Software Engineering within a Digital Business Ecosystem

Giulio Marcon

Salzburg University of Applied Sciences, A-5412 Puch / Salzburg, Austria

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Authors

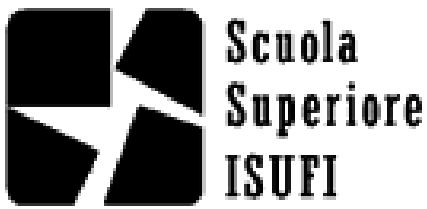
- Giulio Marcon

  Salzburg University of Applied Sciences, A-5412 Puch / Salzburg, Austria
- Angelo Corallo

  eBMS - ISUFI, University of Lecce, 73100 Lecce, Italy
- Maurizio de Tommasi

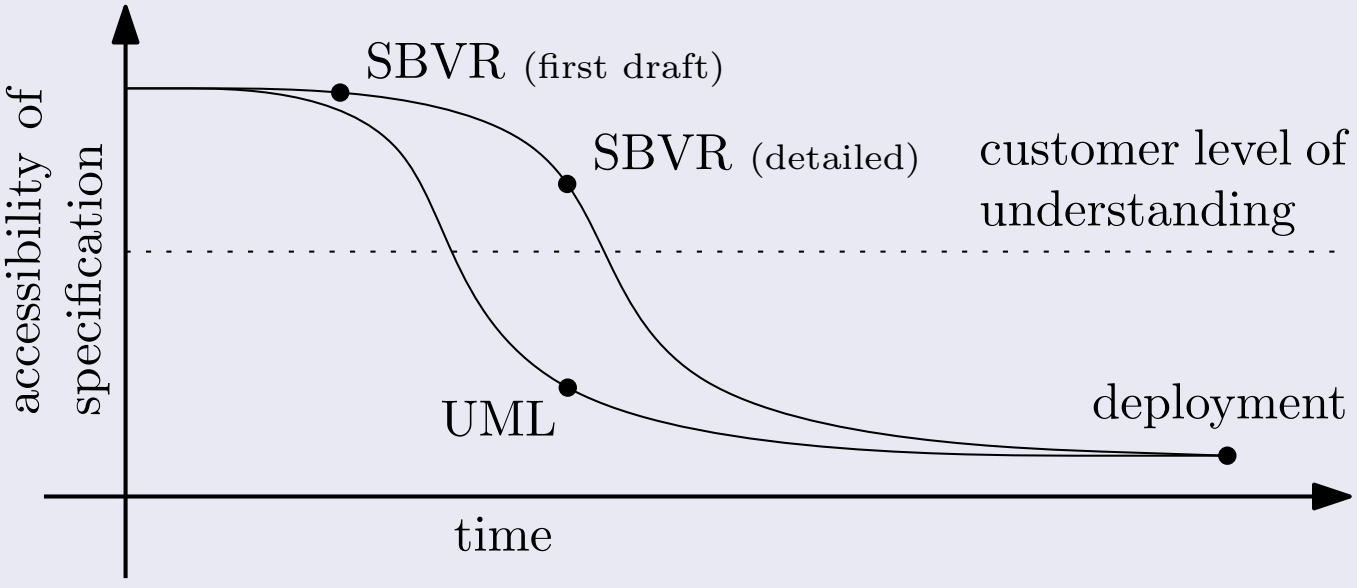
  eBMS - ISUFI, University of Lecce, 73100 Lecce, Italy
- Thomas Heistracher

