Method Engineering : Achievements, Trends & Challenges

Outline

- Backdrop
- Challenges

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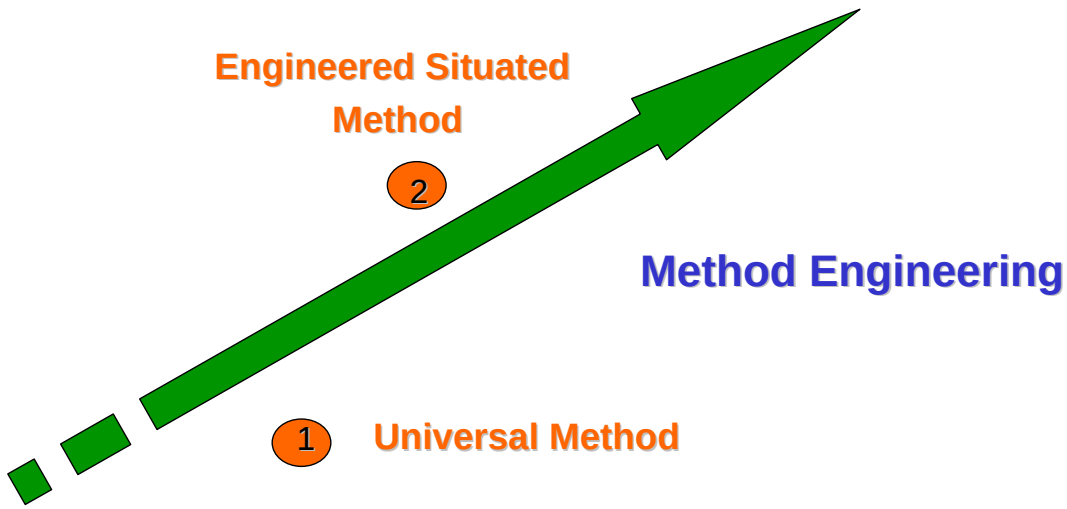
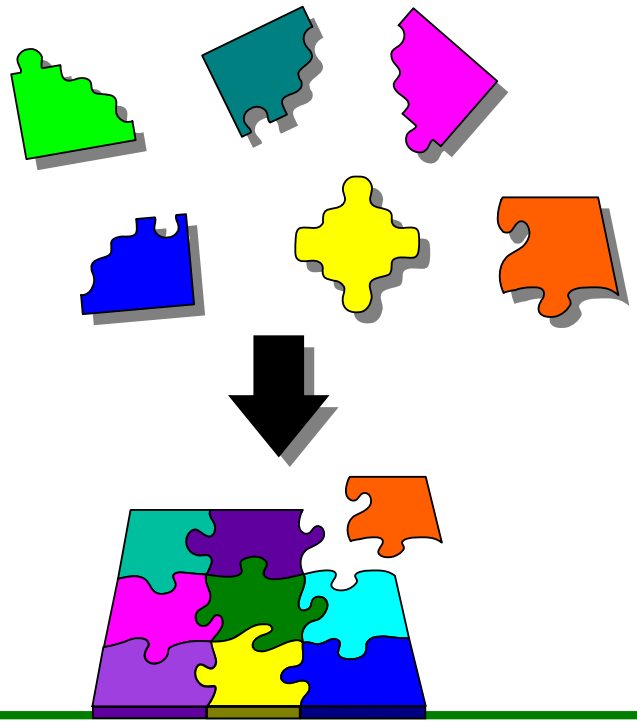
Evolution in Information System Development Methods (ISD)



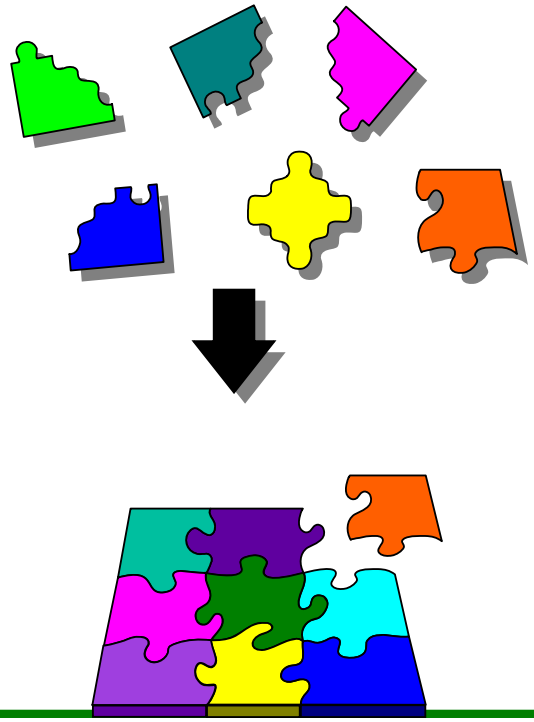
Method Engineering



Method engineering is the discipline of developing, customizing, and/or configuring a situation-specific method from parts of existing methods .

[Brinkkemper 96, Leppanen 2006]

Method Engineering

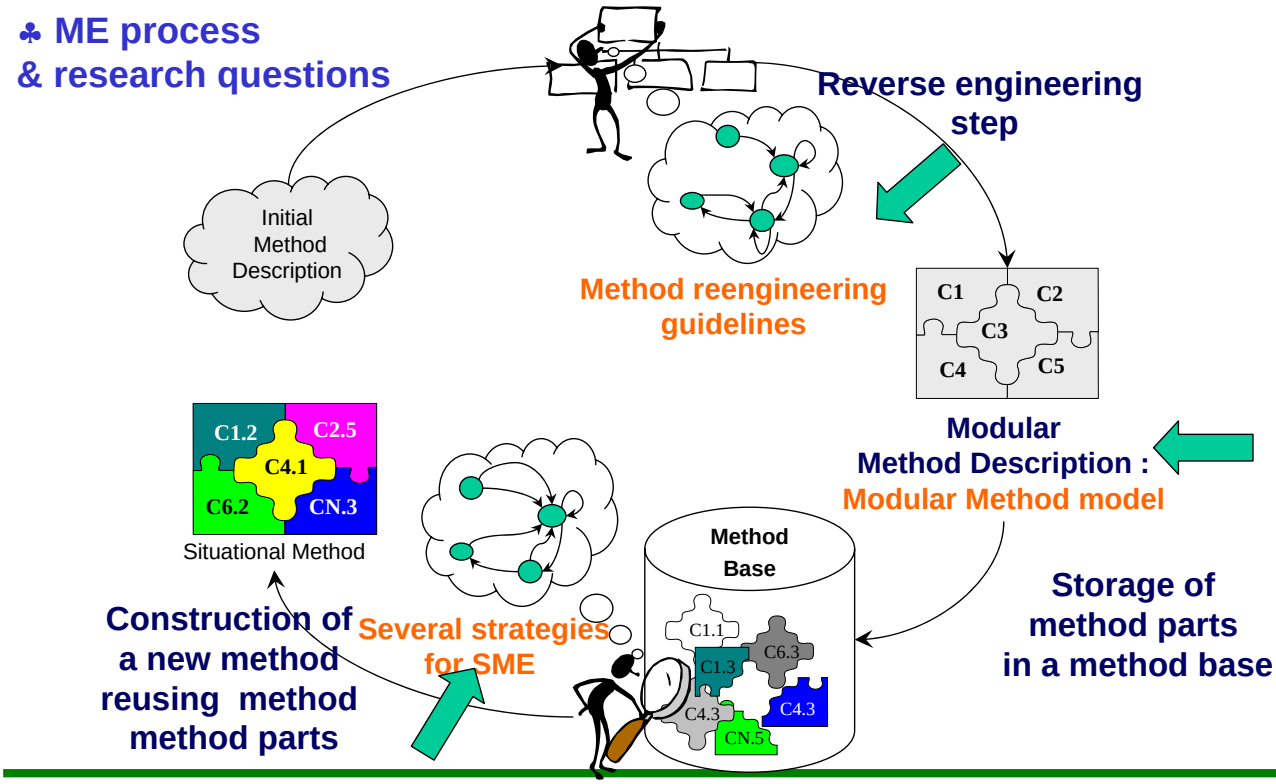


Motivations

Adaptability
(to specific projects, companies, needs & new development settings

Reuse
(of best practices, theories & tools)

