# A Build Server for Model-Driven Engineering

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IT Systems Engineering | Universität Potsdam

## **MDE in Practice**

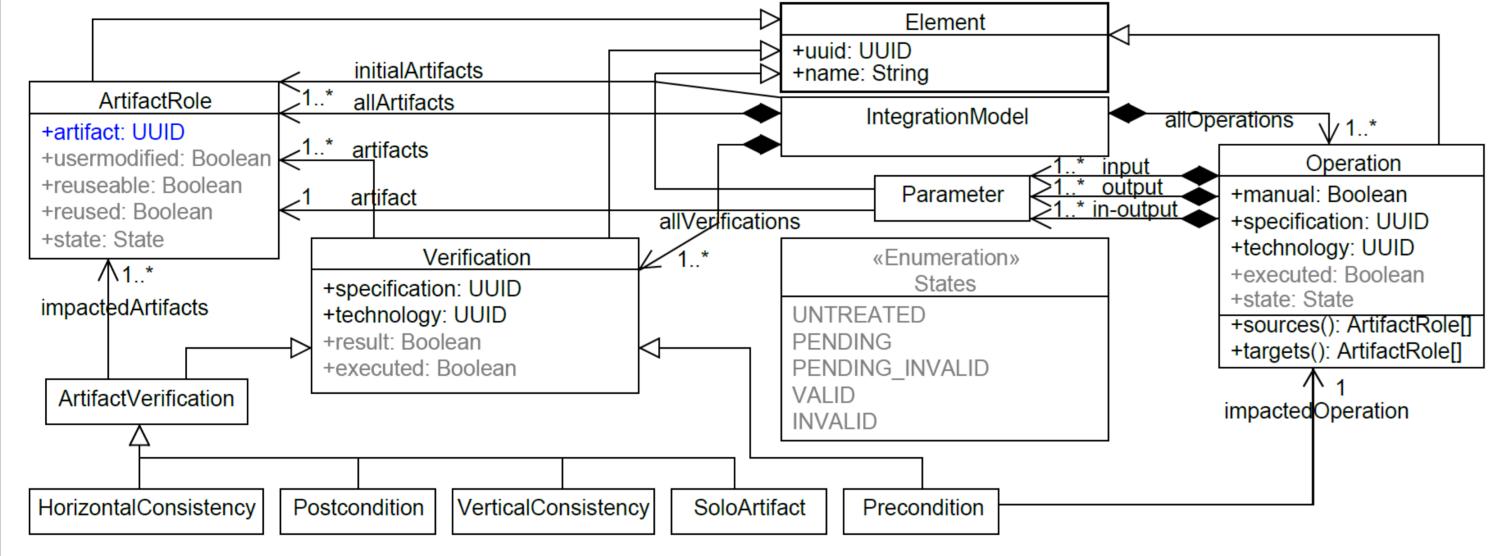
Multiple models complement each other, are merged, transformed, and manipulated in diverse orders



- Handle Manual Operations
  - Deal with missing artifacts
  - Provide all built artifacts to developers (as input for manual operations)
  - Notify developer when manual activities have to be performed (only if necessary)
- Integrated Validation and Verification (V&V) Operations: Prevent usage of already erroneous artifacts in expensive manual activities Lightweight Build Script Allow maximum freedom (spontaneous iterations and execution sequence of manual activities) With minimum specification effort Partial build as far as possible with the given and successfully verified artifacts Goal: provide all valid intermediate products for further manual treatment
- Manual and automated activities are *intermixed*
- Manual activities are expensive and require much time

# **Integration Model**

- Integration model (IM) serves as
  - *Reusable* build script (in black)
  - *Project-global* role mapping to artifacts within the VCS (Version Control System) (in blue)
  - Model of *specific build* with processing annotations (in gray)



# **Execution Example**

- Project for enriching publication list with personal information from a family register
- Combined two ATL examples:
  - 'Families to Persons' [ATL1]
  - 'Book to Publication' [ATL2]
- Added two example verifications