  Salzburg University of Applied Sciences, A-5412 Puch / Salzburg, Austria



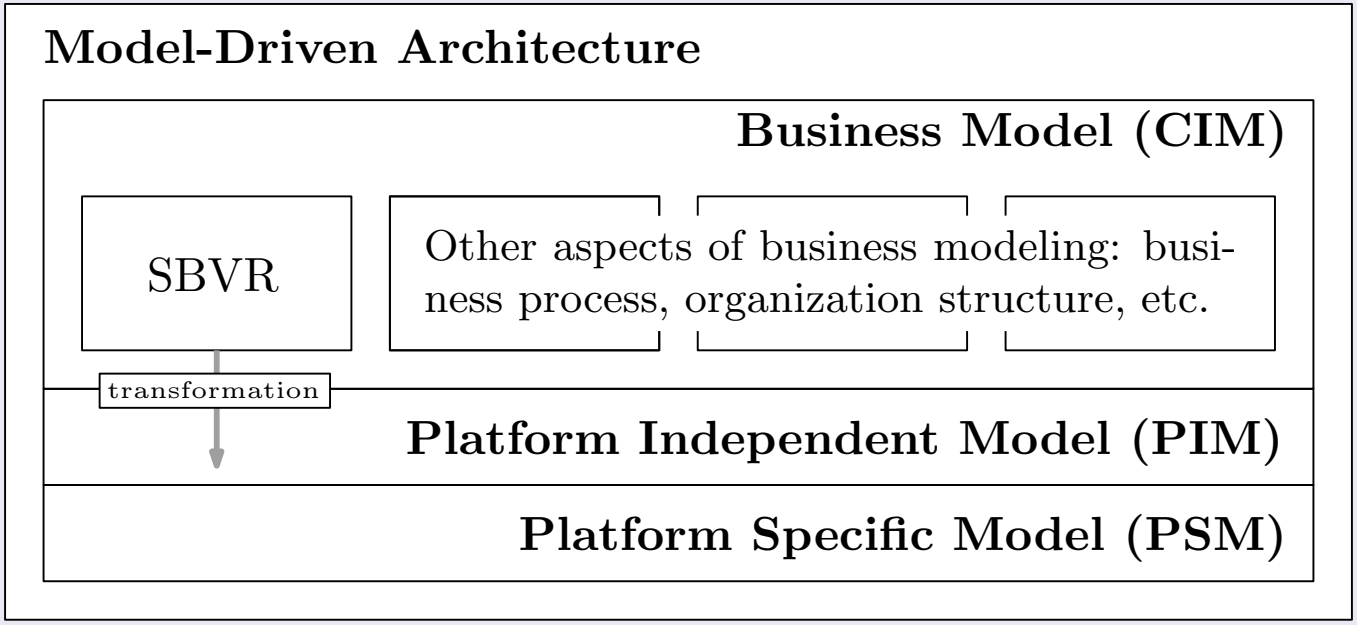
Outline

Natural language software specification



- Standard current practices (UML) drop very soon below the level of understanding of the customers, contrarily to natural language based techniques (SBVR).

SBVR in the Model-Driven Architecture



- According to the vision of the Object Management Group, SBVR is the language of choice for Computational Independent Models in the Model-Driven Architecture.

SBVR model example

branch
Concept Type: organization function
Definition: rental organization unit that *has rental responsability*

car movement
Definition: planned movement of a rental car of a specified car group from a sending branch to a receiving branch

receiving branch
Concept Type: role
Definition: branch that *is the destination of a* car movement

sending branch
Concept Type: role
Definition: branch that *is the origin of a* car movement