Method Engineering



Method Engineering

♣Software engineering vs Method Engineering *

Software engineering	Method engineering
Modelling (specification)	Meta- Modelling
CASE (Computer Aided S/W Engineering)	CAME (Computer Aided Method Engineering)
Software Base	Method Base
Software metrics	Method metrics

*Motoshi Saeki talk (EMISE)

Method Engineering

♣Key Method Engineering Artefacts*

ME products

ME meta models & meta-modelling languages to represent method parts

Harmsen97, Heym& Osterle,92, venable93, Kelly et al 96, Graham et al 97, OMG 05, Prakash 99, Ralyte 01,
* Leppanen06

ME processes

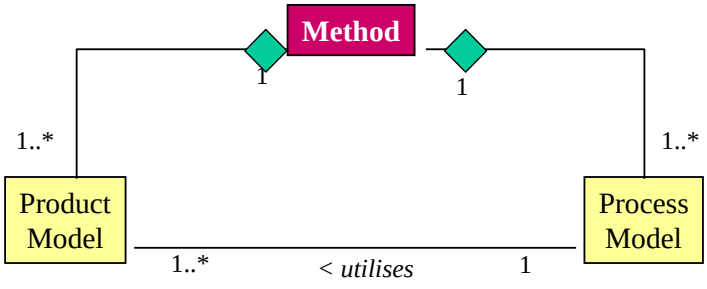
ME strategies, approaches, workflows to combine, integrate, assemble method parts & to guide the ME process

Kumar & Welke, 1992, Oei, 95, Phlihon et al 97, Heym&Osterle 97, Rolland & Prakash 96, Saeki, 98, Leppanen 00 Saeki 03, Karlsson & Agerfalk 04,

Method Engineering Products

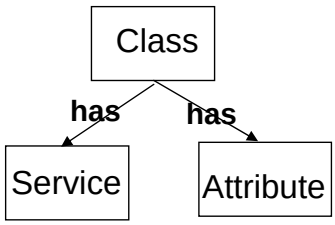
A modularization issue based on two assumptions

❖ **(1) A method is composed of a product model and a process model**



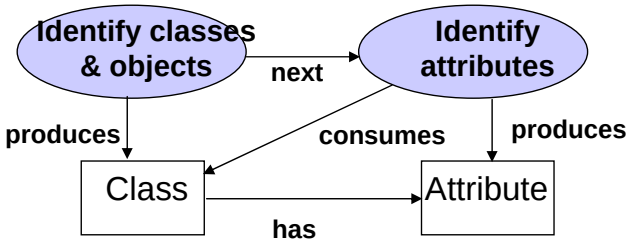
Method Engineering Products

♣ (2) Meta-Modelling is an appropriate means to describe * methods (Yourdon & Coad)



Concept = { Class, Attribute, Service}
Relationship = {has(CS), has(CA)}

(a) Meta model of product part



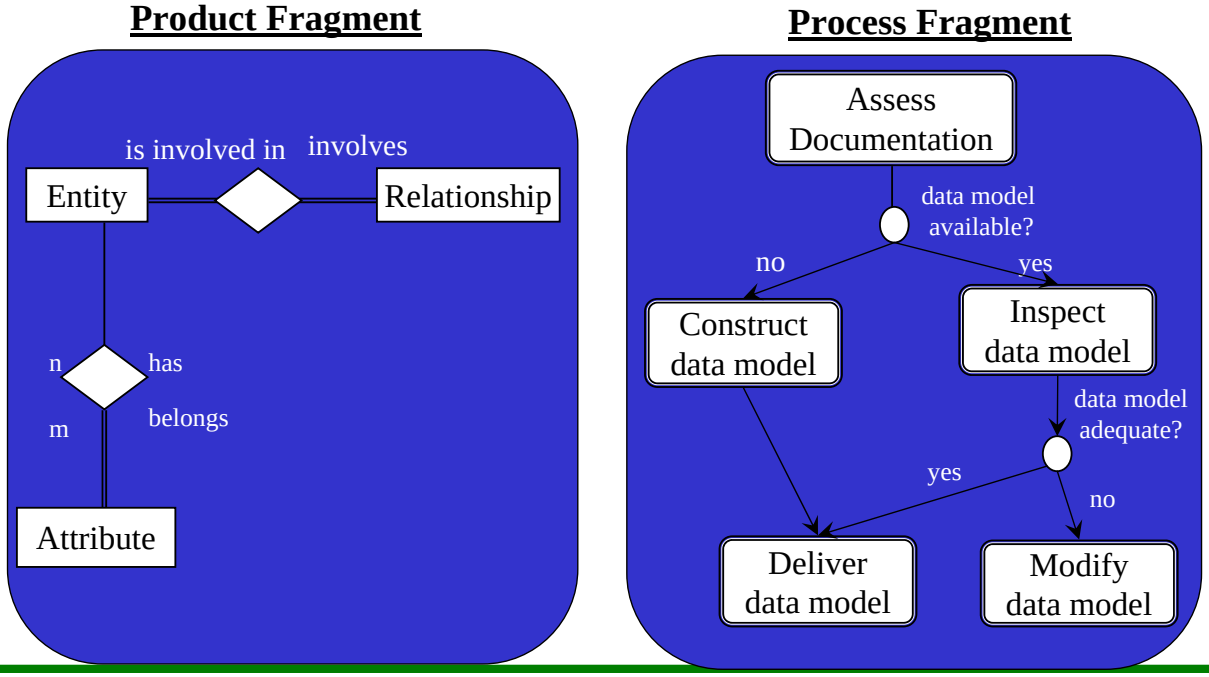
procedure=
{ identify classes & objects, identify attributes}

(b) Meta model of process part

*Motoshi Saeki talk (EMISE)

The Method Fragment Perspective

[Harmsen 94, Harmsen 97, Brinkkemper 99]

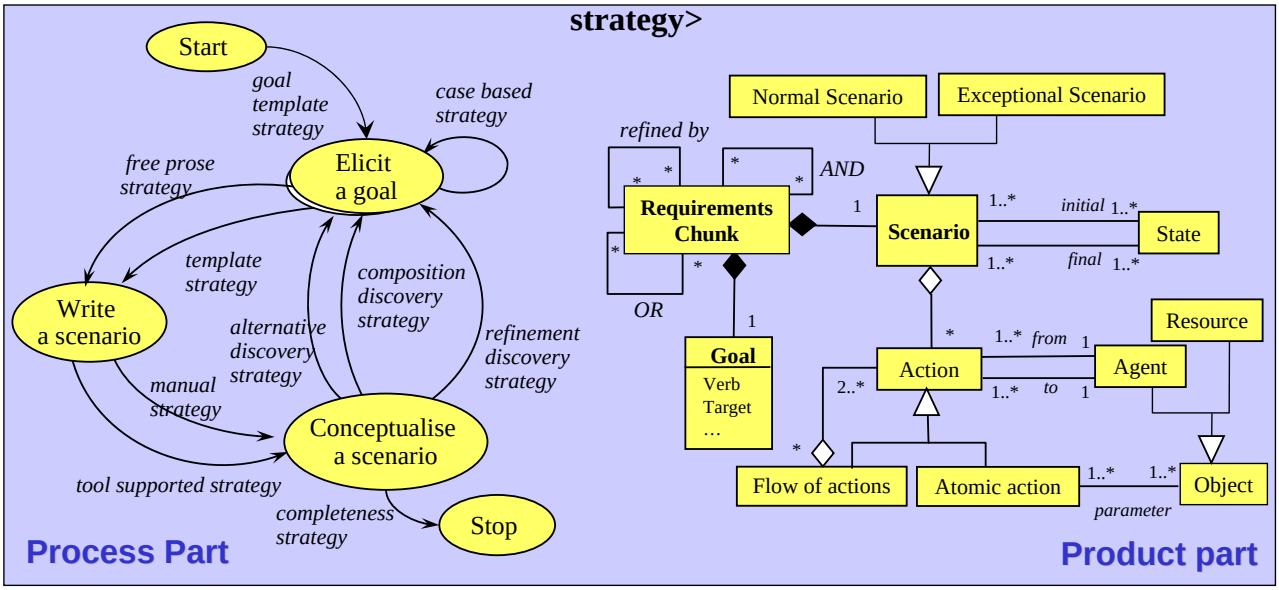


The Method Chunk Perspective

[Rolland & Prakash 1996, Rolland 1994, Ralyte & Rolland 2001]

