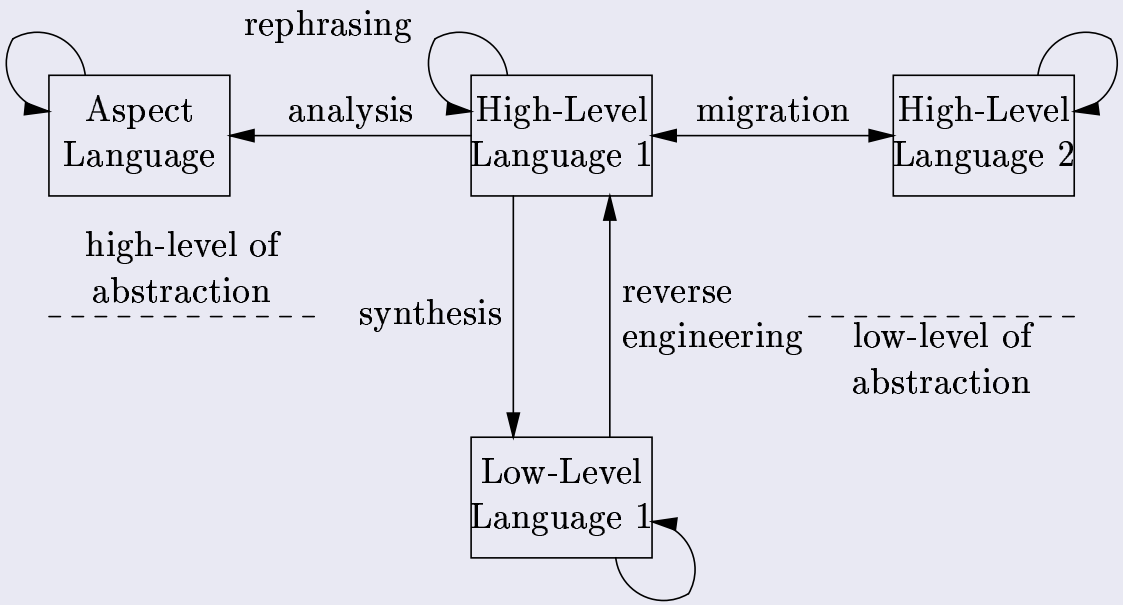

Refinement strategy [Czarnecki 1998, Greenfield/Short 2004]

Transformation classification

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Refinement strategy [Czarnecki 1998, Greenfield/Short 2004]

- Specialization
- Decomposition
- Choice of representation
- Choice of algorithm
- Concretization

Outline

Control Flow Centered Approaches

Characterstics

- concentrate on the execution order
- provide formal algorithms

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Approaches

- Hauser/Koehler 2004: PG/UML AD to BPEL
- Aalst/Lassen 2005: WFN to BPEL
- Ziemann/Mendling 2005: EPC to BPEL
- Kopp et al. 2006: N-eEPC to BPEL
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Evaluation

- handle representation schemes differently

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- horizontal approaches

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Evaluation

- reverse transformations provided

DSL-based Approaches

Characteristics

- focus on complete code generation
- provide language extensions

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Approaches

- Mantell 2003: BPEL-specific UML profile to BPEL
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Evaluation

- Anzböck/Dustdar 2004: vertical approach

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Evaluation

- Heckel/Voigt 2005: iterative development cycles

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Evaluation

- some approachesconsider multiperspective modelling

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Evaluation

- Anzböck/Dustdar 2004: development process

Framework-based Approaches

Characteristics

- focus on complete code generation
- provide extensible frameworks

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Approaches

- Allweyer 2007: stereotyped/tagged EPC to BPEL
- Zdun/Dustdar 2006: Language Framework
- Roser et al. 2007: Workflow Generation Framework

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Evaluation

- aim at pattern-based re-use of recurring problem solutions

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Evaluation

- no iterative development

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Evaluation

- extension required

Outline

Axiom

Horizontal transformation strategy

- starting from an abstract business model $\longrightarrow$ manual refinement efforts
- starting from a business process model augmented with technical details
  - platform identendence to some extend
  - force business analysts to think in technical concepts

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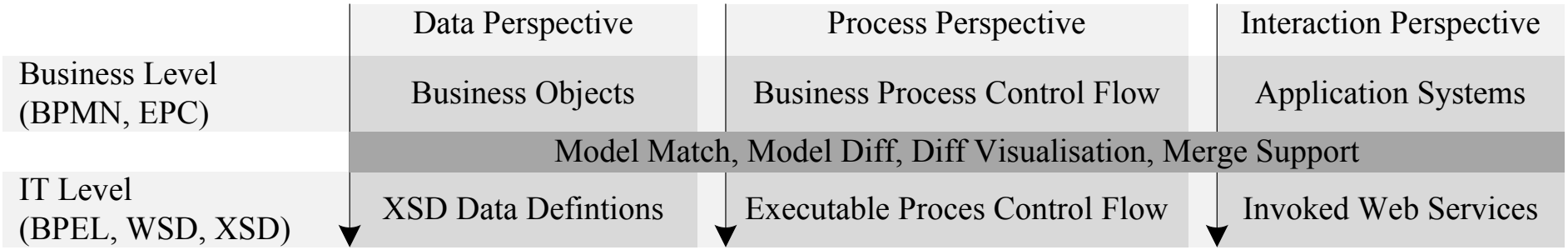
Axiom

