Gestión de la variabilidad y líneas de producto

Ingeniería de Software para un mercado *soft*

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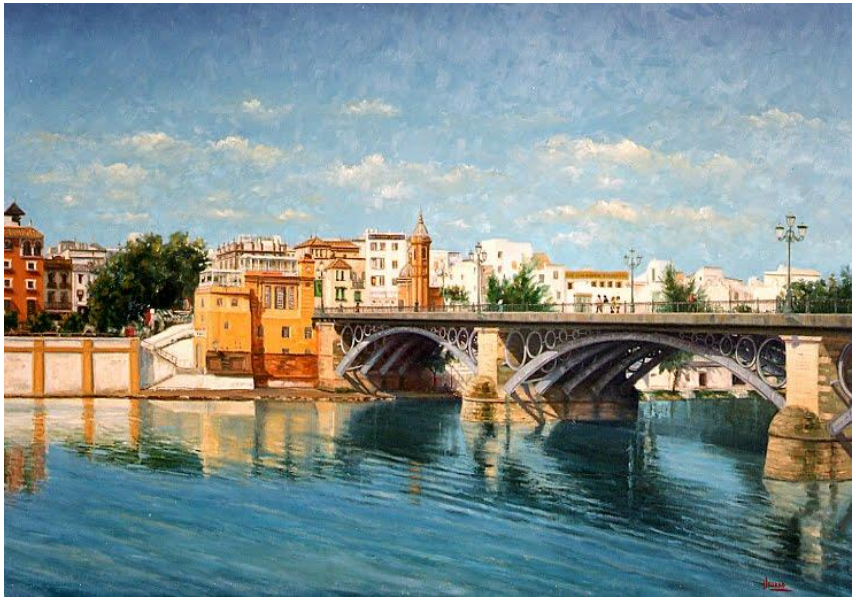
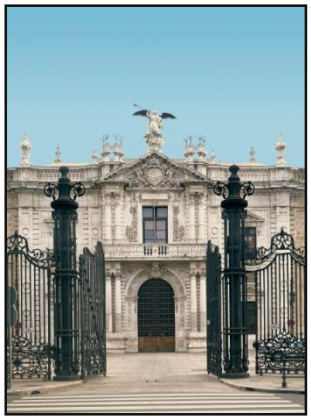
pasarlascanutas.com



Some data

University of Sevilla



- **65.000** students (3rd bigest)
- **4.000** teaching staff
- **500** years

Computer Engineering School

Applied Software Engineering Research Group

www.isa.us.es

Our Team

PhD

Amador Durán

Joaquín Peña

David Benavides

Antonio Ruiz

Beatriz Bernárdez

Octavio Martín

Manuel Resinas

Pablo Fernández

Sergio Segura

Carlos Müller

Jose María García

Adela del Río

Pablo Trinidad

Javier Troya

Fabricia Ross

Jose Antonio Parejo

Cristina Cabanillas

Jesús García

Jose Angel Galindo

Alfonso Márquez

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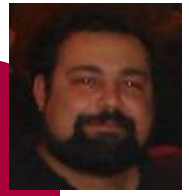
ISA Competences (Research Areas)

Requirements Engineering

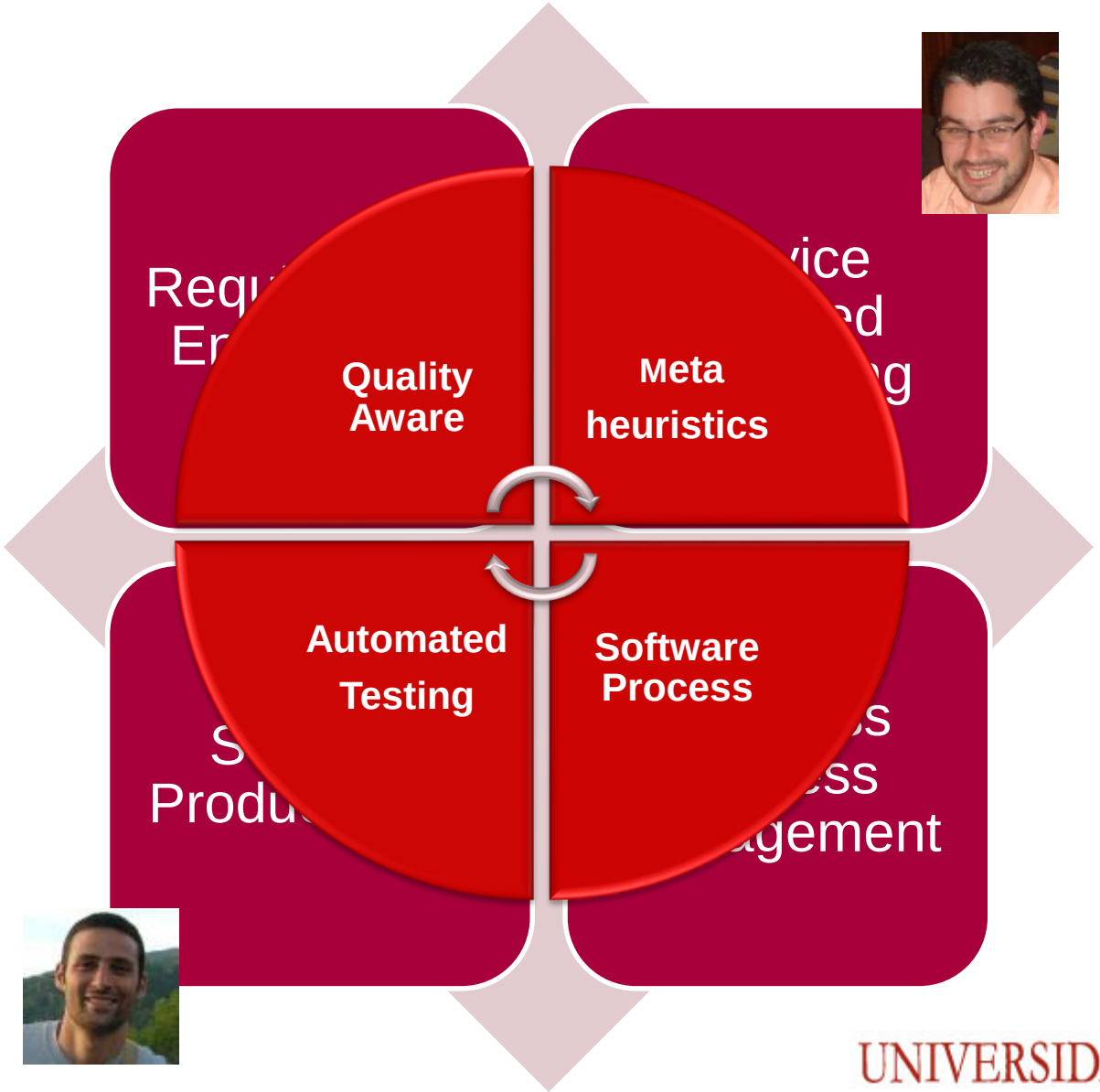


Service Oriented Computing

Variability intensive systems

Business Process Management

ISA Competences (Cross-Areas)



Transferable Results

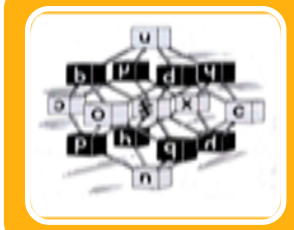
REM	• REquirement Management tool used to guide the requirement elicitation and help the creation of a formal requirement documentation.
FAMA	• Framework for the automated analyses of feature models integrating some of the most commonly used logic representations and solvers proposed in the literature.
FAST	• Framework for automated service trading (Deployed as a JBI-compliant component, JdA).
PPI	
CRIS	
FOM / M	
STATSevices	• **Statistical Analysis tool suite that comprises of: a web portal, a set of web services, plugins for Excel 2007 and 2011**
ADA	• Tool for explaining the inconsistencies of SLA documents specified with WS-Agreement.
MACMAS	• Tool for supporting the MaCMAS models and transformations.