♣ tight coupling in a chunk of the process and related product parts

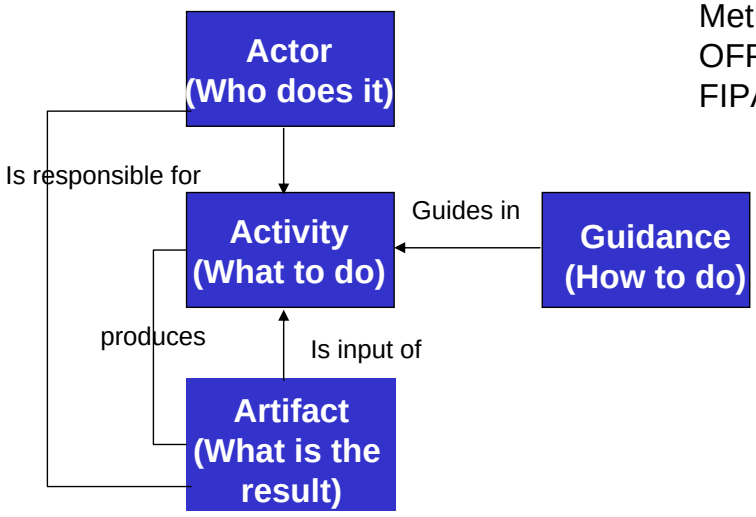
<(Problem description), Discover goal / scenario couples with CREWS-*L'Ecritoire* strategy>



Method Engineering Products

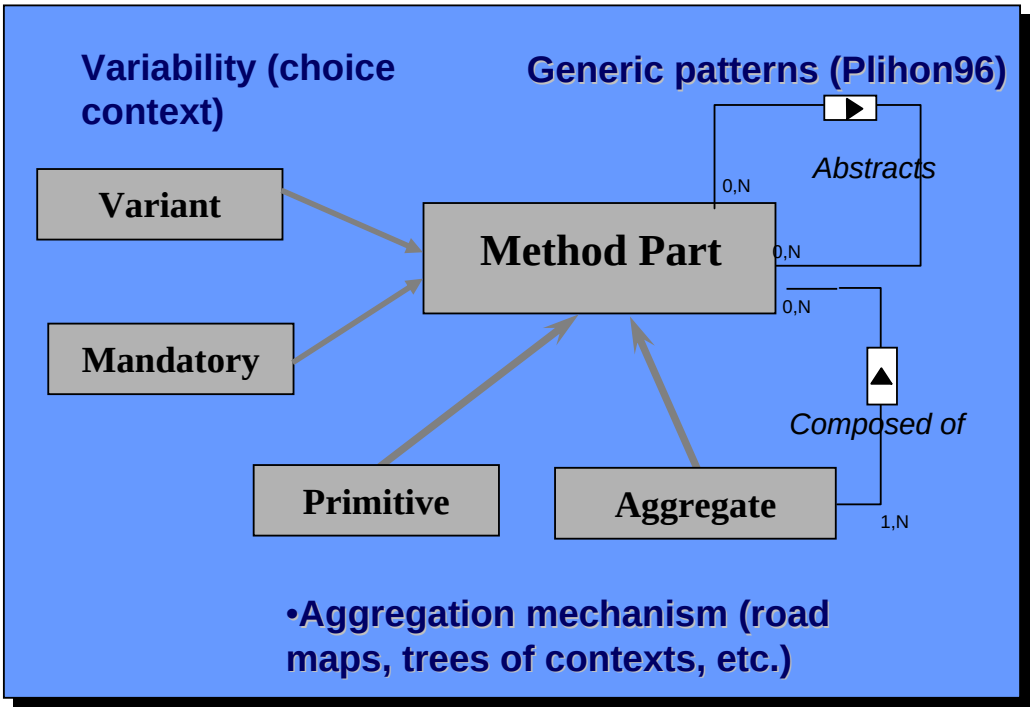
♣ Towards a consensual view (Cossentino et al , 2006)

Method fragments (Brinkkemper et al)
Method chunks (Ralyté et al)
OFP (Henderson Sellers et al)
FIPA fragments (Cossentino et al)



Method Engineering Products

♣ Less consensual view on method part relationship types



Method Engineering Processes

♣ Emphasis on composition strategies* (classification by Ralyté & Rolland)