- business process models (e. g. BPMN, EPC) must be platform independent
- platform specific IT implementations (e. g. BPEL) should be derived through a vertical transformation strategy

Axiom's Consequences and other requirements

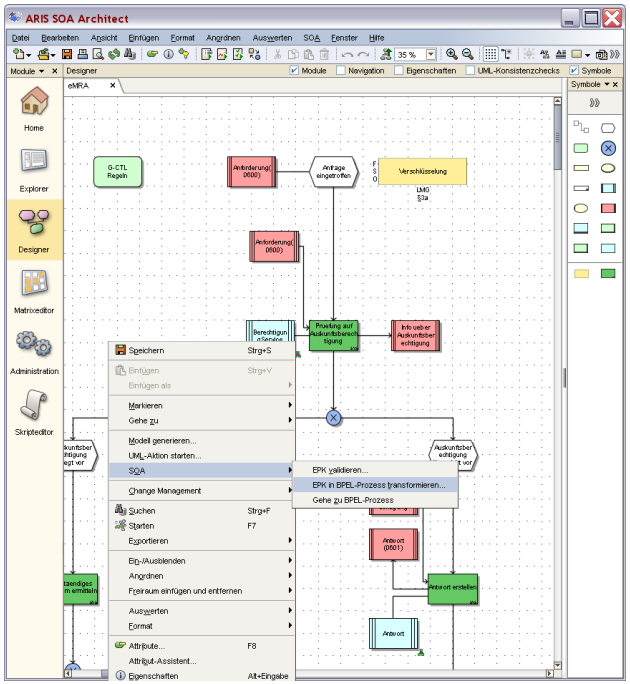
- Business process model shall not contain any platform specific details, e. g. references to WSDL artefacts
- Should use refineable proxy elements instead
- Restrict source models to a subset, which can be unambiguously transformed
- Full code generation is desirable but not achievable
- Target models should be comprehensible for human users
- Iterative development processes through change detection, change visualisation, merge functionalities

Framework


Data Perspective
Process Perspective
Interaction Perspective
Business Level
(BPMN, EPC)
Business Objects
Business Process Control Flow
Application Systems
Model Match, Model Diff, Diff Visualisation, Merge Support
IT Level
(BPEL, WSD, XSD)
XSD Data Defintions
Executable Proces Control Flow
Invoked Web Services

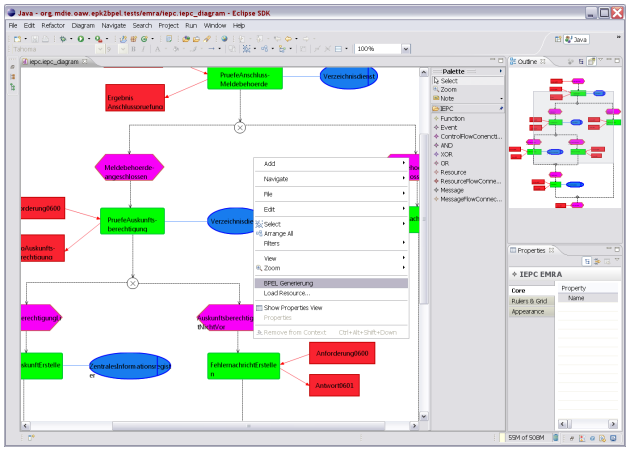
Outline

ARIS SOA Architect



- Service-oriented EPC to BPEL transformation
- No OR-connectors
- Import of service descriptions (WSDL import)
- References to technical assets through proxy elements
- Manual refinement of generated orchestrations required

EMF/GMF/oAW prototyp



- Service-oriented EPC to BPEL transformation
- Folding/unfolding: block-structured control-flow fragments, interaction fragments, data flow aspects
- Unstructured sequential SESE fragments processed by goto elimination techniques
- Functional and template-based implementation in openArchitectureWare (oAW)
- Support of evolutionary development processes through model diffs

Summary

- Business to IT transformations to bridge the gap between business and IT
- Control-flow centered research efforts
- Separation of business and IT aspects
- Vertical transformation strategy

Summary

- Business to IT transformations to bridge the gap between business and IT
- Control-flow centered research efforts
- Separation of business and IT aspects
- Vertical transformation strategy
- Future research efforts
  - Abstraction mechanisms
  - Adaptability of transformation definitions (white box)
  - Model synchronisation/reconciliation for evolutionary development processes