And more at

www.isa.us.es/tools

Introduction

Software Product Lines



Variability Modelling

Software product lines

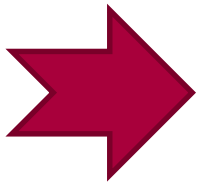
What's a software product line?

Real example

Real example

Why a new software production paradigm?

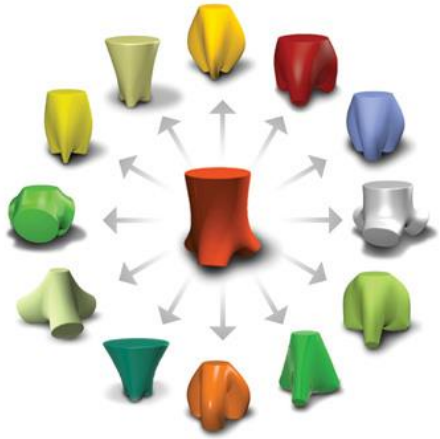
Software product lines



Communicate

Reproduce

Produce



Software product lines

A new software production paradigm

Software Product Line Engineering

Industrial Trends

Organizations are evolving	• *Project* Centric Software Engineering • *Product* Centric Software Engineering
Software ***variability*** constantly increasing:	• Variability goes from hardware to software • Variations points grows by thousands
Assets' ***Reuse*** is shifting	• from ad-hoc to ***systematic***

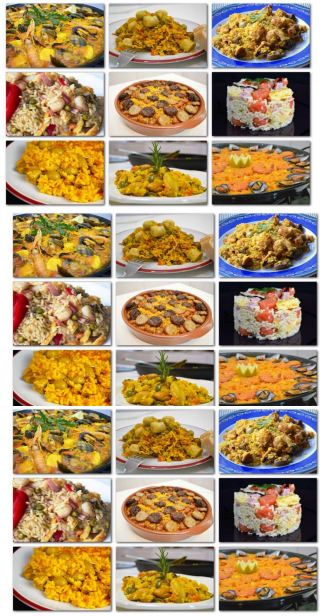
Software product lines

No customization
-
one product

oduction

acing efficiently a large amount of
standardized products

Software product lines



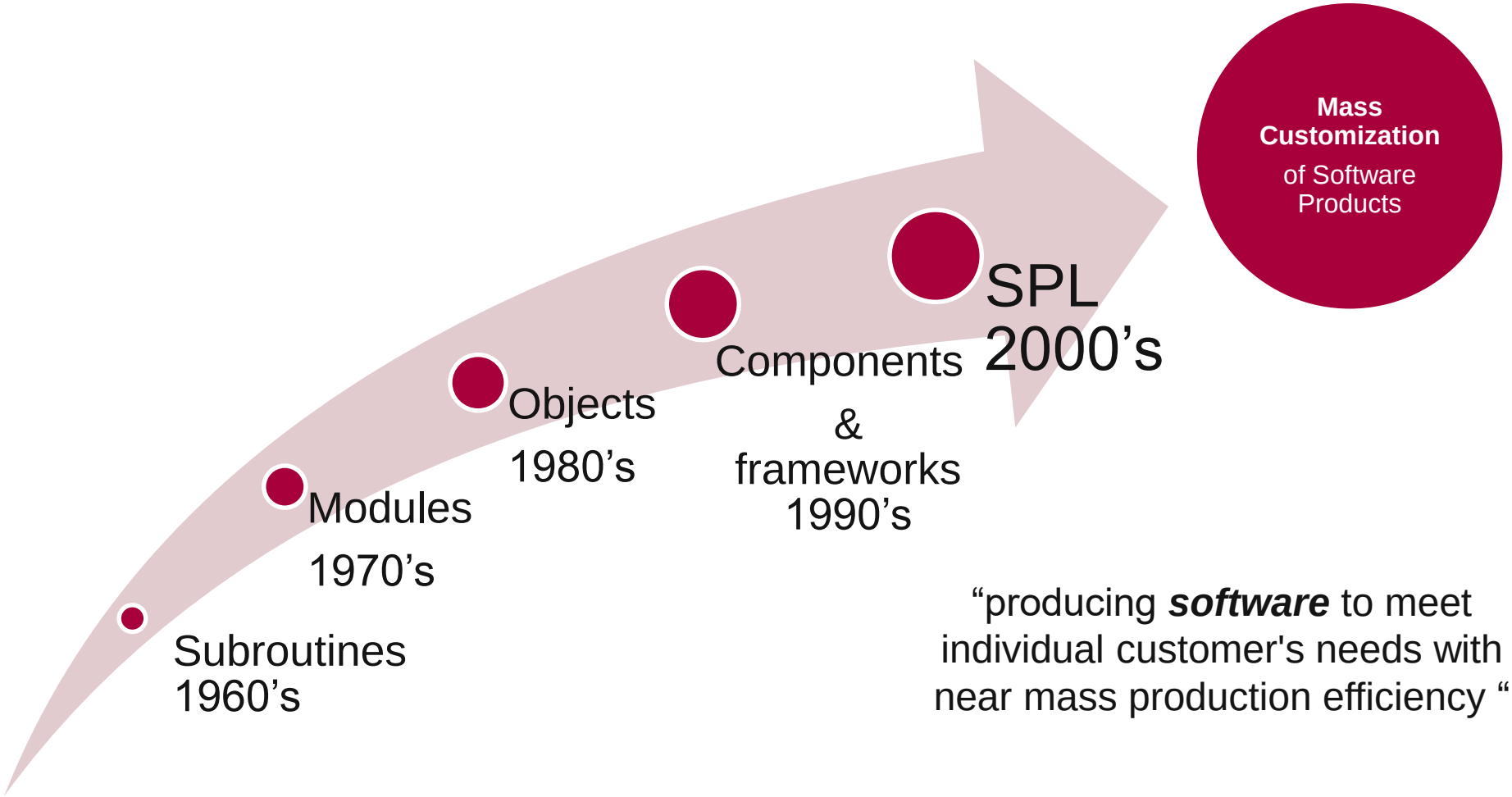
Customization
-
A set of products

Mass customization

"producing goods and services to meet individual customer's needs with near mass production efficiency "

[Tseng, M.M., Jiao, J. (2001)]

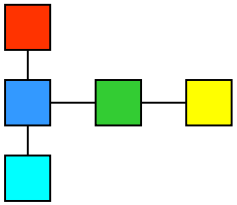
Software product lines



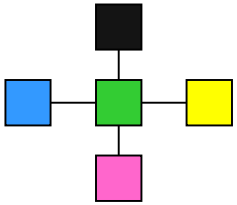
"producing ***software*** to meet individual customer's needs with near mass production efficiency "