❑ Assembly based

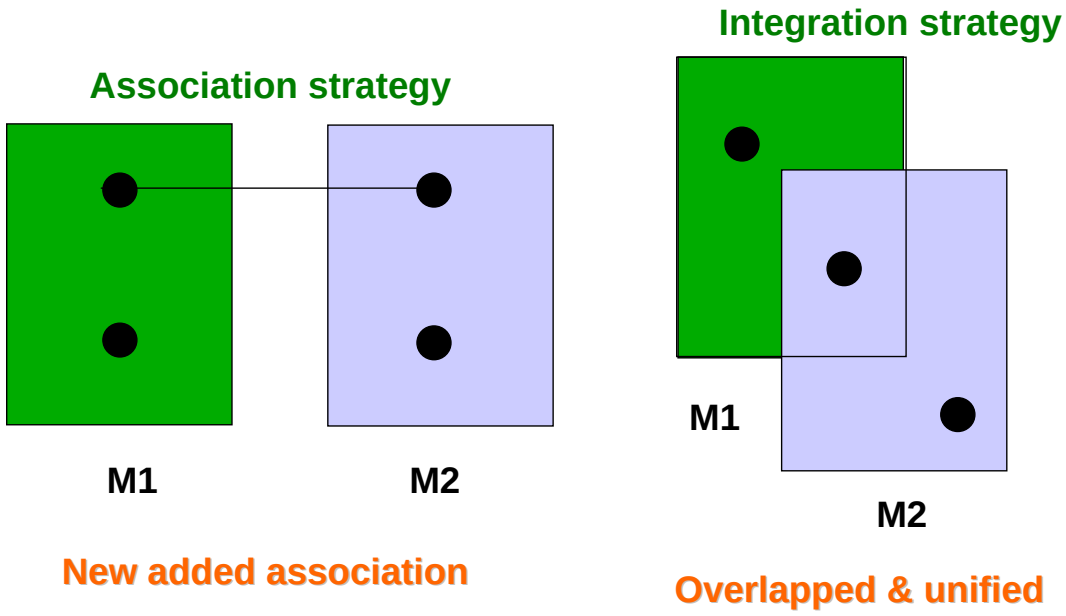
❑ Extension based

❑ Paradigm based

*Motoshi Saeki talk in EMISE

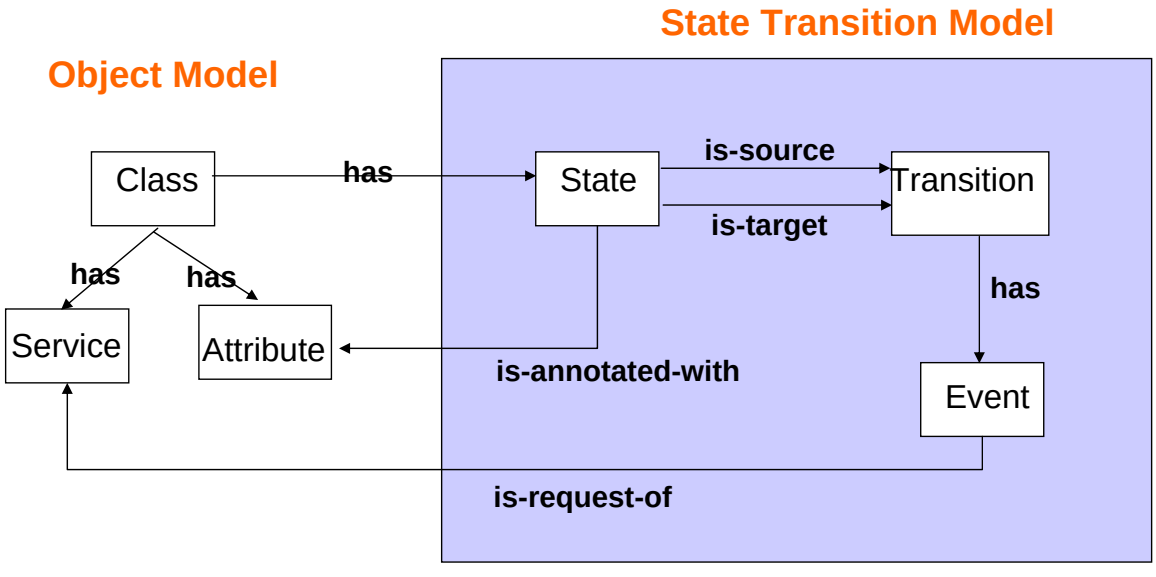
Method Engineering Processes

♣ Method Assembly* : classification by J.Ralyté & C.Rolland



Method Engineering Processes

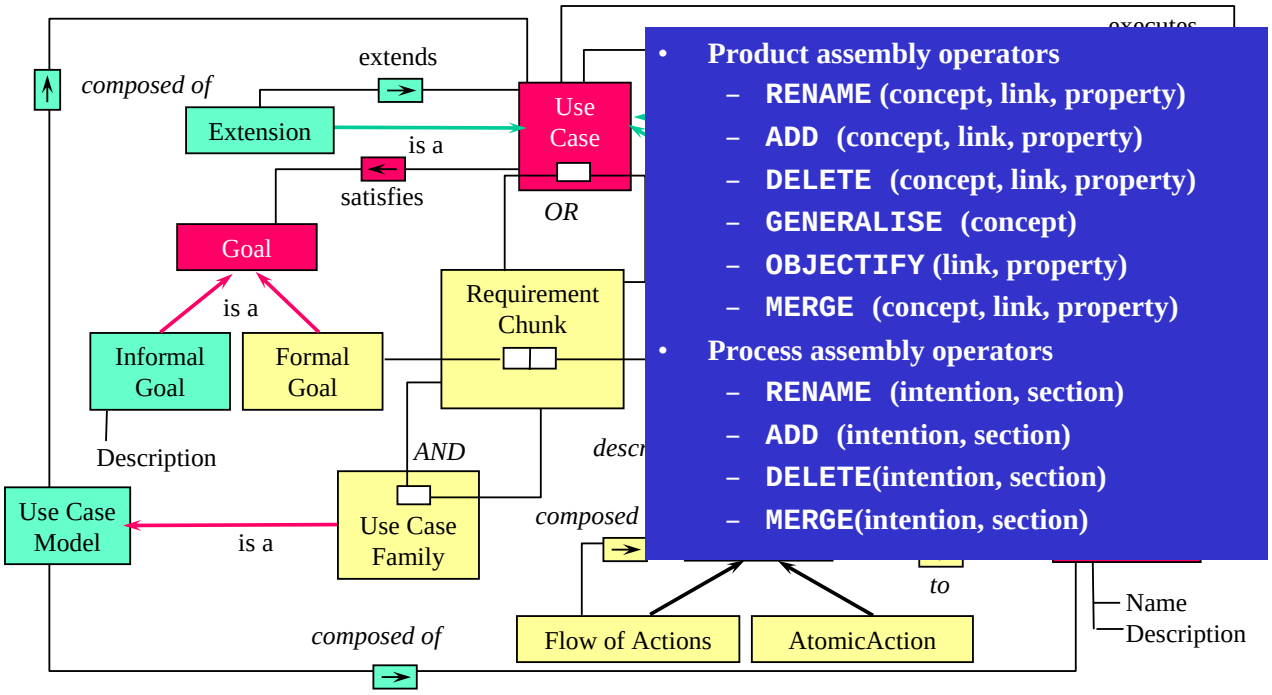
♣ Method Assembly by association*: example of product models assembly



ObjectChart, Coleman et al92

Method Engineering Processes

♣ Method Assembly by integration: L'Ecritoire and OOSE



Method Engineering Processes

♣ Less studies on ME processes

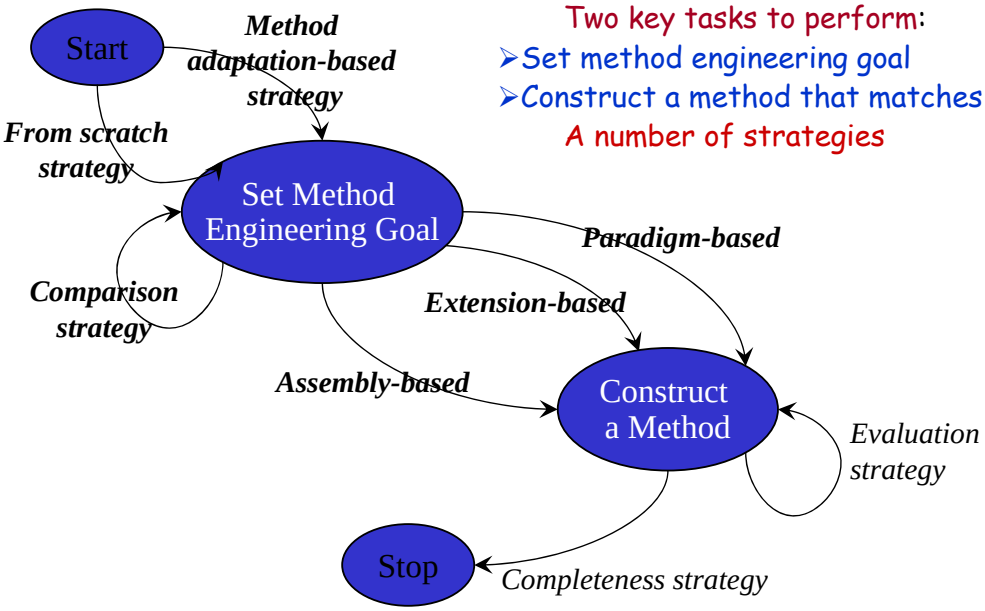
"Towards a life cycle for method engineering "(Gupta, Prakash 2007)

Stage	Process	Input	Output
Requirements engineering	**Intention matching**	Goal of the method To-Be	Intentionally similar methods
Design engineering	**Architecture matching**	Architectures of intentionally similar methods	Architecturally similar method
Construction engineering	**Organization matching**	Workflows of architecturally similar methods	Method To-Be

Bajec et al 2007, Agerflak 2007, Mirbel &Ralyté 2006 etc.

Method Engineering Processes

♣ **A generic process model for method engineering** (Ralyté, Rolland 2003)



Two key tasks to perform:
- Set method engineering goal
- Construct a method that matches this goal

A number of strategies

Method Engineering Processes

♣ **A still fragmented position on designing ME processes (Leppanen 2006)**

Goodies …….

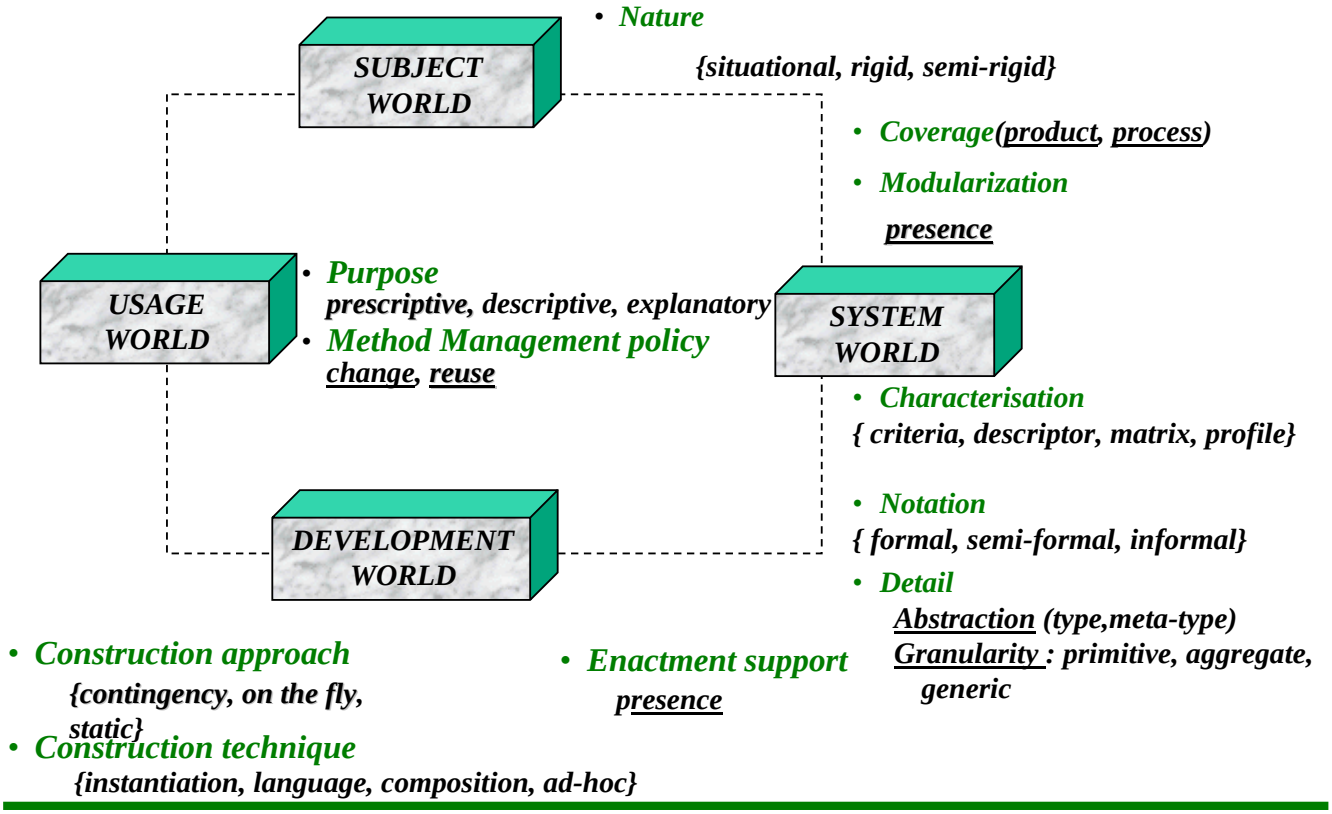
- **a rich set of composition approaches and procedures**
- **attempts to integrate various composition strategies**
- **set of generic taxonomy of assembly operators**
- **proposals for decomposing ME into ME workflows**