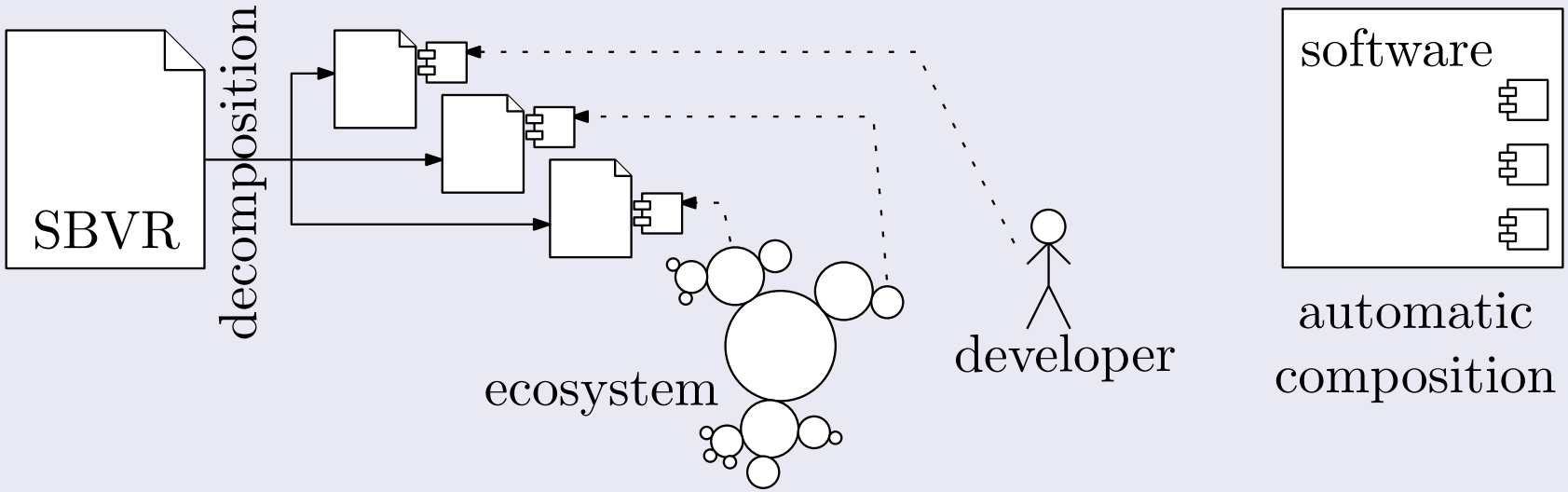
car movement *has* receiving branch
Necessity: each car movement *has* exactly one receiving branch

car movement *has* sending branch
Necessity: each car movement *has* exactly one sending branch

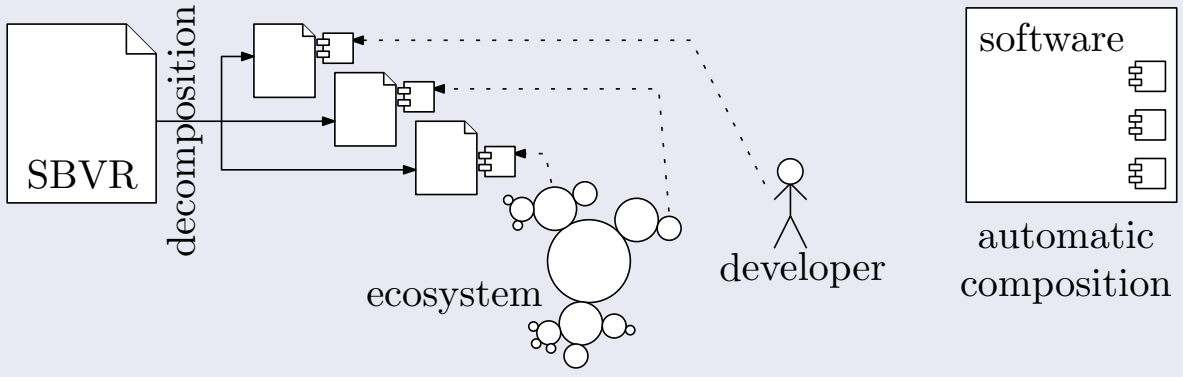
rental car *is assigned to* car movement
Necessity: At most one rental car *is assigned to* each car movement

car movement *being international*
Concept Type: characteristic
Definition: car movement *having* country *of* sending branch that *is* not the country *of* receiving branch *of* the car movement.

