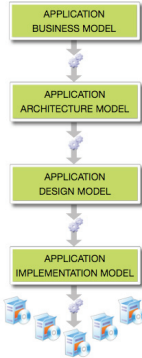# Towards
Multi-step Concern Refinement

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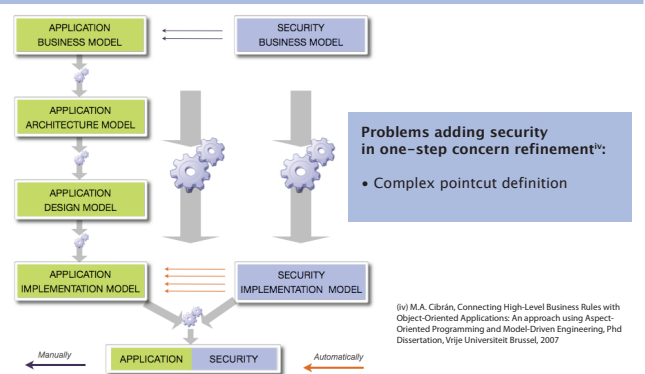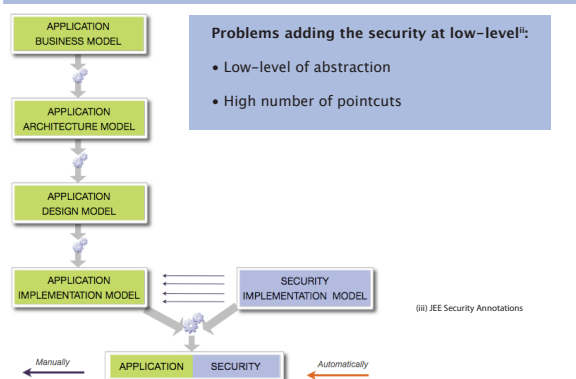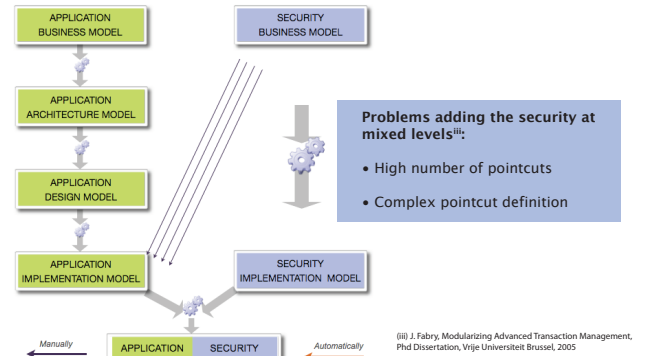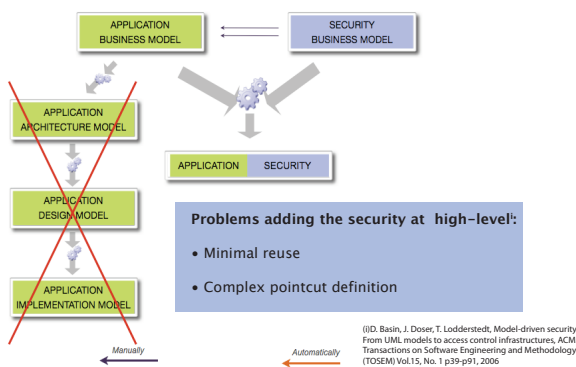Universidad de los Andes

THE PROBLEM

In an existing Model-Driven Software Product Line, how can we add a new crosscutting concern as:

- Security
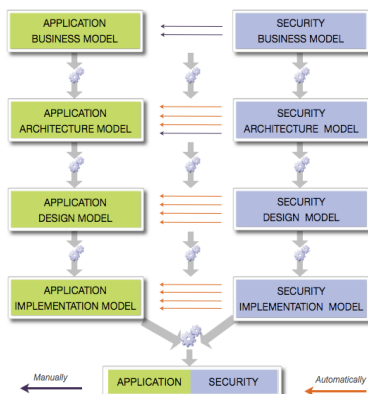- Transactions
- Monitoring
- Logging

Challenges

- Minimize the changes in the existing MD–SPL
- To add the new concern a high–level of abstraction
- To reduce the number of manually defined pointcuts
- To reduce the pointcut definition complexity
- To reduce the composition complexity

EXISTING APPROACHES

Problems adding the security at high–level[i]:

- Minimal reuse
- Complex pointcut definition

(i) D. Basin, J. Doser, T. Lodderstedt, Model-driven security: From UML models to access control infrastructures, ACM Transactions on Software Engineering and Methodology (TOSEM) Vol.15, No. 1 p39-p91, 2006

Problems adding the security at mixed levels[iii]:

- High number of pointcuts
- Complex pointcut definition

(iii) J. Fabry, Modularizing Advanced Transaction Management, Phd Dissertation, Vrije Universiteit Brussel, 2005

Problems adding the security at low–level[ii]:

- Low-level of abstraction
- High number of pointcuts

(iii) JEE Security Annotations

Problems adding security in one–step concern refinement[iv]:

- Complex pointcut definition

(iv) M.A. Cibrán, Connecting High-Level Business Rules with Object-Oriented Applications: An approach using Aspect-Oriented Programming and Model-Driven Engineering, Phd Dissertation, Vrije Universiteit Brussel, 2007

PROPOSED APPROACH

Multi–step Concern Refinement

- High–level of abstraction
- Small number of pointcuts
- Simple pointcut definition (At the same level of abstraction)
- Composition at lowest level