Method Engineering Processes

and remaining issues …….

- an incomplete coverage of the systelogical, infological, conceptual, datalogical & physical perspectives (Leppanen, 2006)
- need for a better understanding of the dimensions of situational method development (Aydin et al 2007)
- poor understanding of the notion of situation (Bucher et al, 2007)
- need for more syntactic and semantic checking techniques
- too conventional workflow type of ME process modeling

Method Engineering Framework (Caise98&..)

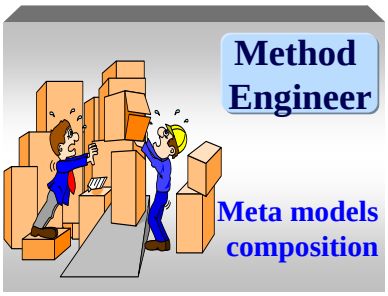


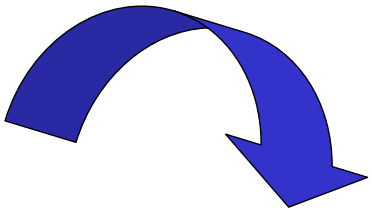
Method Engineering Trends & Challenges

♣ Where to go next?

Method Engineering Trends & Challenges

♣ A shift of focus : from engineering issues to usage concerns





From components to services

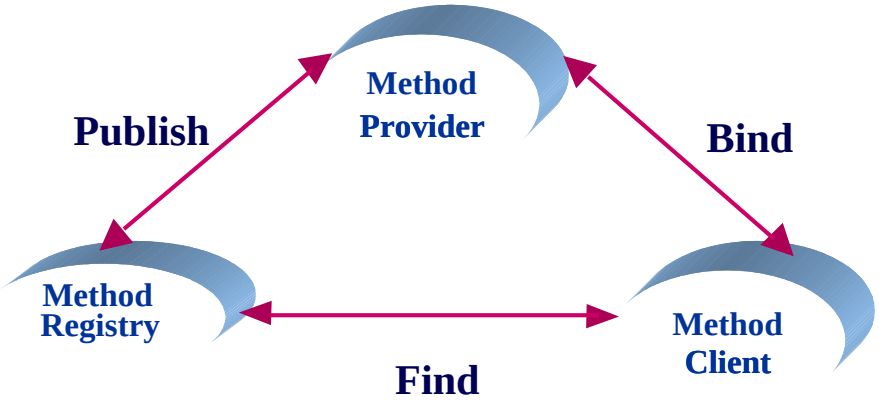
Towards CoP (Mirbel 07)

- **Emphasize and standardize MP Interface descriptions**
- **Publish and make them publicly available**
- **Provide contextual information to ease MP finding**
- **Facilitate MP composition**

Method Engineering Trends & Challenges

♣ Towards MOA : Method Oriented Architecture

➢ Use method services as fundamental elements
➢ Reorganize a portfolio of existing methods into self-describing, elements (services) , accessible through standard interfaces and that can be assembled together
➢ Based on an interaction between three kinds of method agents



Method Engineering Trends & Challenges

♣ MaaS : Methods as Services

➢ Using Web service technology to provide self-describing, platform agnostic elements (MaaS) , accessible through standard interfaces and that can be assembled together

Types :
LastTradePriceRequest *(ticketSymbol:String)*
TradePrice *(price : float)*
Messages :
GetLastTradePriceInput *(body:LastTradePriceRequest)*
GetLastTradePriceOutput *(body:LastTradePrice)*
Port-type :
StockQuotePortType *GetLastTradePrice (in : GetLastTradePriceInput*
out : GetLastTradePriceOutput)
Binding :
StockQuoteSoapBinding (StockQuotePortType, soap, document,http) GetLastTradePrice : http://example.com/GetLastTradePrice

Method Engineering Trends & Challenges

♣ MaaS : An XMI based solution (CRI's approach 07)

Types :

ImproveRoleRequest(**inputSchema:XMIDocument**, RoleName : XmiIdref, ClassWithRole : String, ClassWithoutRole : String)

ImproveRoleResult (**ResultSchema:XMIDocument**)

Messages :

ImproveRoleInput *(body:ImproveRoleRequest)*

ImproveRoleOutput *(body:ImproveRoleResult)*

Port-type :

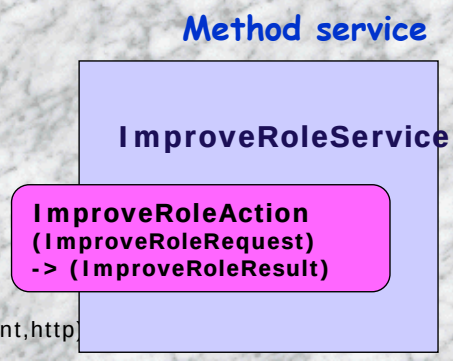
ImproveRolePortType *ImproveRoleAction (in : ImproveRoleInput out : ImproveRoleOutput)*

Binding :

ImrpoveSoapBinding(ImrpoveRolePortType, soap, document,http)

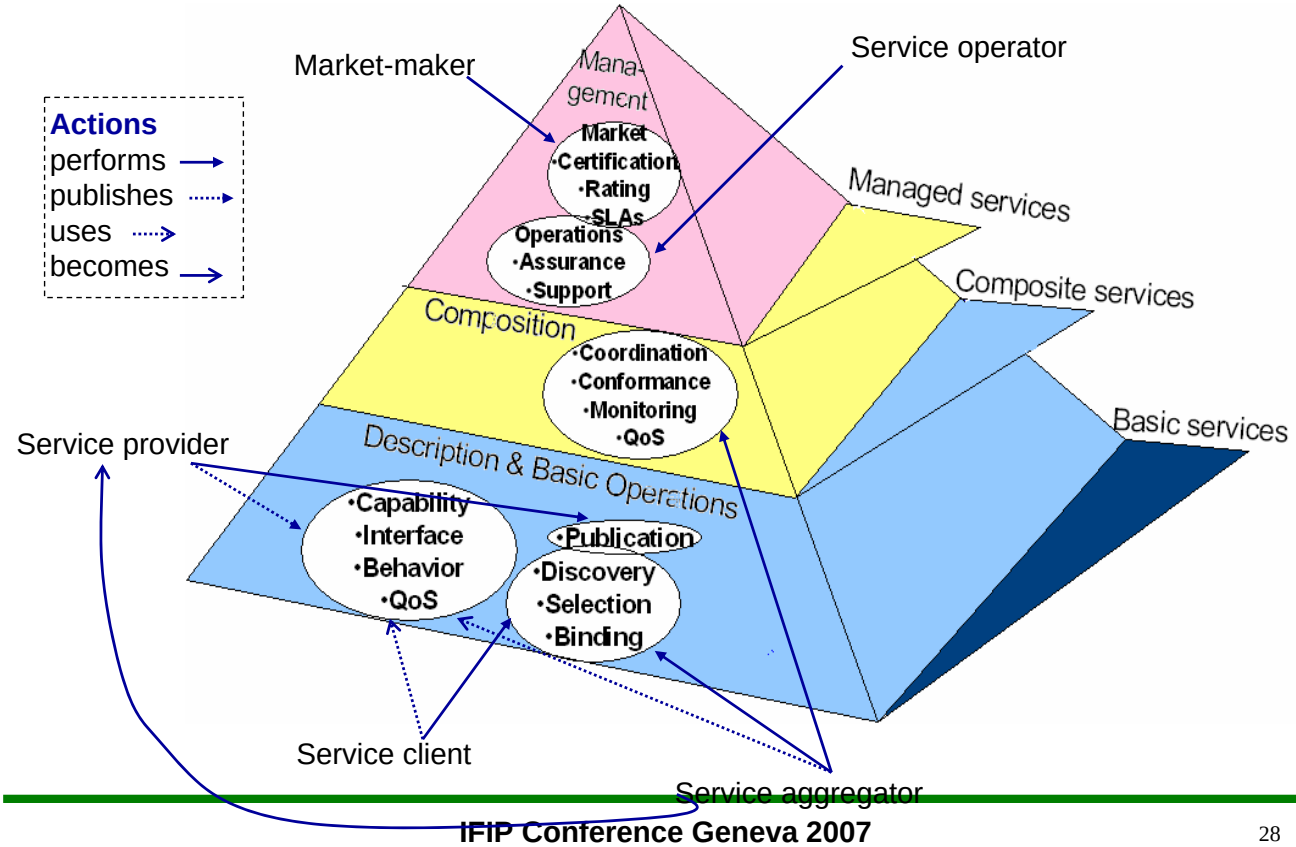
ImproveRoleAction :