#### Start of scenario:

Initially no artifacts are available in VCS

### **Partial build:**

All operations and verifications are invalid for execution

#### Change 1:

□ *XMLSource* committed to VCS

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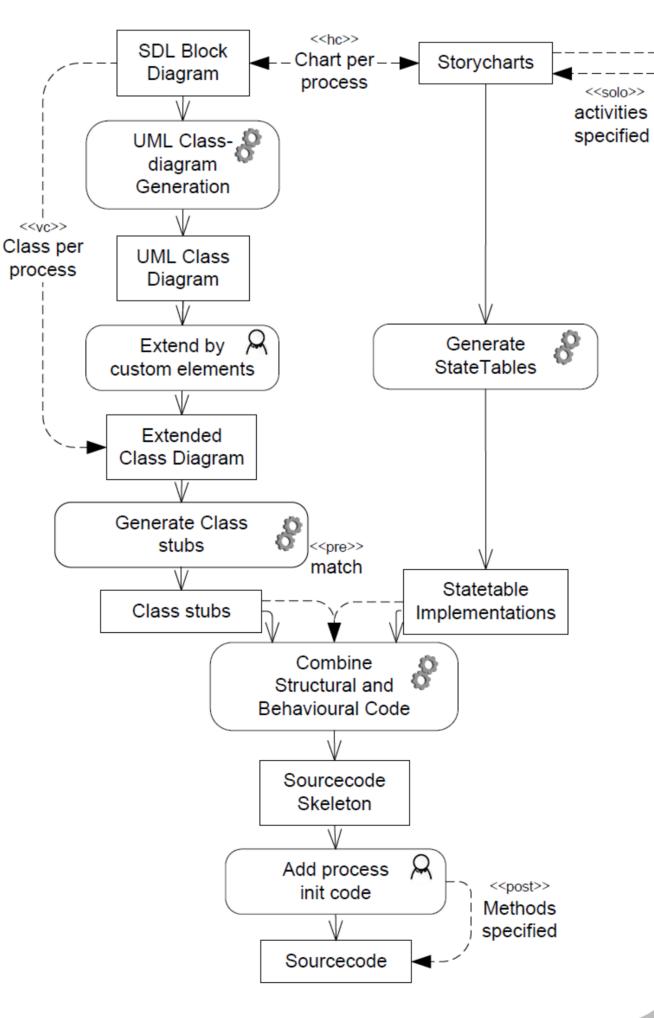
- IM specifies object flow, operation implementations and verifications
- Verification types differentiated by:

#### Focus

- Appropriate artifact quality
- Correct operation execution
- Target of consequence
  - Artifacts vs. operations
- **Execution Semantic:** 
  - Partial builds:
    - Executes build as far as possible respecting
    - Missing artifacts and
    - Failing verifications
  - Created artifacts are stored in VCS, where they can be accessed by developers
  - Incremental builds:
    - Reuse artifacts and verification results from previous build, if possible

#### **Developer IDE Extension**

Build script for factory example from [Köhler2000]:



#### **Partial build:**

- Notification to execute ManualXMLToBook is sent
  - Including VCS references to available input artifact and
  - Role of required output artifact