Software product lines

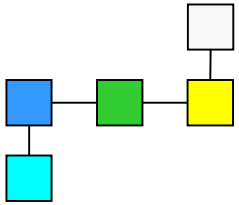
Traditional Approach (*mass production*)



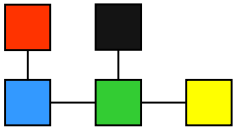
Product 1



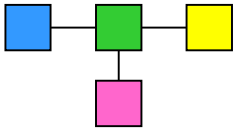
Product 2



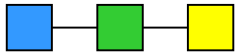
Product 3



Product 4

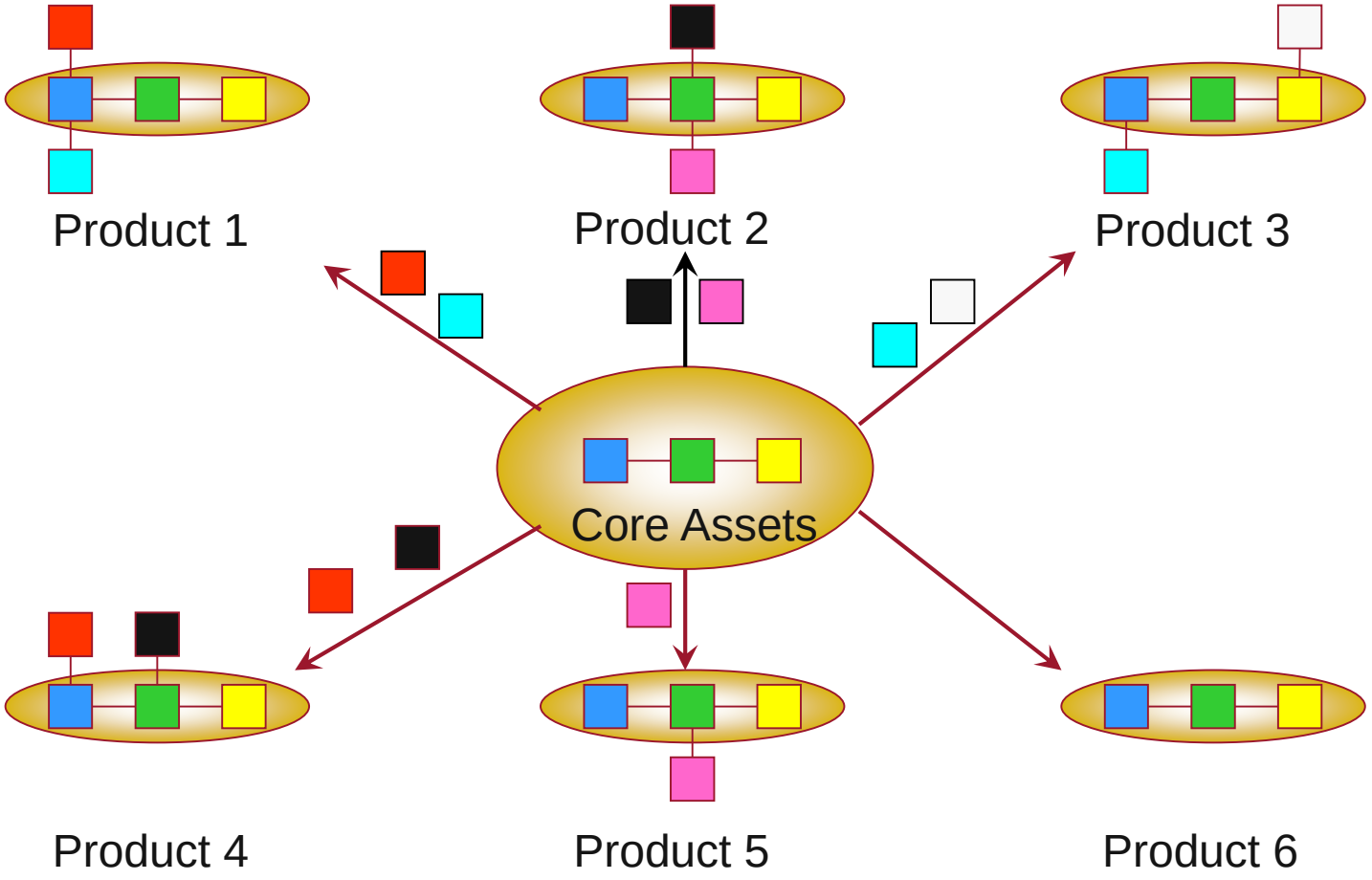


Product 5

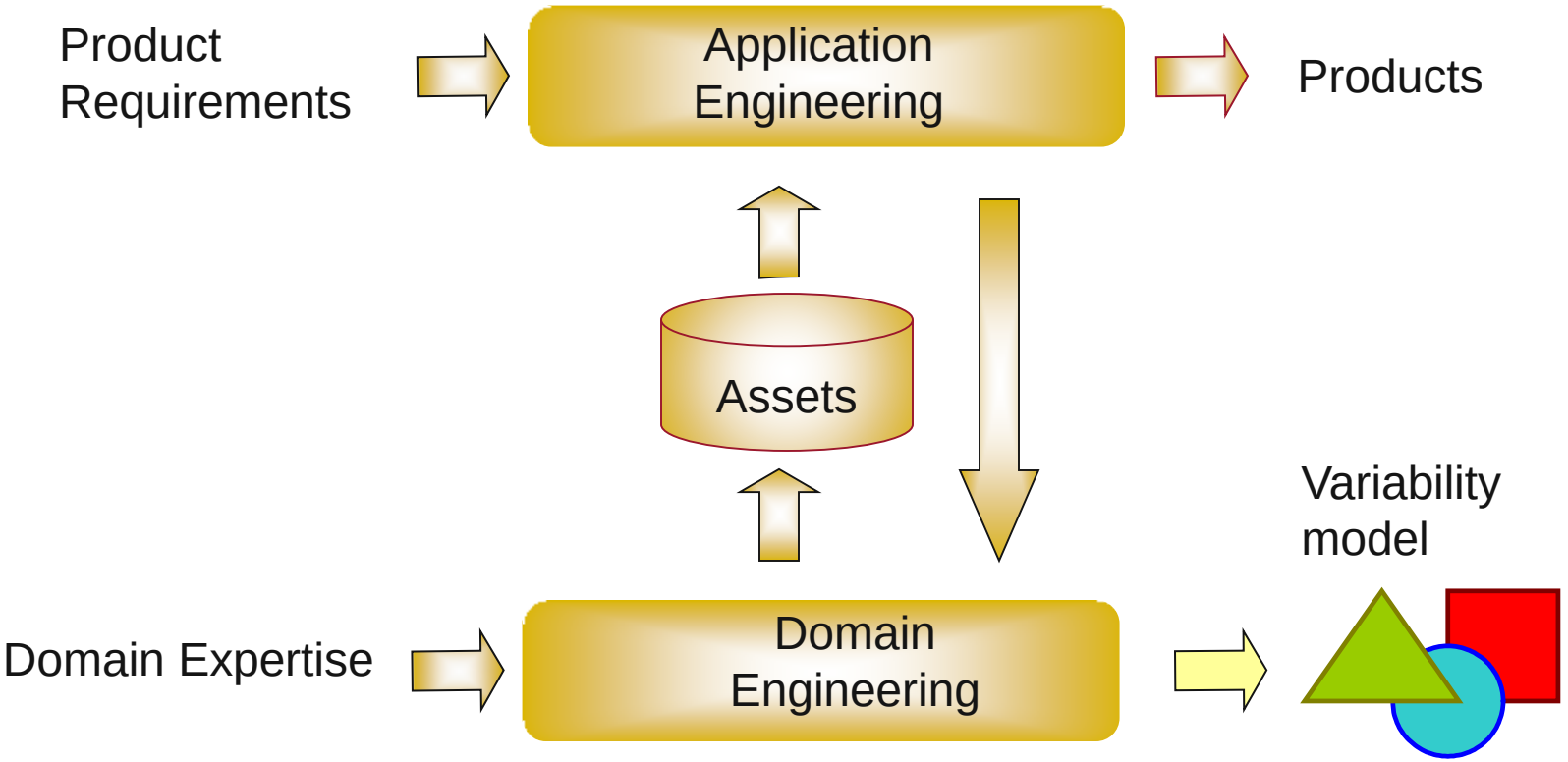