http://maas.crinfo.univ-paris1.fr/ImproveRoleAction



http://maas.crinfo.univ-paris1.fr/improverole

From ME to MaaS Management



Method Engineering Trends & Challenges

♣ Emphasise the evolutionary perspective of ME (Rossi et al, 2004)

From static ME…

Adapt to project contingencies at time t
Assuming a sharp time-space disjuncture*

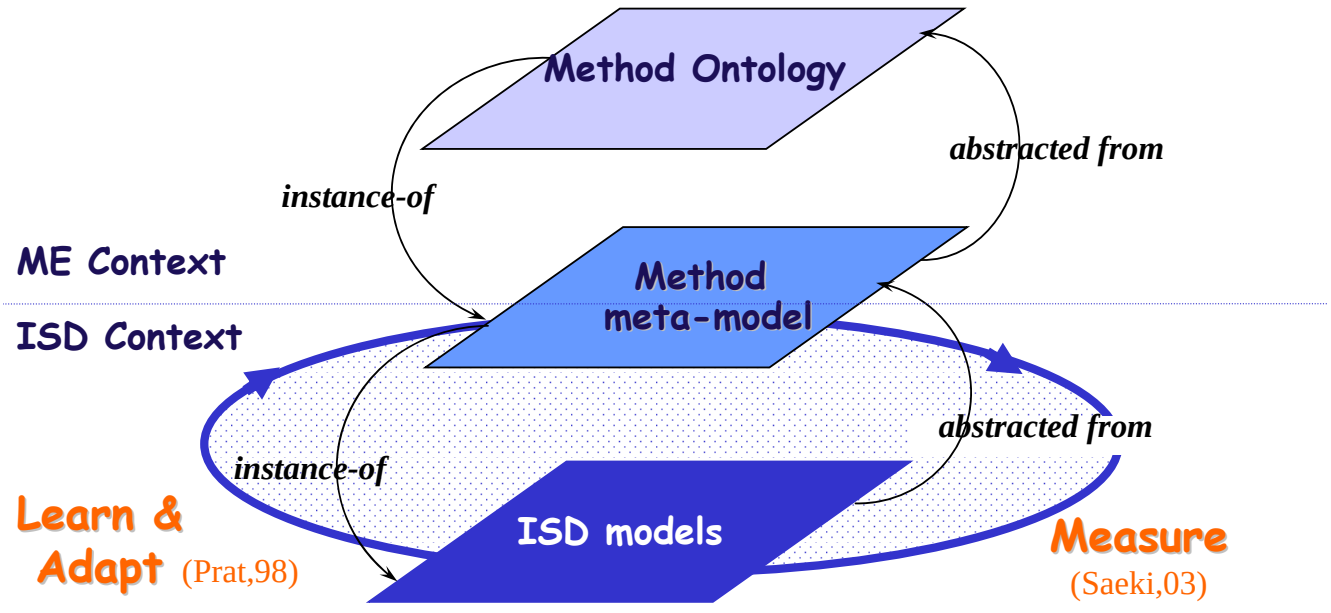
….To evolutionary ME

Co-evolution of method and system development
Need for evolutionary ME processes
Continuous search for fit at all times

*Orliwowski

Method Engineering Trends & Challenges

♣ The continuous improvement loop (BPR/TQM like)



Method Engineering Trends & Challenges

♣ Engineering methods in an evolutionary perspective

Method rationale (Rossi et al, 2004) :
trace of method changes & associated use experiences

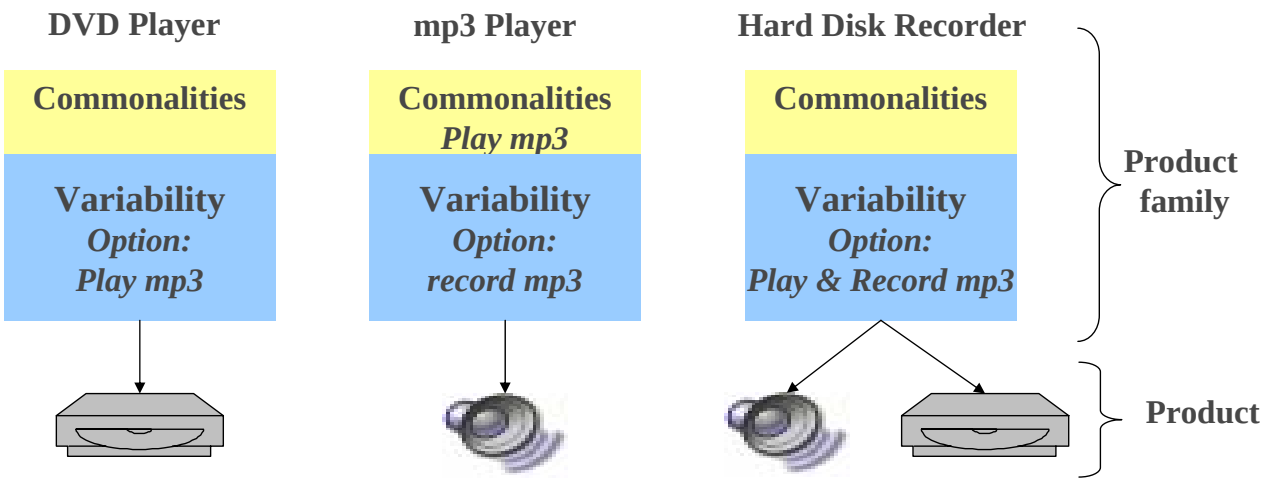
Method configuration (Karlsson & Agerfalk,07) :
Three-layered configuration reuse model consisting of method components, configuration packages & templates

Method families :
Organization of a set of method variants and their justifications

Method Engineering Trends & Challenges

♣ **Product Line & Product Family** [Bühne05]

