Overcoming the Difficulties of Implementing a QVT Execution Solution

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Outline

- Implementing QVT: Problems
- Current QVT Solutions
- Our Solution: ATC-Based
- Our Support to QVT
  - Editors
  - Translation into ATC
  - Execution
- Overcoming Challenges
- EPL Contribution

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Implementing QVT: Problems I

- Specification problems (semantic and syntactic):
  - Inconsistencies
  - Ambiguities
  - Insufficiencies
  - Lack of Reference Implementation
- Implementation Challenges:
  - Mixture Of Paradigms
  - Language Dependencies
  - Complexity
  - Maintenance
  - General vs. agile DSTLs

Implementing QVT: Problems II

- Abstract Syntax and Semantics Superclasses mismatch in the QVT Operational Mappings Language
- QVToStdLib as a model instance of the QVTo language
- Element as instance of MOF::Element in the QVToStdLib (Sect. 8.3.1)
- Type Inconsistencies & Mind Breaker Considerations

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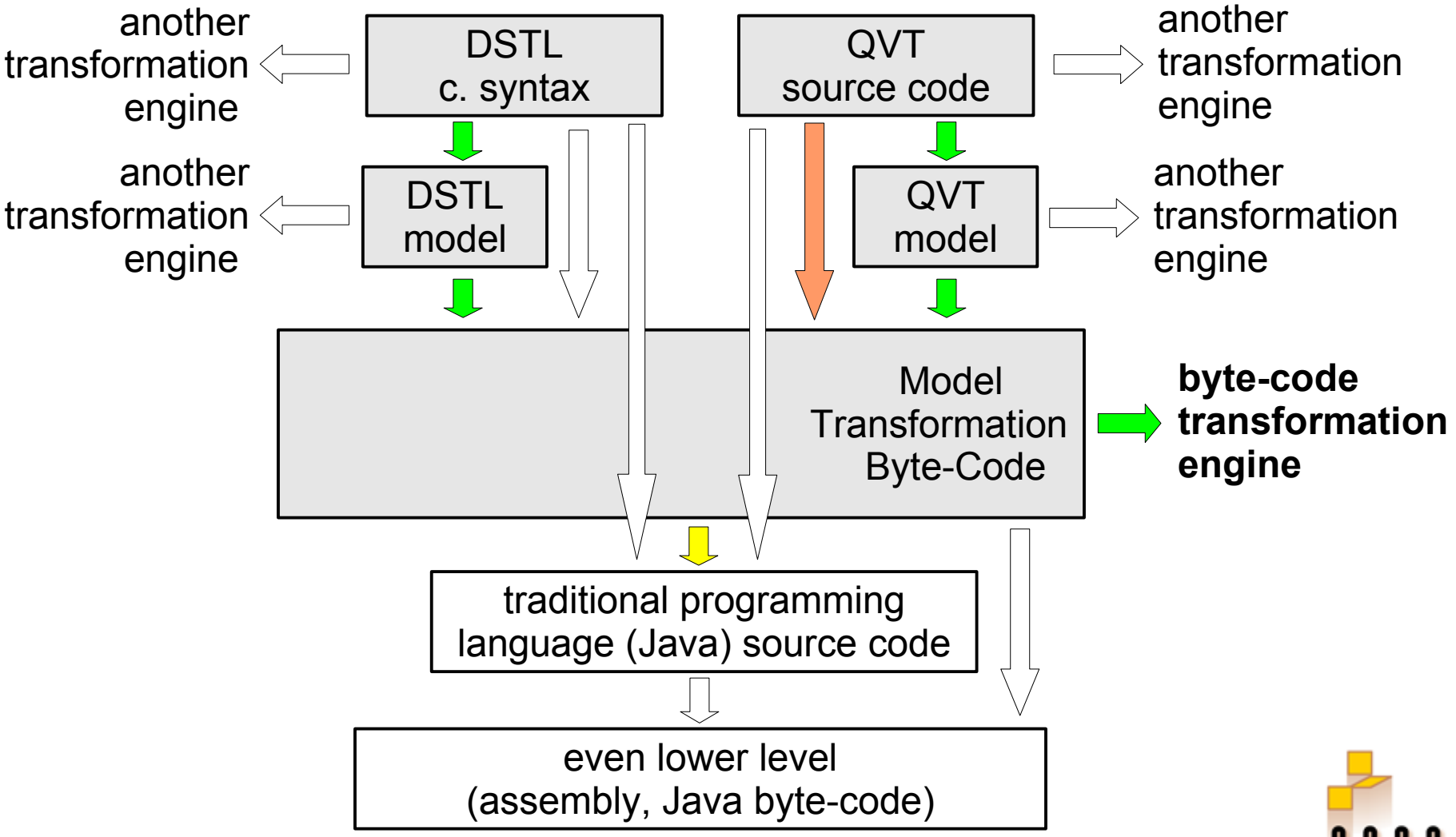
Current QVT Solutions (I)