#### Change 2:

*FamilySource* committed to VCS

### **Partial build:**

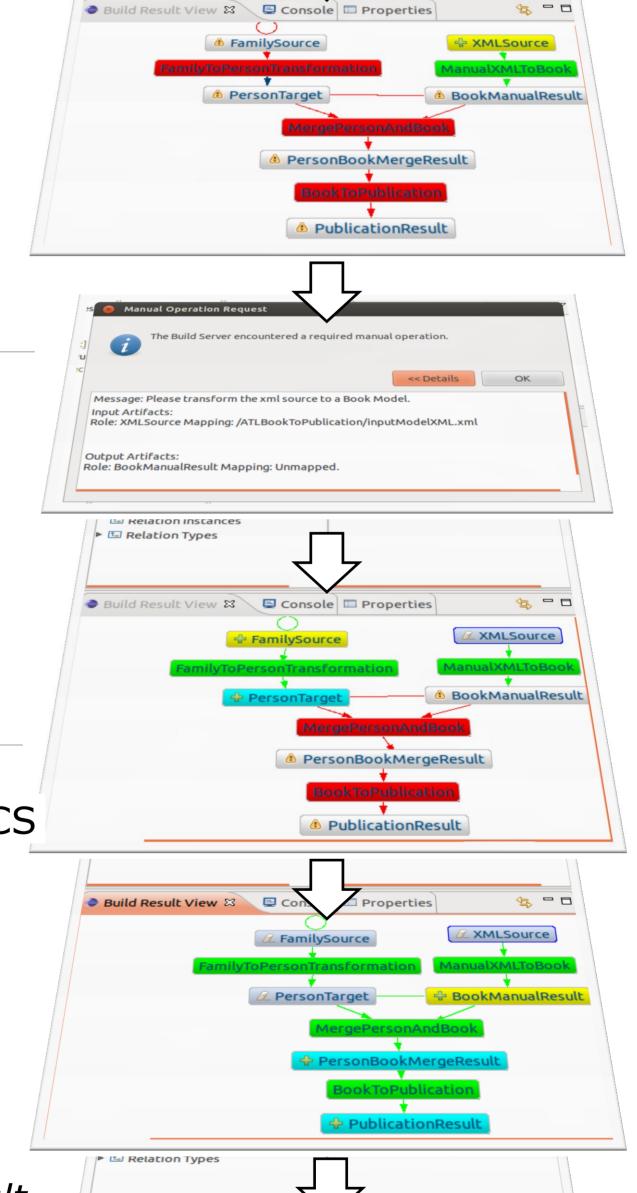
- Successful execution of solo verification on *FamilySource*
- Execution of FamilyToPersonTransformation
- PersonTarget generated

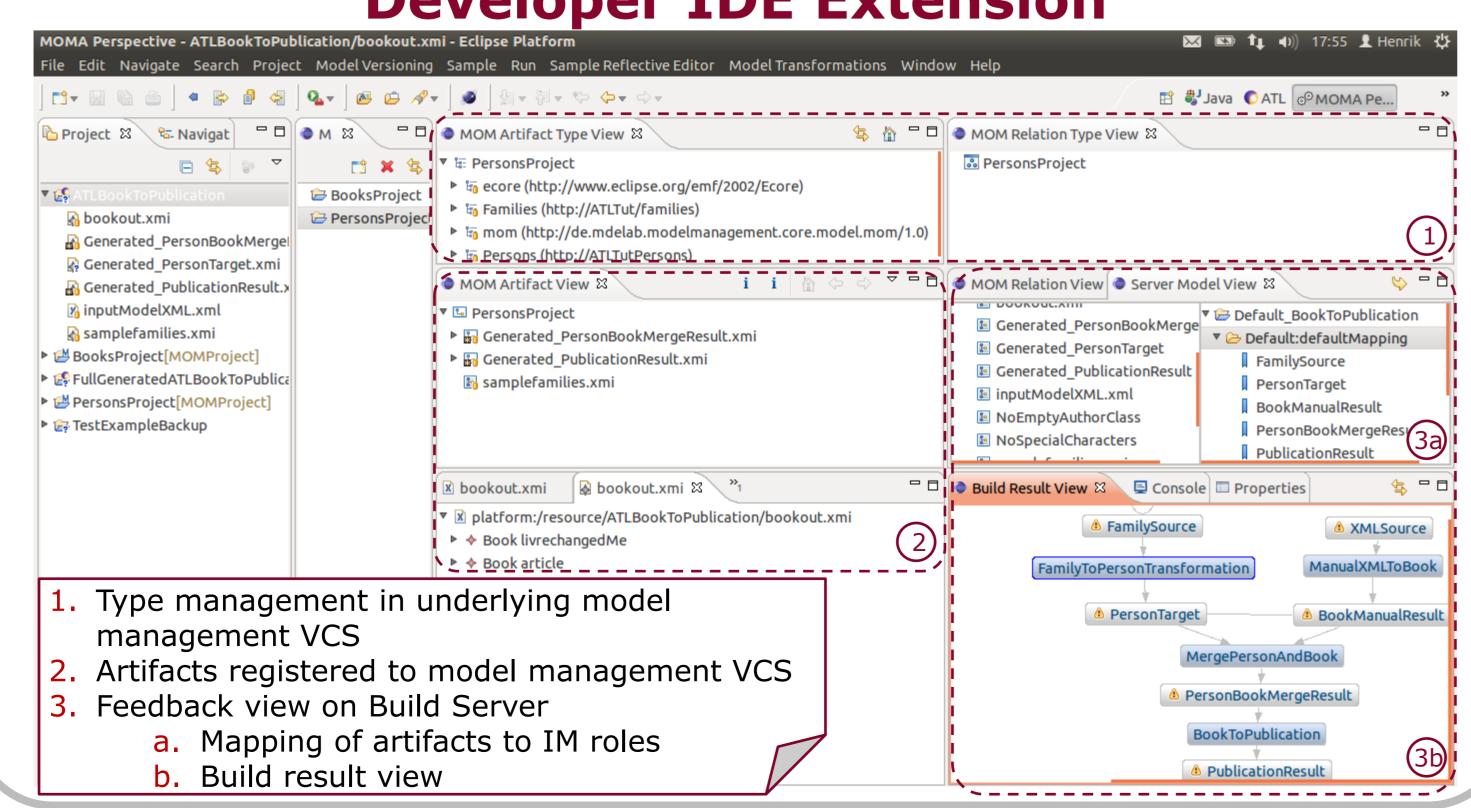
#### Change 3:

- BookManualResult committed to VCS
- Execution of *ManualXMLToBook* confirmed

### **Partial build:**

- Result of solo verification on FamilySource and PersonTarget reused from previous build
- Horizontal verification between PersonTarget and BookManualResult successfully executed PersonBookMergeResult generated PublicationResult generated



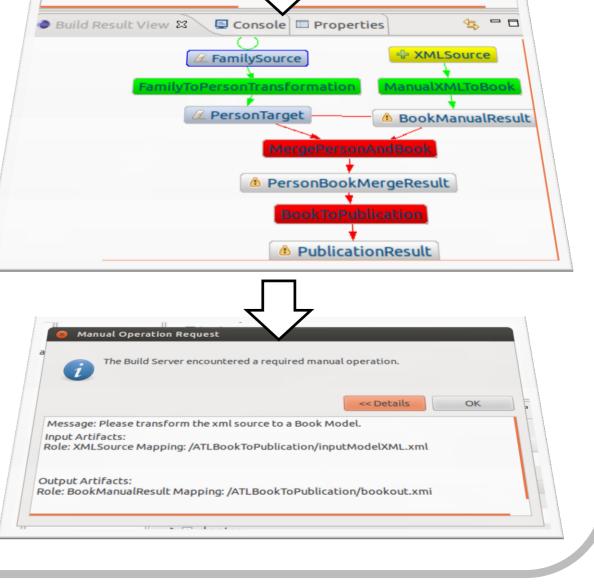


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Handling of spontaneous iterations: XMLSource updated to VCS 

#### **Partial build:**

- Result of solo verification on FamilySource and PersonTarget reused from previous build
- Notification to execute ManualXMLToBook is sent



[Köhler2000] H. J. Köhler, U. A. Nickel, J. Niere and A. Zündorf. Integrating UML Diagrams for Production **Control Systems.** In Proc. of the 22<sup>nd</sup> International Conference on Software Engineering (ICSE), Limerick, Ireland, Pages 241-251, ACM Press, 2000 [ATL1] http://www.eclipse.org/m2m/atl/basicExamples Patterns/ [ATL2] http://www.eclipse.org/m2m/atl/atlTransformations/#Book2Publication