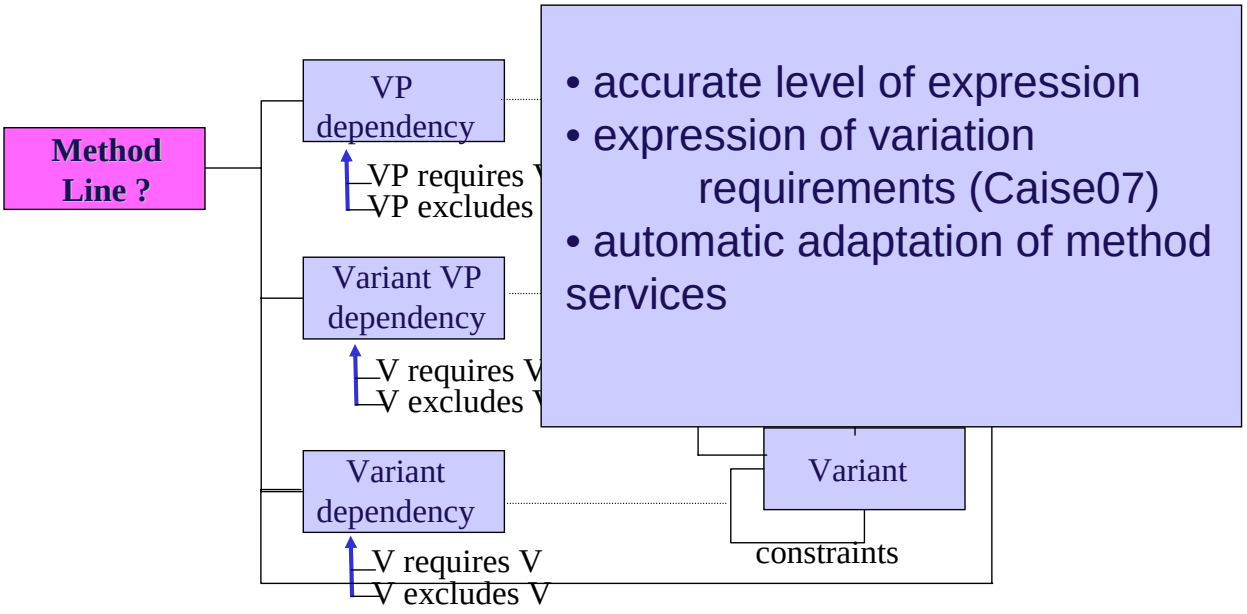
Variability as a central concept for reuse and adaptability



[Bühne05] S. Bühne, K. Lauenroth, K. Pohl. Modelling Requirements across Product Lines, RE'05, Paris.

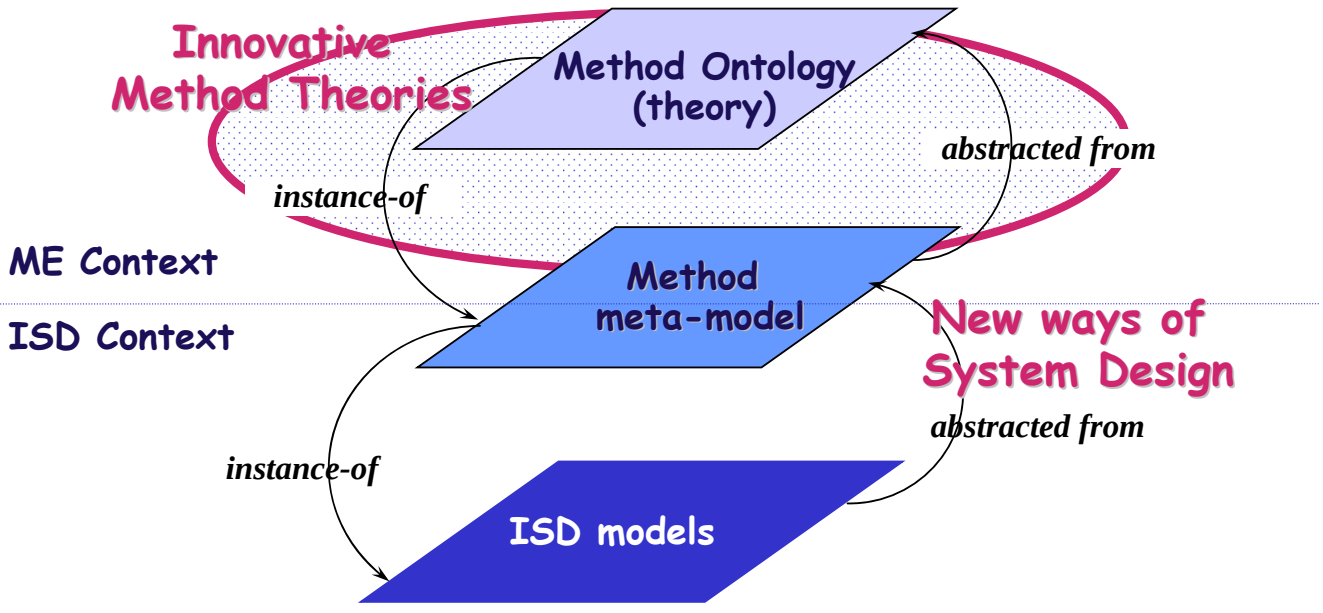
Method Engineering Trends & Challenges

♣ Adapt **Variation meta-model to method lines** [Bühne05]



Method Engineering Trends & Challenges

♣ The radical change (BPR like)

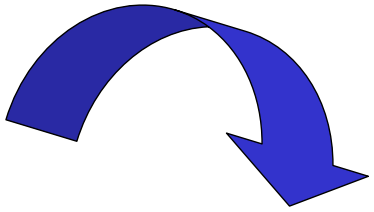


Method Engineering Trends & Challenges

♣ Move towards intentional process modelling

From prescriptive workflows…

- ISD & ME processes are decision making processes
- Design is a cognitive act and intentionality is at the core of cognition
- Method guidance shall use human intentions as the drive of the process



To flexible intentional guidance…

Method Engineering Trends & Challenges

♣ Using philosophical foundations

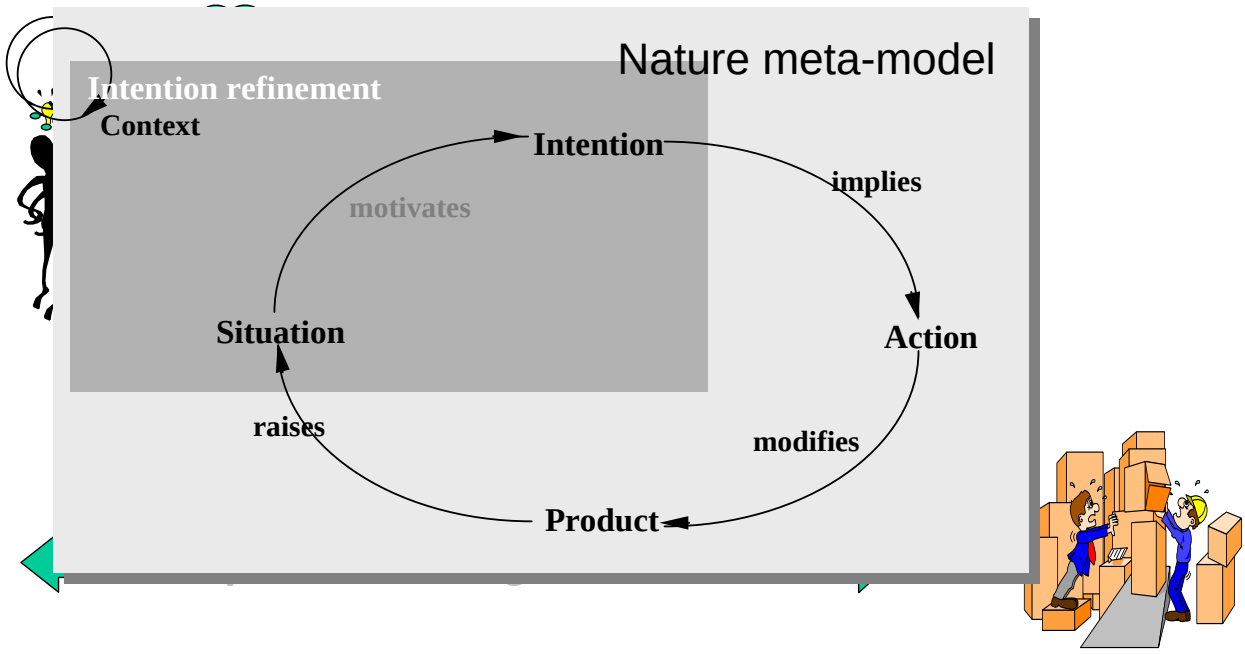
➢ **Intentionality is at the core of cognition** (all modern philosophers : Brentano, Twarsdwowski, Hurssel, Sartre,Merleau Ponty, Berner….