Service Oriented Architecture with a Digital Ecosystem

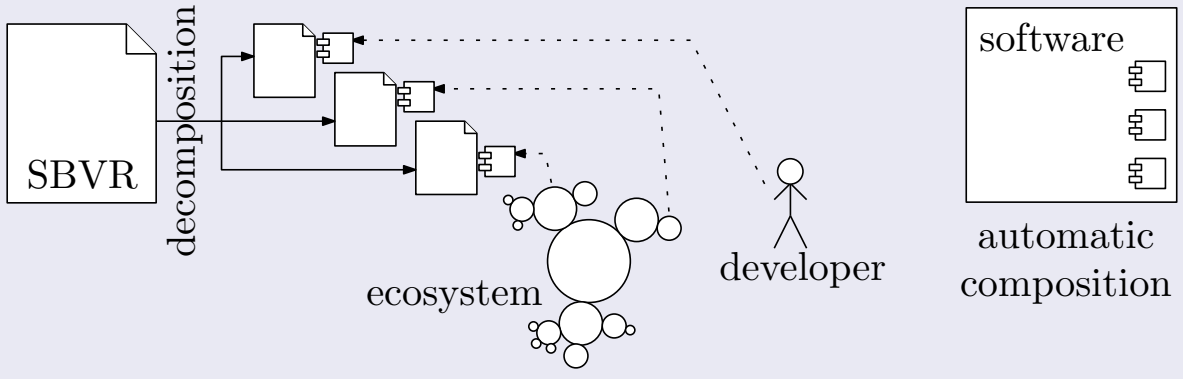


How a request can be satisfied



- Some implementor finds the request and offers to develop it;
- several components existing in the digital ecosystem can be re-used to satisfy the request and the additional parts necessary are developed by some implementors;
- all the necessary components are already in the digital ecosystem and only fine-grained optimization prior to deployment needs to be done.

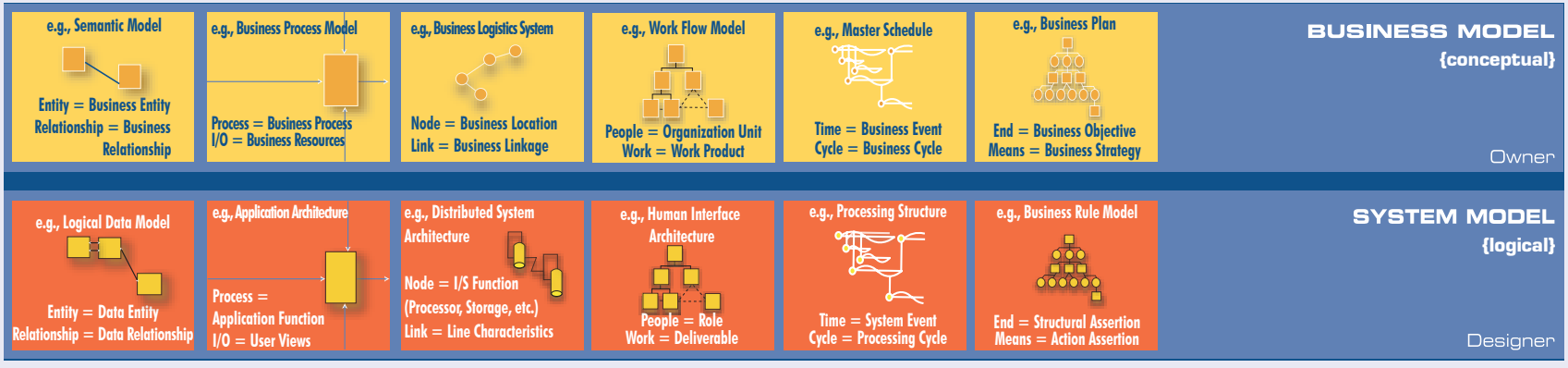
Levels of automation



- Decompose the request/specification in atomic units;
- match the atomic components to the ones available;
- offer the best solutions to the requester;
- combine the components to satisfy the request;
- open bids for developers to implement missing components.

Zachman Framework

In Zachman Framework terms



- From row 2, the conceptual business model, to row 3, the logical system model.

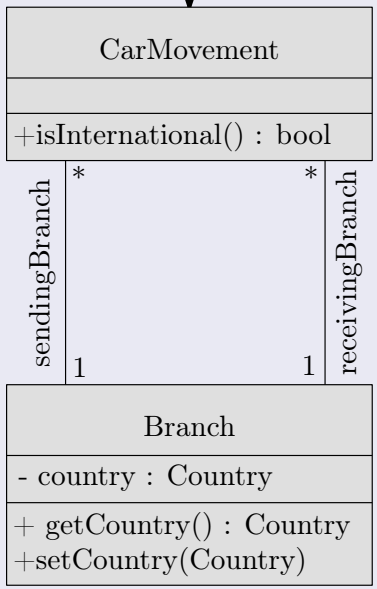
From SBVR models to UML class diagrams and code

car movement *being international*
Concept Type: characteristic
Definition: car movement *having* country *of* sending branch that *is* not the country *of* receiving branch *of* the car movement.