Product 6

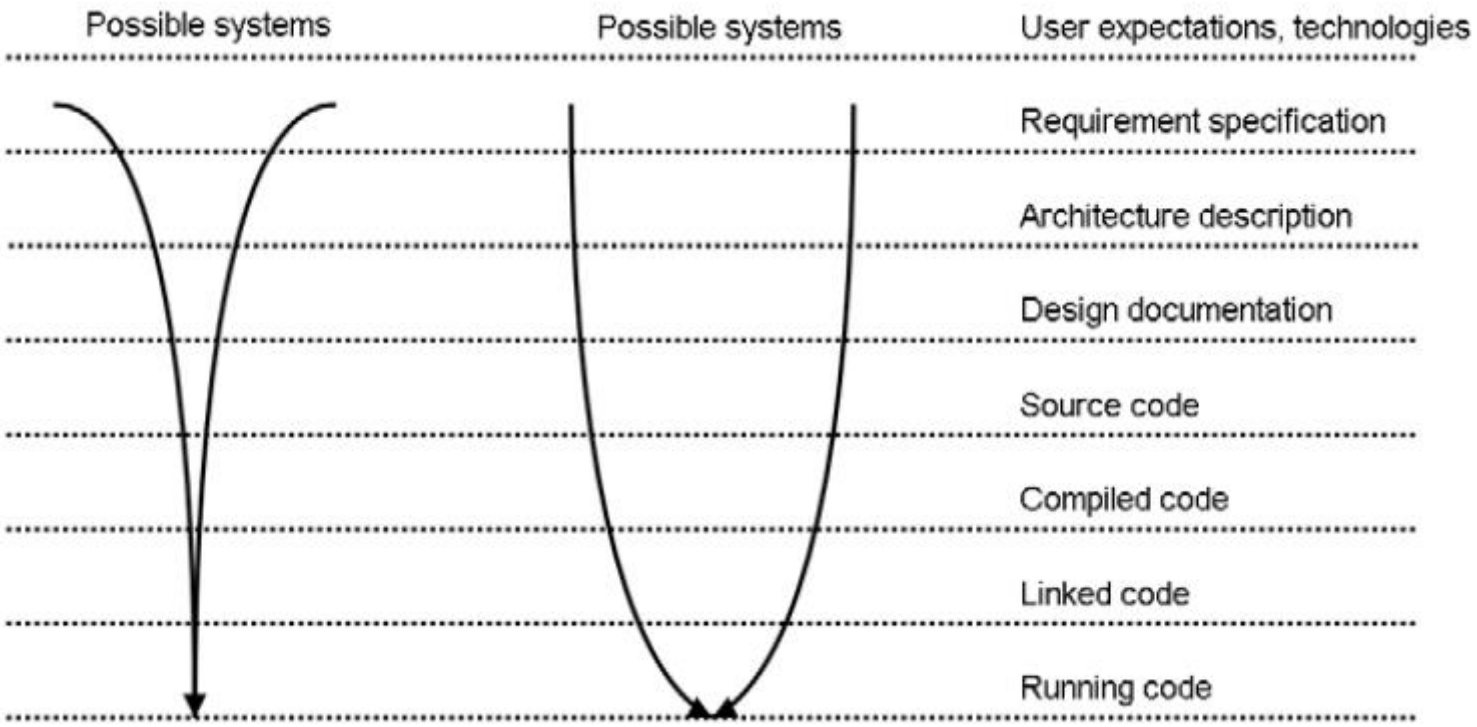
Product Lines Approach (*mass customization*)



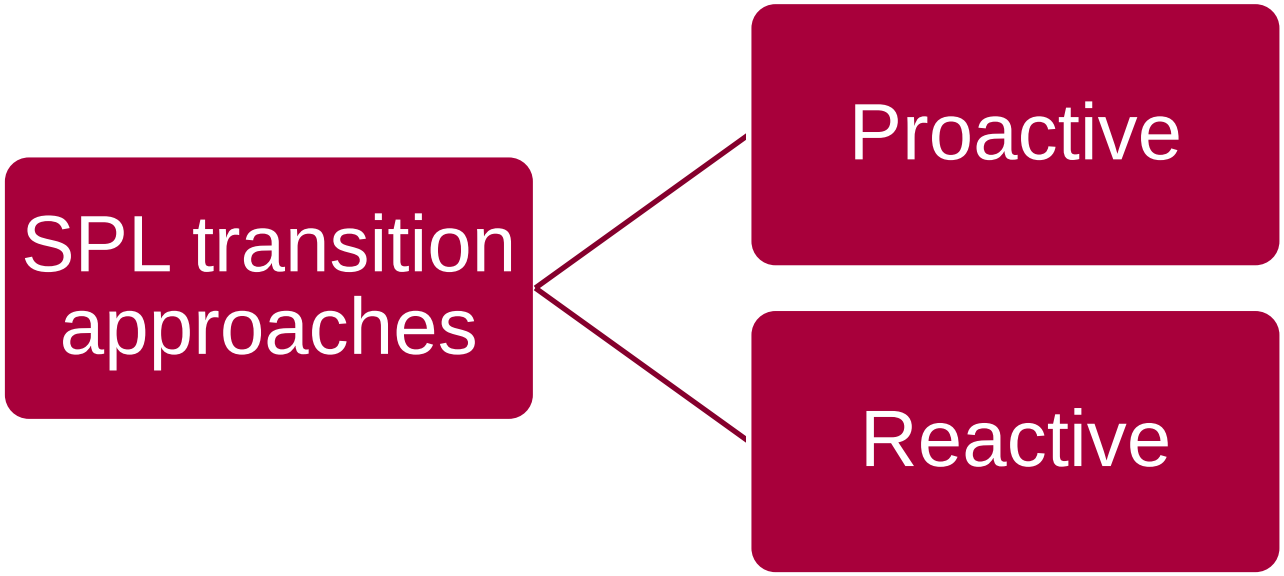
SPL: Activities



SPL metaphors

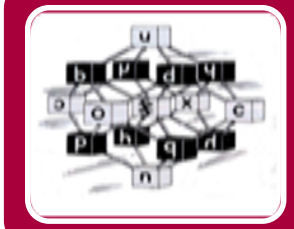


Svahnberg M., van Gurp J., Bosch J., *On the Notion of Variability in Software Product Lines*. Proceedings of IEEE/IFIP Conference on Software Architectures, 2001.