- The Solutions:
  - growing and improving
- Based On:
  - Code Interpreters
  - Code Translators (compilers, e.g: into java)
  - Byte-Code Virtual Machine Approaches

Current QVT Solutions (II)



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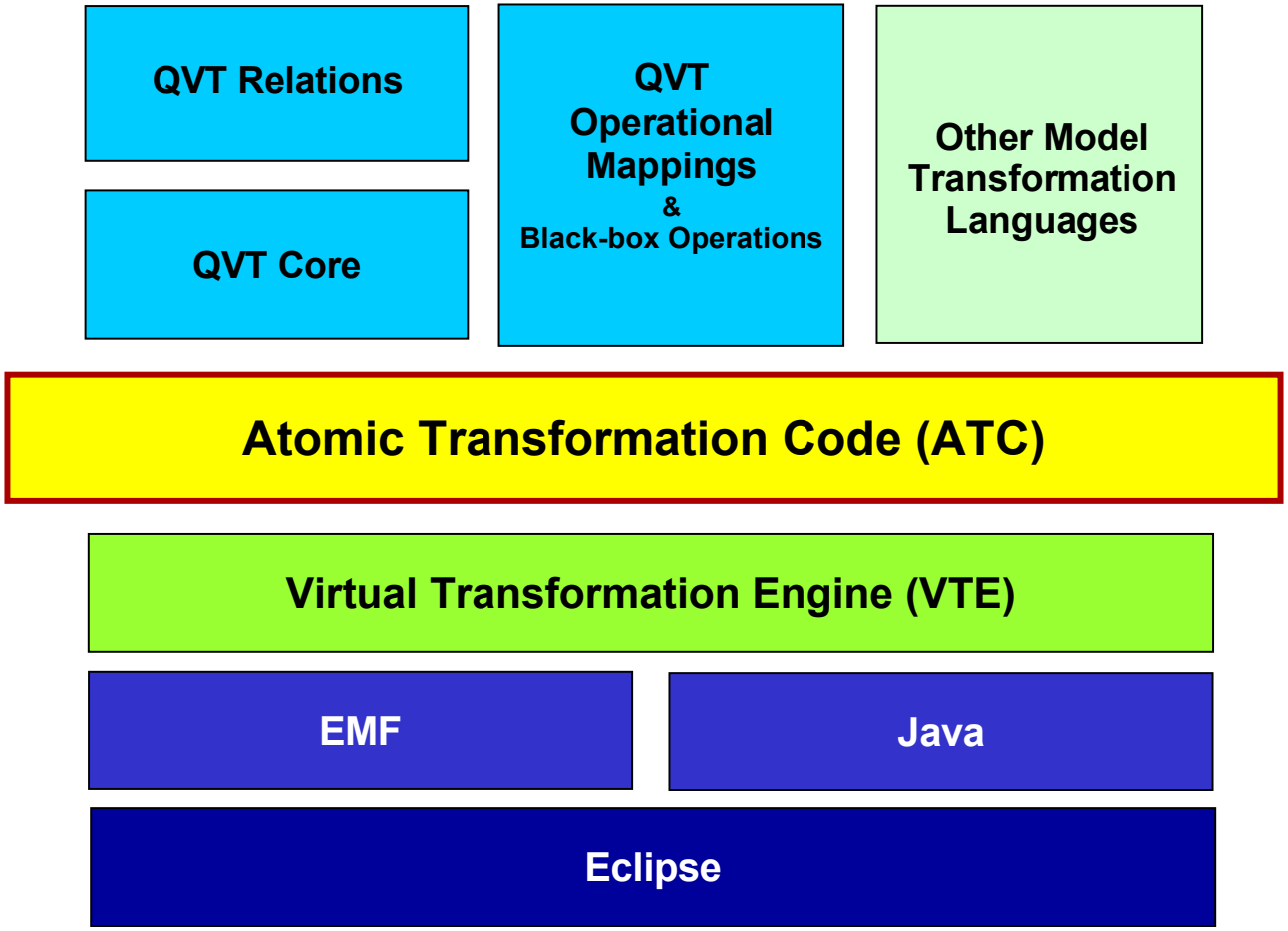
Our Solution: ATC (I)

- Atomic Transformation Code (ATC):
  - Low-level Model Transformation Language
  - Set of small Transformation Primitives (Byte-Code)
  - Imperative
  - Lightweight Thin Layer Built Upon EMF
  - Different Abstraction Layers Available (Generative ATC)
- Current Uses:
  - Model Transformation Development (ATC, QVT)
  - Modernization (ADM, KDM...)
  - DSTL support (MTTL, GATC...)