➢ **Intention is a mental state that integrates desires and beliefs and determines actions**

Intentionality Model

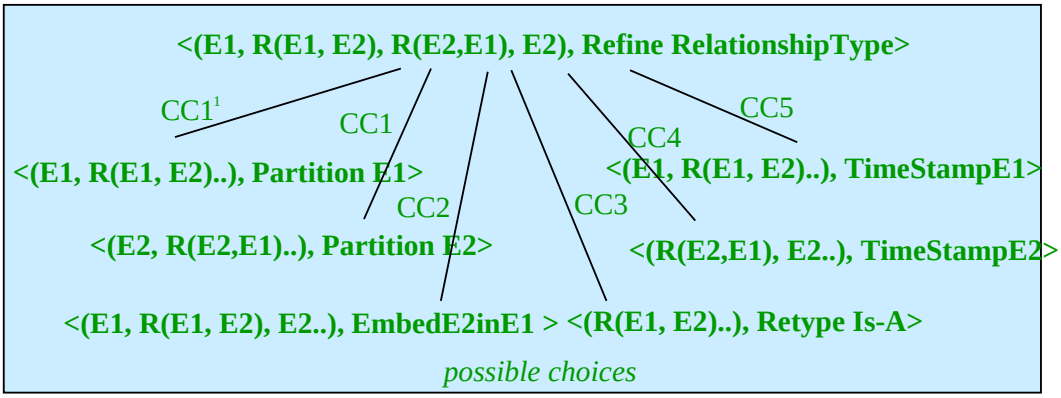
Method Engineering Trends & Challenges

♣ Guiding the achievement of intentions



Method Engineering Trends & Challenges

♣ Choice Guideline in NATURE



CC1: a2
CC1: a3
CC2: a4 or a9 or a10 or a11
CC3: a1 or a7 or a8
CC4: a6
CC5: a5
CC6: a1 or a7
CC7: a8

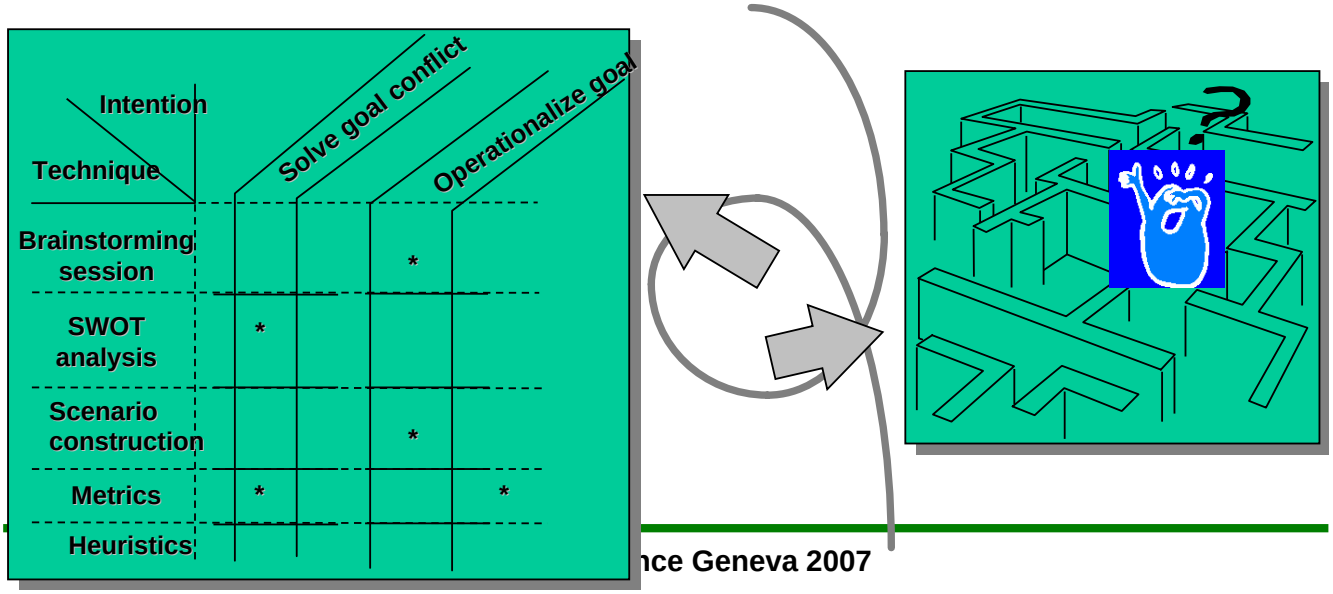
a1: cardinalities are: <t, s, p - p, s, v>
a2: cardinalities are: <p, ?, ? - ?, ?, ?>
a3: cardinalities are: <?, ?, ?- p, ?, ? >
a4: cardinalities are: <t, m, p - t, s, p>
a5: cardinalities are: <?, ?, v - ?, ?, p>
a6: cardinalities are: <?, ?, p - ?, ?, v>
a7: cardinalities are: <t, s, p - p, s, p>
a8: cardinalities are: <p, m, v - p, m, v>
a9: cardinalities are: <t, m, v - t, s, p>
a10: cardinalities are: <t, s, p - t, s, p>
a11: cardinalities are: <t, s, v - t, s, p>

Method Engineering Trends & Challenges

♣Guidance types

Step guidance: the satisfaction of an intention (step guidance)

Flow guidance : selecting the next intention to make the process proceed



Method Engineering Trends & Challenges

♣ Can we export reuse mechanisms?

From aggregation based Web services composition …

Reuse Mechanisms in ME*:

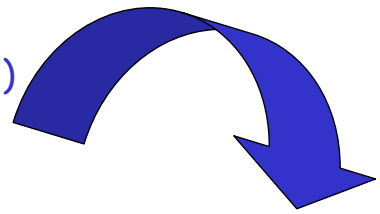
Analogy construction (Ralyté, paradigm based)

Aggregation (almost all)

Configuration (Bajec, Karlsson&Agerfalk)

Specialization (Rossi, Ralyté, Baskerville..)

Instantiation (Nuseibeth, view point super templates)



*Jorg Becker

To a more complete set of mechanisms (2007) …

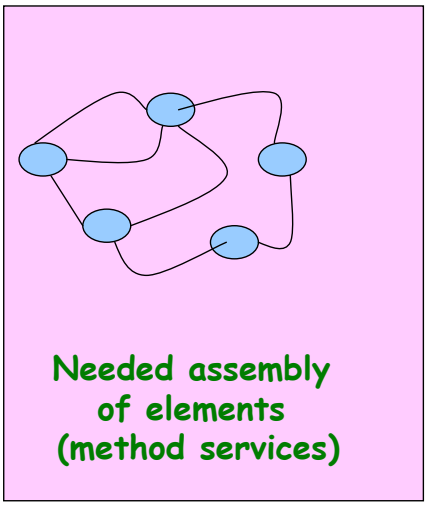
Method Engineering Trends & Challenges

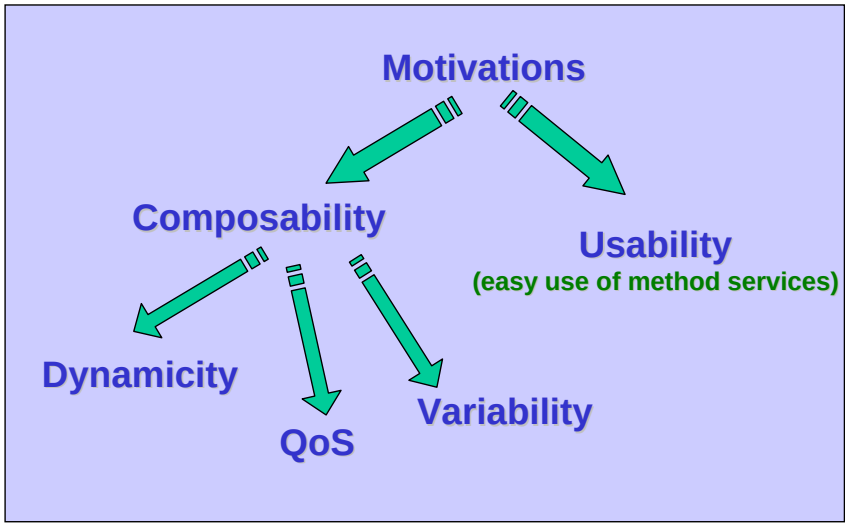
♣ Can we export reuse mechanisms?

Reuse Mechanism	Number of utilizations (over19)	Percentage
Analogy construction	3	16%
Aggregation	14	74%
Configuration	2	11%
Specialization	9	47%
Instantiation	1	5%

Method Engineering Trends & Challenges

♣Conclusion





Thank you for your attention