SPL transition approaches
Proactive
Reactive

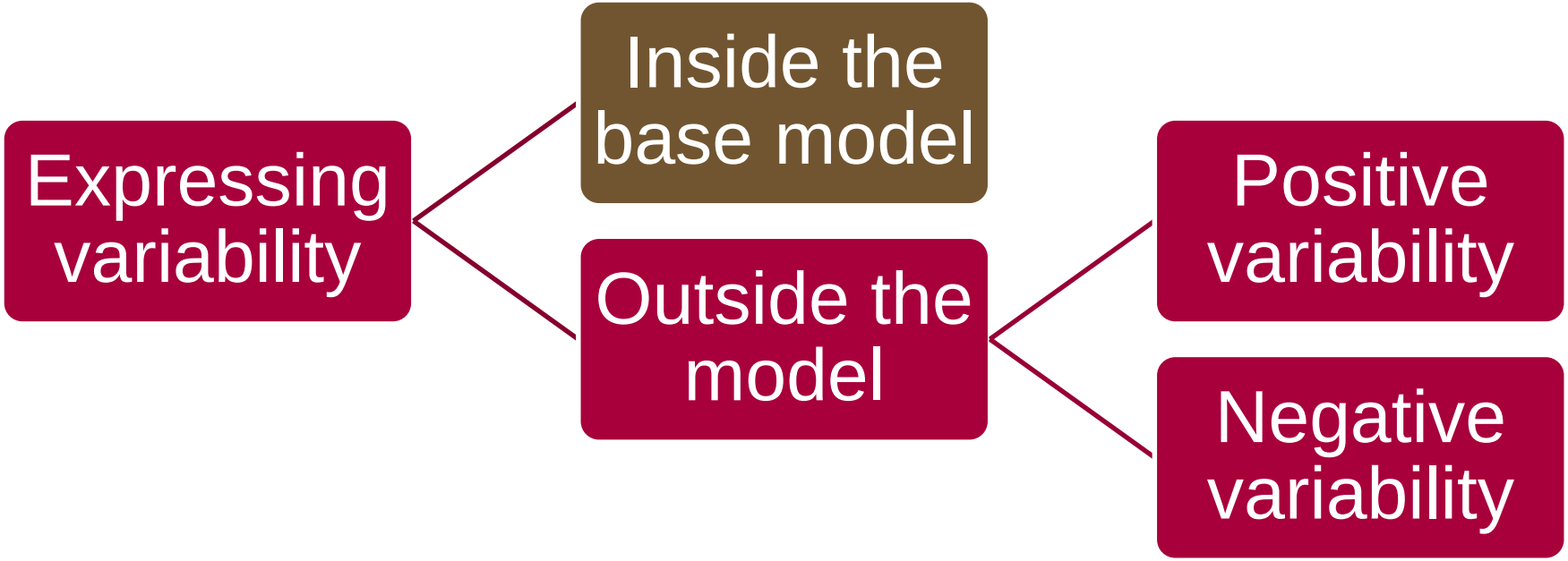
Introduction

Software Product Lines



Variability modelling

How to model variability



Inside the model

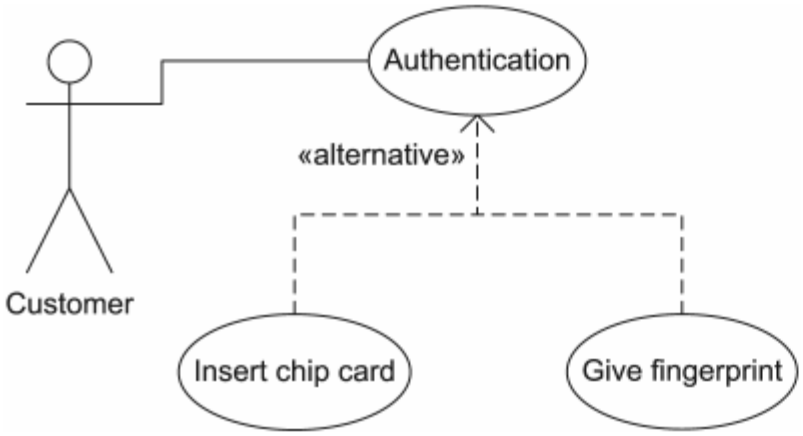


Figure 5: Example of an alternative relationship

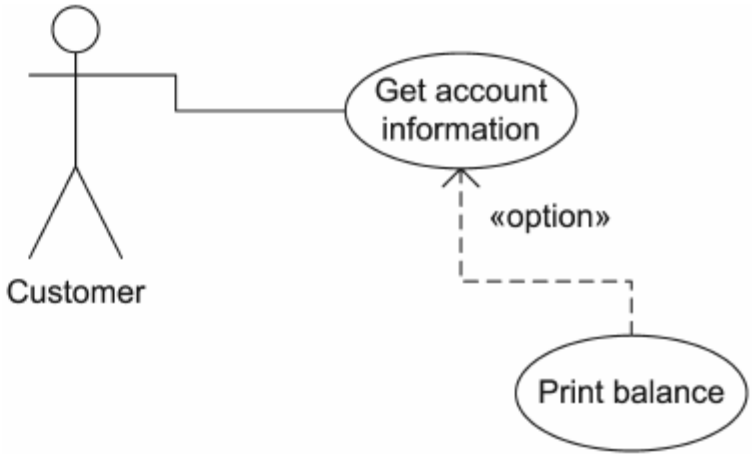
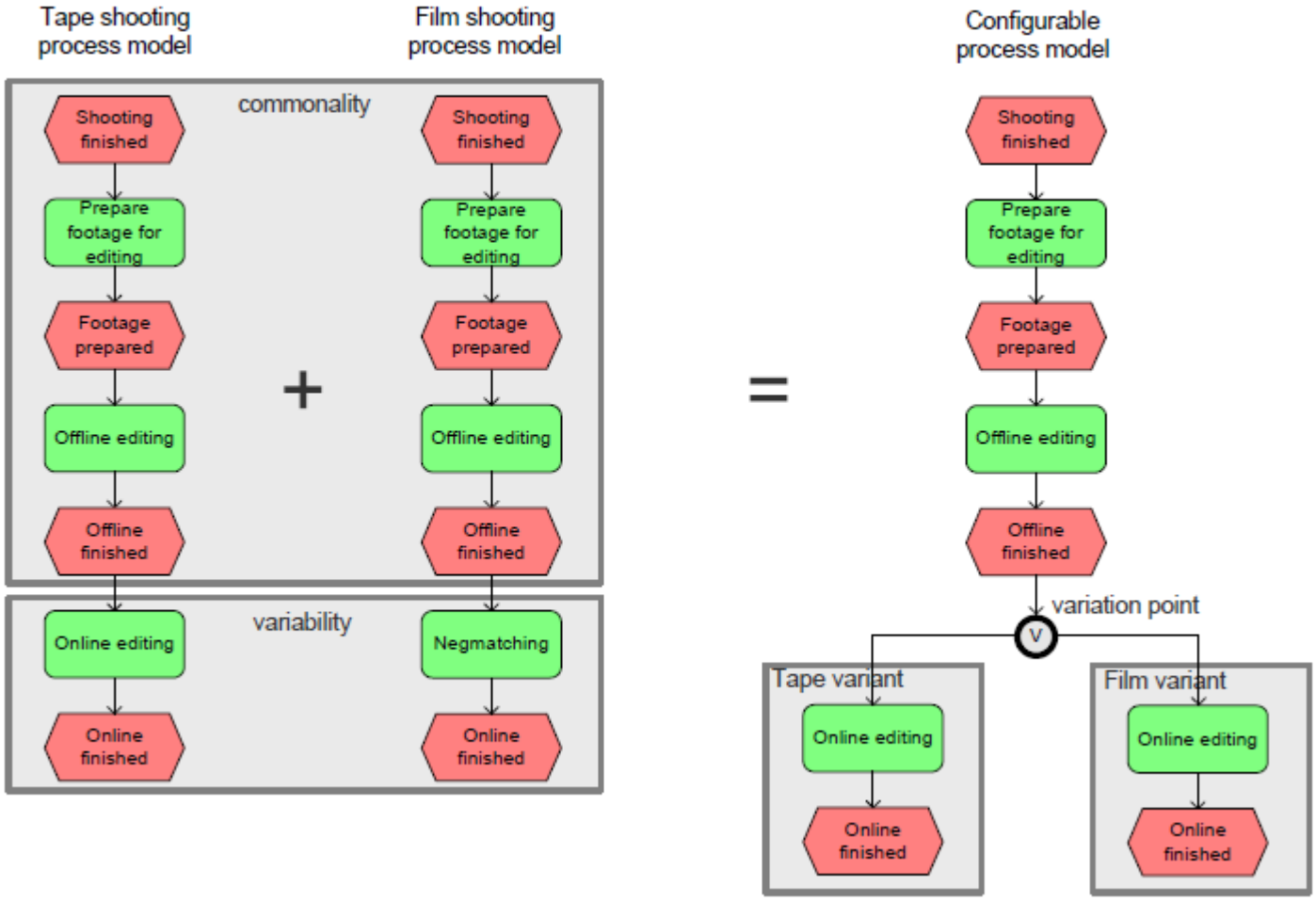