Code Generation

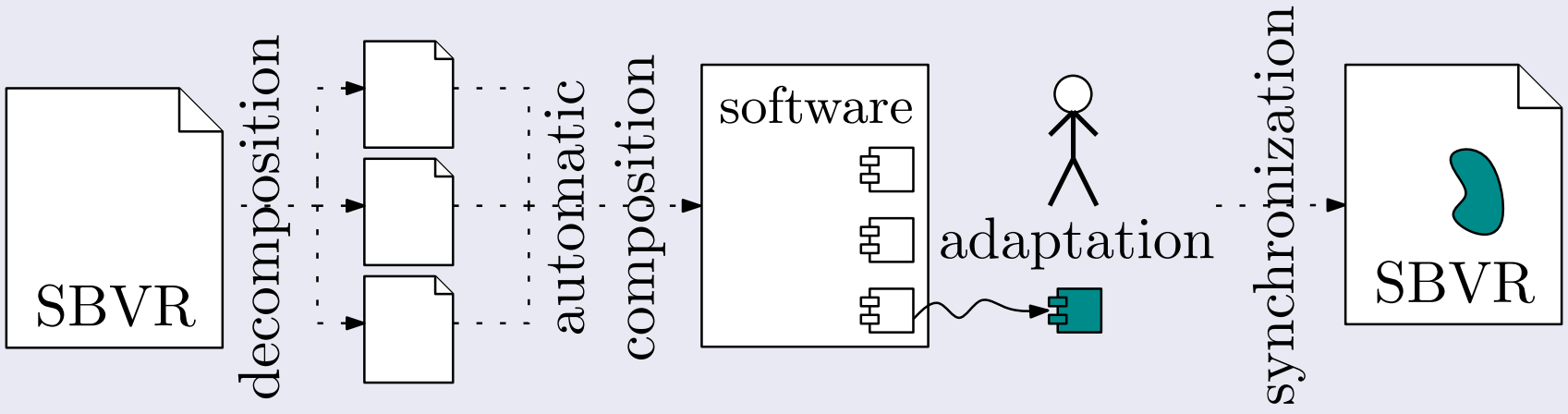
```
class CarMovement {

  private Branch sendingBranch;
  private Branch receivingBranch;

  /* SBVR_Concept_Type: Characteristic */
  public bool isInternational () {
    Country countryFrom = sendingBranch.getCountry();
    Country countryTo =  receivingBranch.getCountry();
    return !contryFrom.equals(countryTo);
  }

}
```

UML Class Diagram generation



- Example from ruleset for transformation of unary fact types (characteristics).

Re-adaptation of specification



Round-trip engineering with SBVR

- An SBVR model is created;
- the corresponding UML models are generated;
- code is generated from the annotated UML models;
- UML models or the source code are modified;
- the original SBVR model is updated with the modification.

References

Heistracher, T., Kurz, T., Marcon, G., Masuch, C.:

Collaborative software engineering with a digital ecosystem.
In: Proc. International Conference on Global Software Engineering, Costão do Santinho, Florianópolis, Brazil (2006) (accepted).

Nachira, F.:

Toward a network of digital business ecosystems fostering the local development.
Discussion paper,
http://www.digital-ecosystems.org/doc/discussionpaper.pdf (2002)

OMG:

Semantics of Business Vocabulary and Business Rules Specification. (2006) First interim specification, http://www.omg.org/docs/dtc/06-03-02.pdf.

G. Marcon, H. Okada, T. Kurz, and T. Heistracher.

D16.3, Report on Adaptive Service Generator.
DBE Project, EU-IST 507953, June 2006.

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