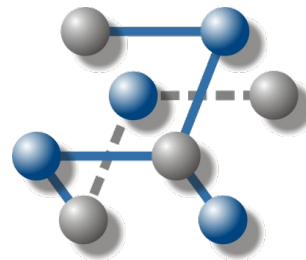


Searching for Service Models



Outline

- The Past, The Present, and The Future
 - Genesis
 - Service Modelling
 - Problem Description
- Research Questions
 - At a glance
 - In detail
- Other interesting questions
- Publication Plan

Genesis

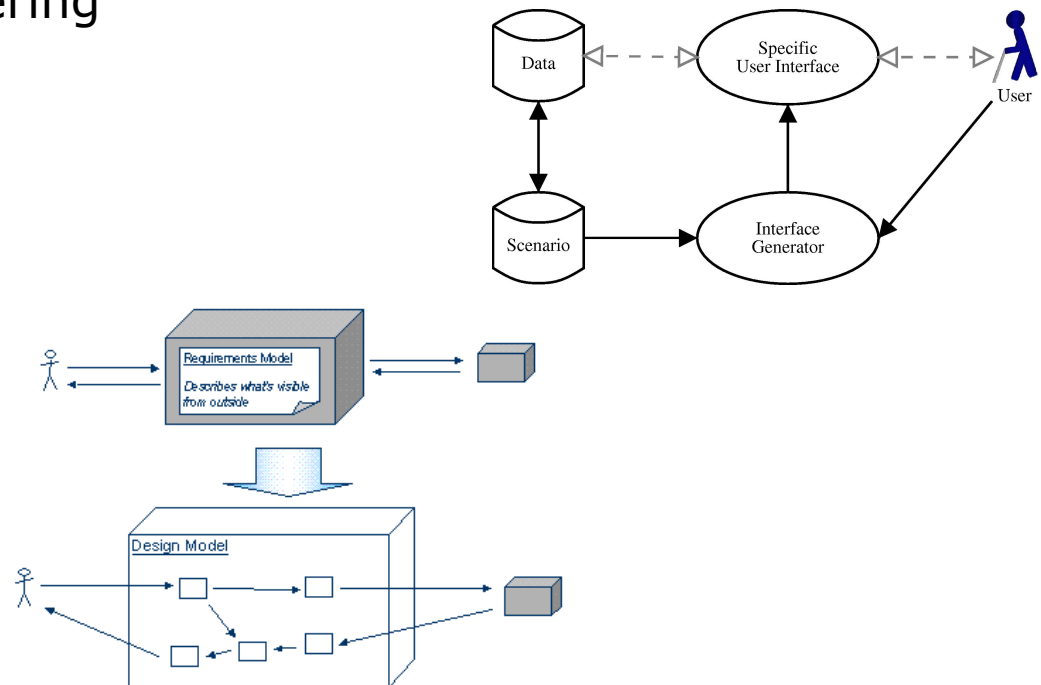
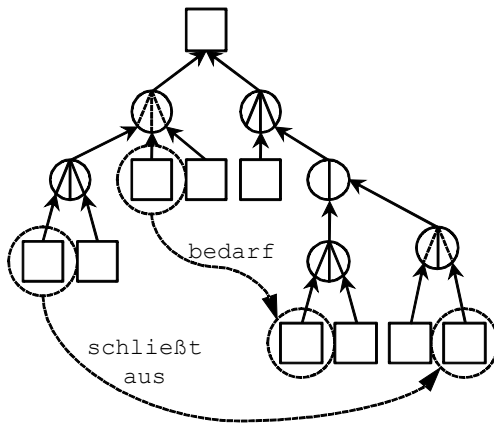
- Integrating different system perspectives to facilitate model driven engineering (29.10.2009)
- Organising and structuring models of components (08.04.2010)
- Automated Model Grouping (21.09.2010)
- Searching for Service Models (today)

Forecast (ASE 2009)

- Problem
 - Handling large amount of existing models
 - Not limited to software engineering
 - Service Engineering, Workflow Management, etc.
- Approach
 - Group models according to their similarity
 - What is similarity?
 - How can models be grouped automatically?
- State
 - Very beginning

Actual Situation (ASE 2009)

- Models are used everywhere
 - Description of software, services, workflows, etc.
- Models base on different notations
 - UML, EPC, BPMN, Service Configuration Graph
- Models are becoming more and more important
 - MDE, Service Engineering



Service Modelling

- ... in the small
 - Basic activity in service development
 - Using (semi)formal notations allows for sound description
 - Transformation in Workflow Management System
 - Product, Process, Resource model
 - Representation of knowledge

Service Modelling

- ... in the large
 - Amount of models increases
 - Reuse existing models
 - Use as source of inspiration
 - Requirement: knowledge about models

Problem Description

- Growing number of models adds to the difficulty of
 - Organising models
 - Searching models
- Existing models are not reused
 - Developers will not reuse models if it is more time-consuming to find, understand, and integrate existing models than to create new models.
- Existing knowledge is not reused
 - Engineering costs increase

Research Questions at a glance

What is similarity in the domain of services?