Figure 6: Example of an optional relationship

Taken from [Modeling variability by UML use case diagrams](#) by Von der Massen et al.

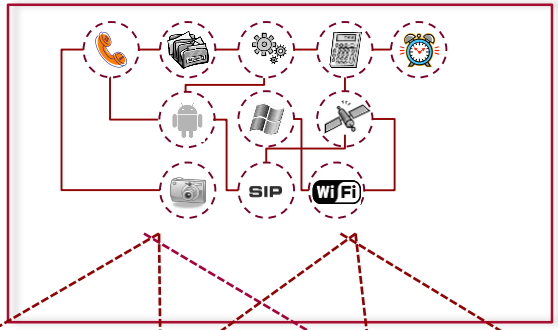
Inside the model

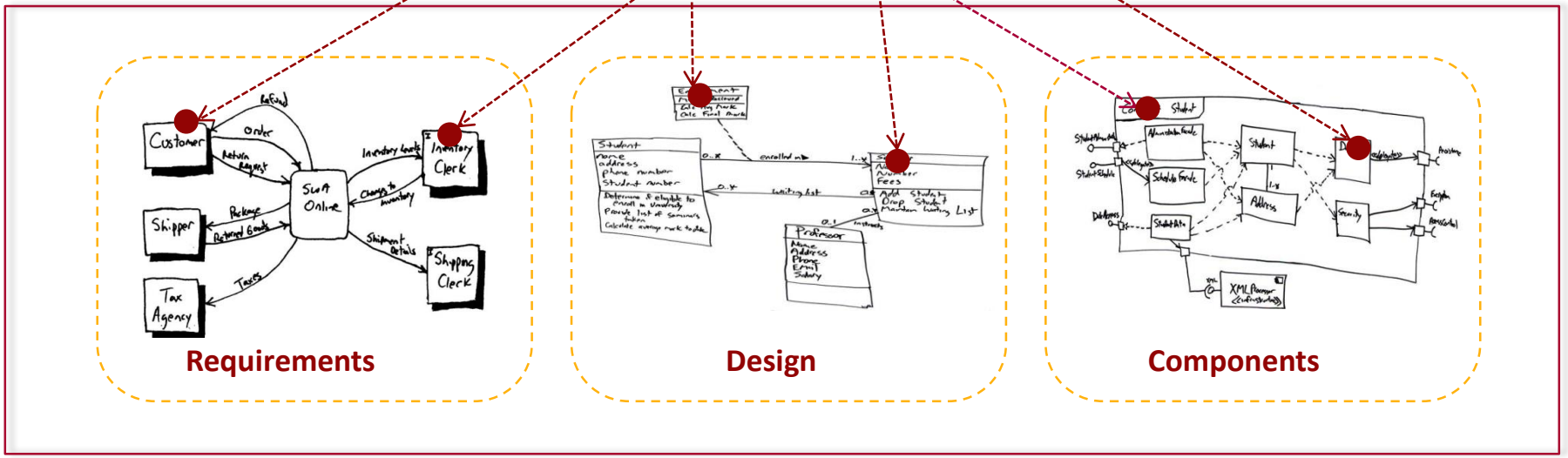


Taken from La Rosa et al. (2010) Configurable multi-perspective business process models. Information Systems

Outside the model

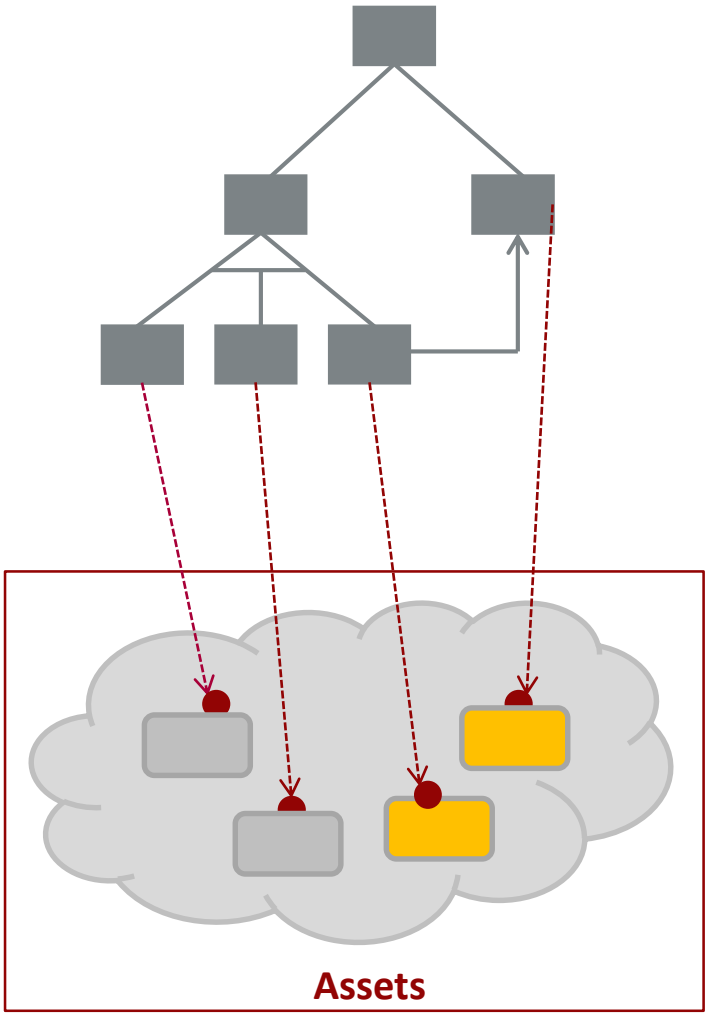
Variability Model

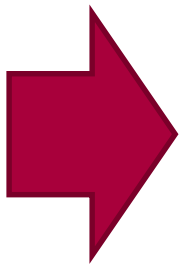




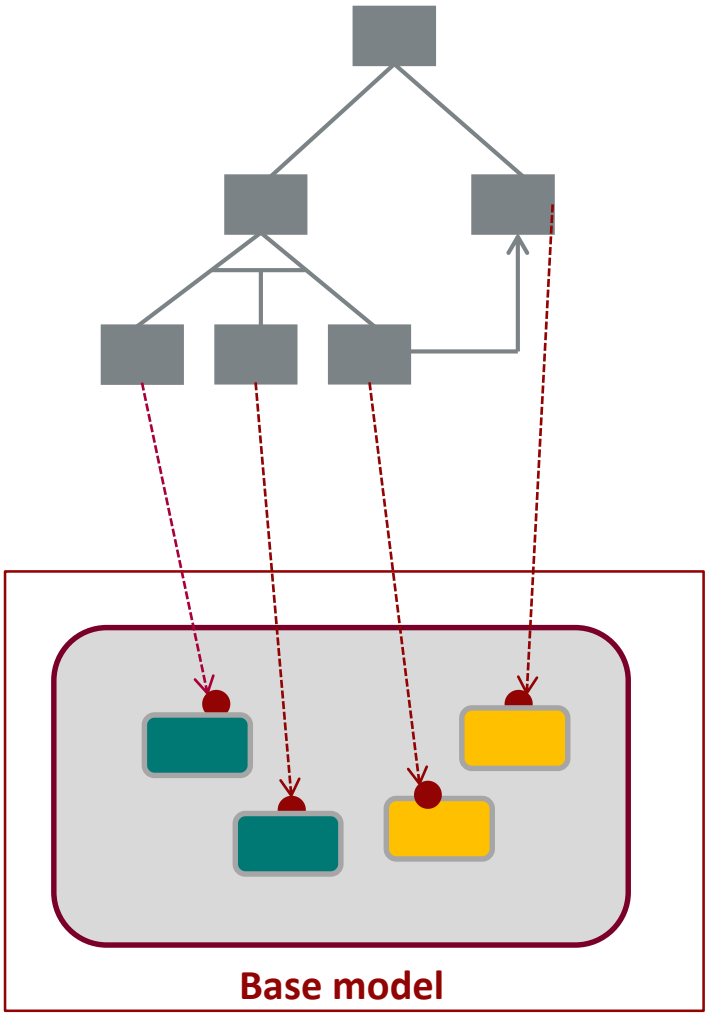
Base models

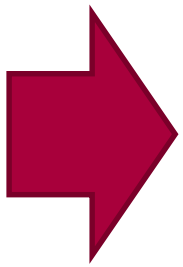
Positive variability



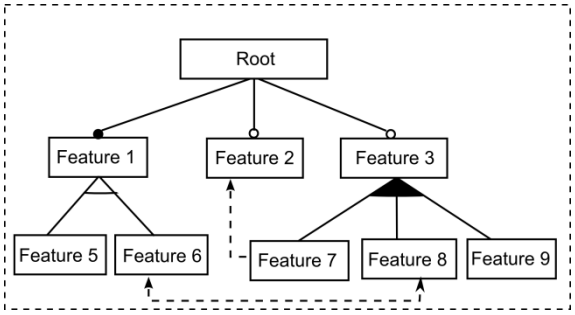


Negative variability

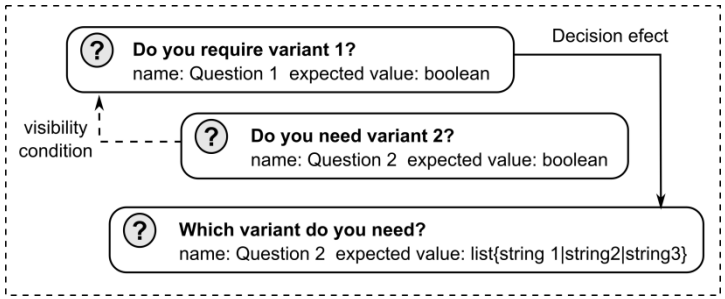




How to model variability



Feature modelling

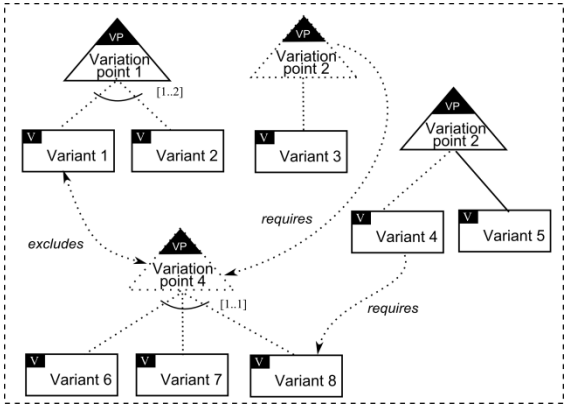


Decision modelling

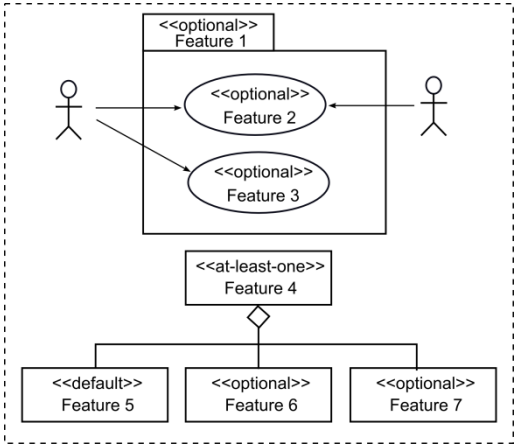
Techniques

Ad-hoc solutions: tables, textual docs, ...

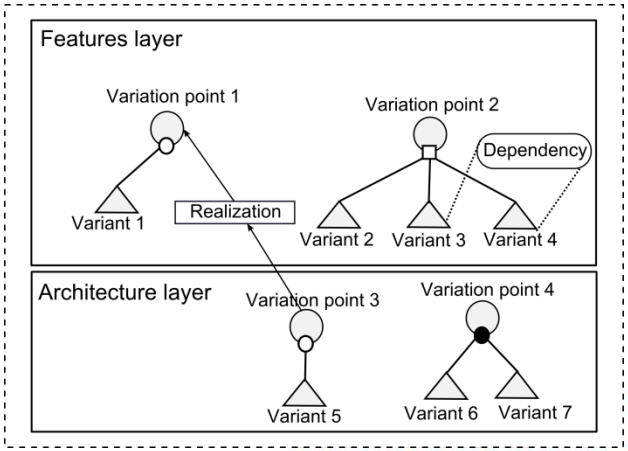
Orthogonal variability modelling



UML-based



COVAMOF



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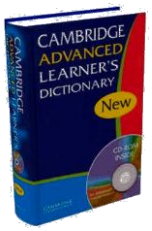
How to specify a particular product?