How can matching services be found?

Which algorithms are applicable?

How can matching services be integrated?

Similarity in the Service Domain

- Outcome of answering question #1: What is similarity in the service domain?
- We know what similarity means in the domain of service models.
 - Look alike, have the same meaning, the same structure, the same words, ...
- We know what types of similarity there exist.
 - Similarity types in BPM: syntactic, linguistic, structural
- We know what types of similarity are applicable in respective life cycle phases (if so).

Similarity in the Service Domain

- Different flavours depending on life-cycle phase
- Design
 - Abstract Semantic Similarity
 - How did we achieve dependable transportation in the past?
- Construction
 - Concrete Semantic Similarity
 - How can we build a blue door?
- Execution
 - Structural Similarity
 - We need replacement parts.



Image Courtesy of: http://www.agileproductdesign.com/blog/acurate_estimate_red_herring.html

Finding Services

- Outcome of answering question #2: How can matching services be found?
- We know characteristics of service notations in the domain of similarity search.
 - Outcome of a search depends on the notation (find processes, find components, etc.)
- We know how to unify notations at search time.
 - Search should be notation-independent
- We know how different model types are linked.
 - Find product models given a process model

Finding Services

- Several dimensions
 - Free-text-query, Structured Query
 - Existing approaches in the domain of Web Services: WSDL, Unified Service Query Language (Pantazoglou), BPMN-Q
 - Additional query parameters in the domain of Business Services: location, pricing, customer contact, etc.
 - Query by Example
 - Query using a given model
 - Transformation, Direct Representation
 - Transform Services in Ontologies, Semantic Queries

Algorithms

- Outcome of answering question #3: Which algorithms are applicable?
- We know different types of algorithms to calculate similarity.
- We can assess the runtime behaviour of these algorithms.
 - $O(n^n)$... hopefully not
- We know which algorithm to use in a specific scenario.
 - Simple Search, Automatic User Support, Browsing

Algorithms

- Requirements: precision, efficiency
 - Recall less important due to comprehensibility
- Existing approaches for business process modelling
 - Causal Footprints, S-BPMs, Graph Edit Distances
- Existing approaches for class diagrams
 - Attributes, Operations, Associations, etc.

Integrating Services

- Outcome of answering question #4: How can matching services be integrated?
- We know how to integrate (parts of) services in existing models.
 - Service Nesting, Referencing
- We know how to specify variability points for integration.
 - Modelling Notation Adjustment

Wait a second ...

I thought you were talking about searching for models?!

Integrating Services



Image Courtesy of <http://www.cleverworkarounds.com>

Integrating Services

- Hush now baby, baby, don't you cry*
- Integrating model elements requires consistency checks
 - Requires formal metamodel of services (KoProServ)
 - Allows for automatic user support for modelling

* Guess the famous song!

Other interesting questions

- Can we search for patterns?
 - Searching for patterns would be more generic than searching for specific model parts
 - Four-Eyes Principle, Fault Report, Incoming/Outgoing Goods
 - How can we describe patterns in a generic way?
- How to deal with different levels of abstraction?
 - Analyse abstraction level
 - Automatic Refinement, Coarsening
- What about informal models?
 - Models created in brainstorming, etc. are usually not formalised
 - Huge unrevealed knowledge

Publications in line with PhD planning

- 2010
 - ASE 2010 Doc Symposium – General Research
- 2011
 - ASE 2011 Short Paper or workshop – Similarity search over different notations or Characteristics of models in language-based comparison (abstract Apr. 25th, paper May 9th)
 - Services and Models (second half)
- 2012
 - Conceptualising models in the service domain
- 2013
 - Unified search in service models

Other publications

- Computers in Industry Special Issue Managing Large Collections of Business Process Models: A Comparative Survey of Business Process Similarity Measures, ext. abstract Feb. 2nd (collaborating with Ralf Laue, ebus)
- A Comparative Survey of UML Similarity Measures
- Cloud Engineering Process (collaborating with SE Duisburg-Essen)

Conclusion

- What?
 - Similarity search in service models
- Why?
 - Facilitate Reuse, Automatic User Support
- How?
 - Analyse meaning of similarity
 - Analyse applicability of similarity measures
 - Analyse possible tool support



Thanks for your attention
Discussion

Image Courtesy of <http://www.abendblatt.de/wirtschaft/karriere/article1023769/Einschlaefern-bei-Vortraegen-leicht-gemacht.html>