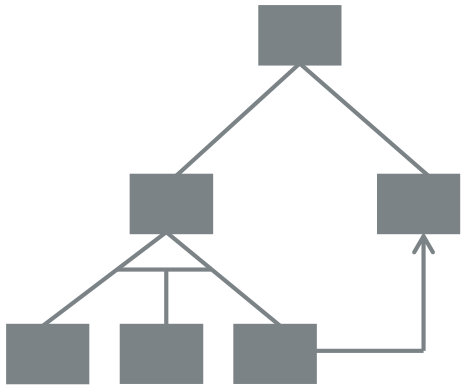
FEATURE



"An important part of something"

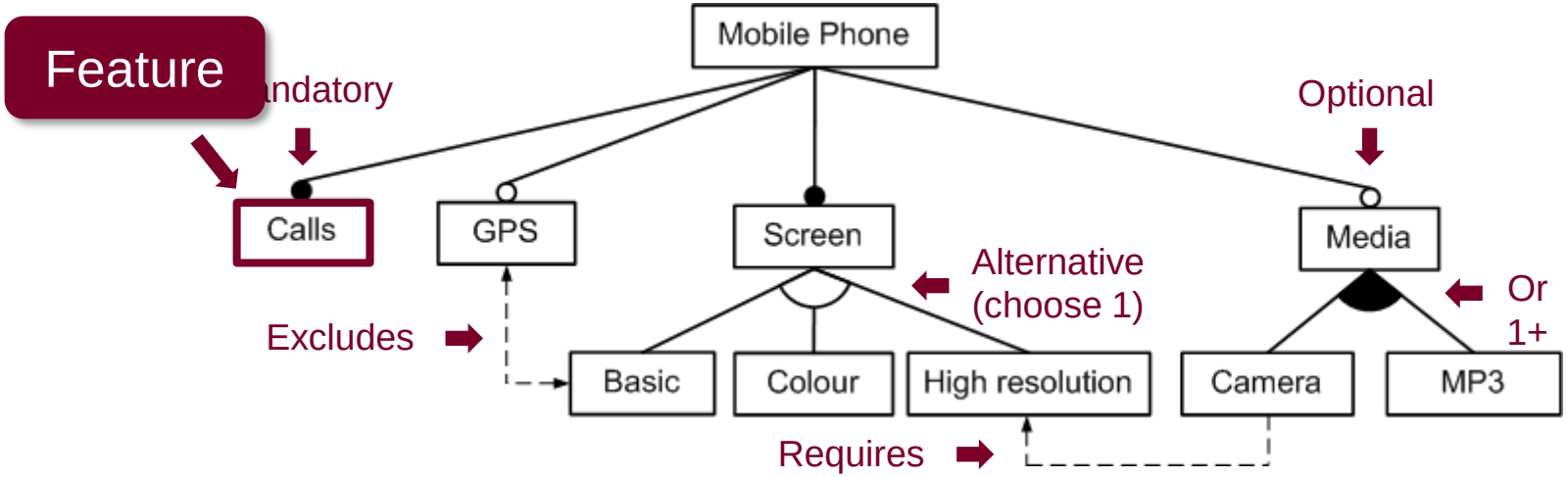
"A prominent or distinctive characteristic of a software system"

How to specify an SPL?

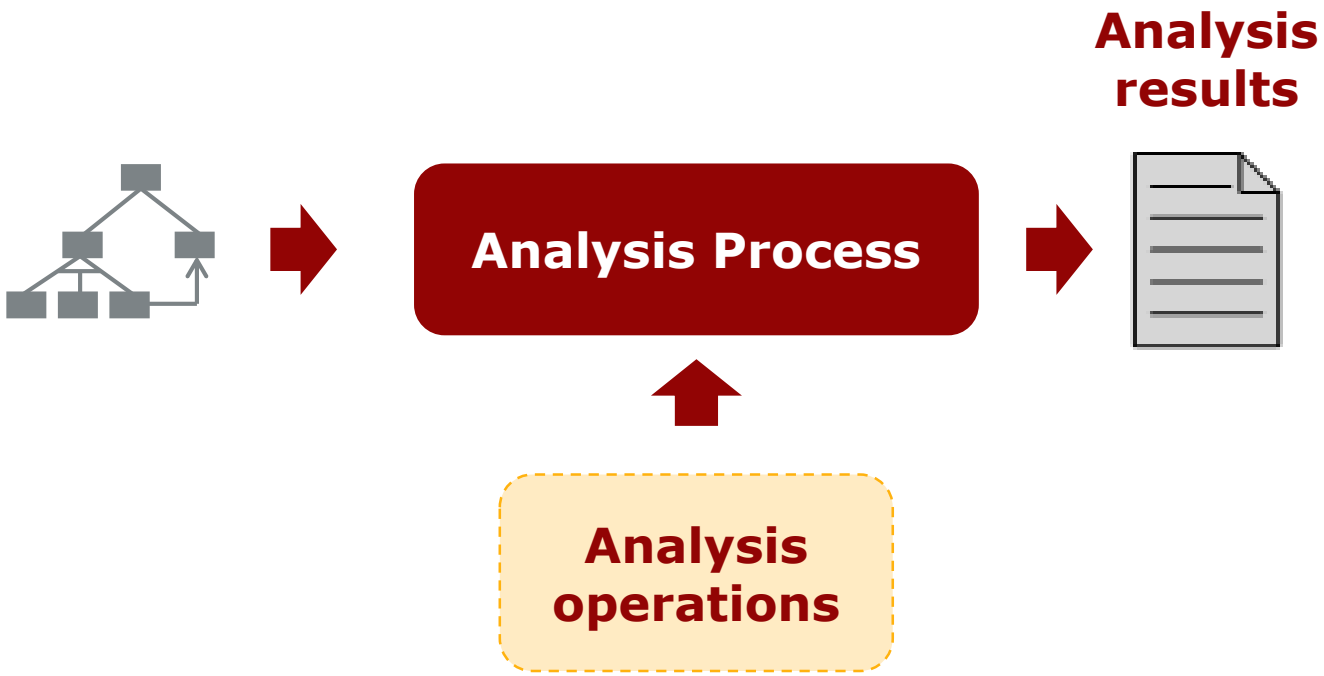


“Feature Model: A hierarchically arranged set of features to represent all possible products of an SPL”

Feature models

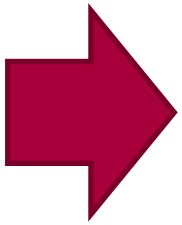


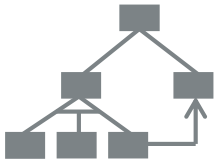
Automated Analysis



And how can this help in real scenarios?

Real cases





What configurations should I test to defend my users from bugs?

Conclusions

- SPL is a *new* software production paradigm
- SPL affects all levels of abstraction
- Variability management is essential

Software product lines

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