Our Solution: ATC (II)



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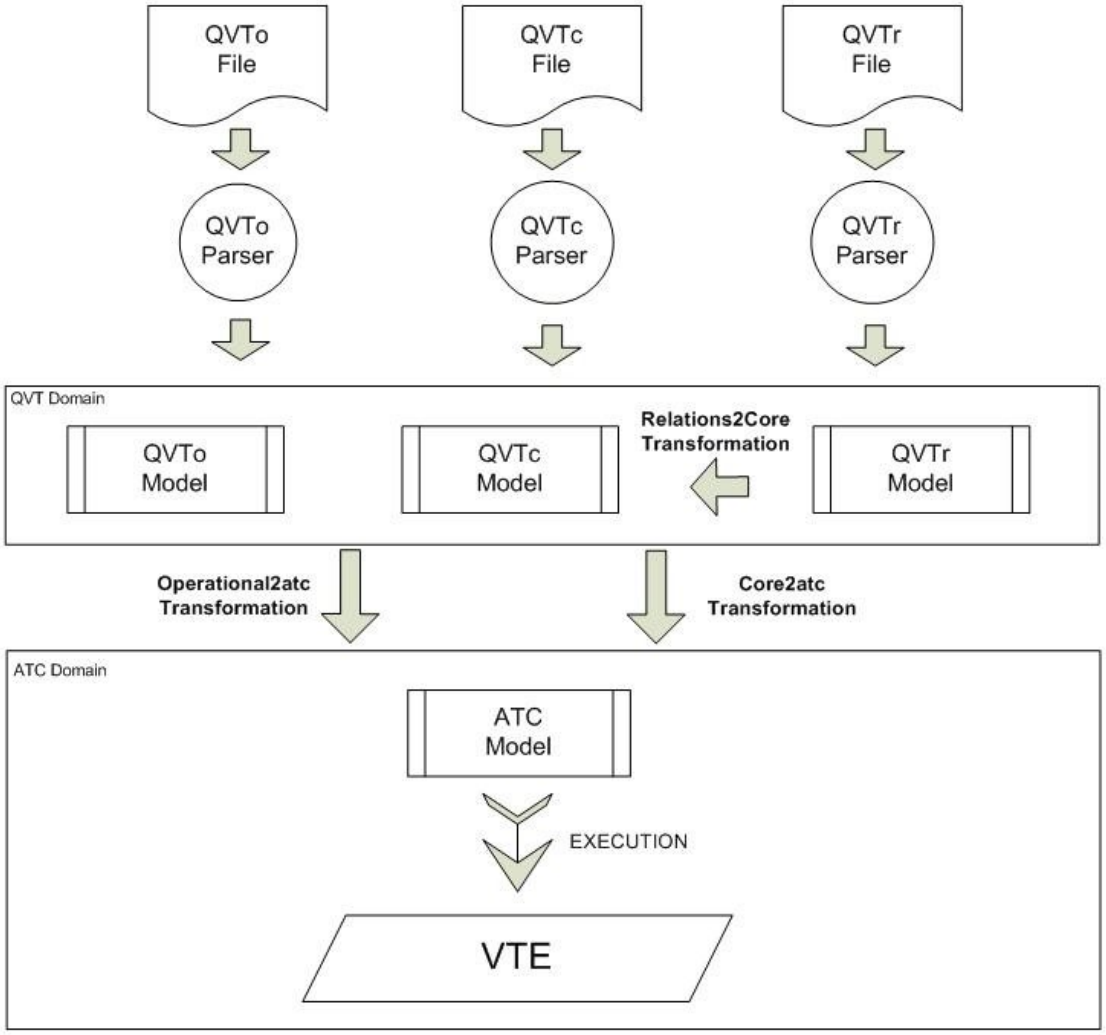
Our Support to QVT (I)

- 3 Repeatable Independent Steps:
  1. Edition + Parsing of QVT concrete syntax notation
     Currently hosted at the UMLX project (QVTo pending?)
  2. Transform edition + parsing output QVT models into ATC
  3. Ready to Execute the Translated QVT Model Transformation!
- Transparency to the User is Required

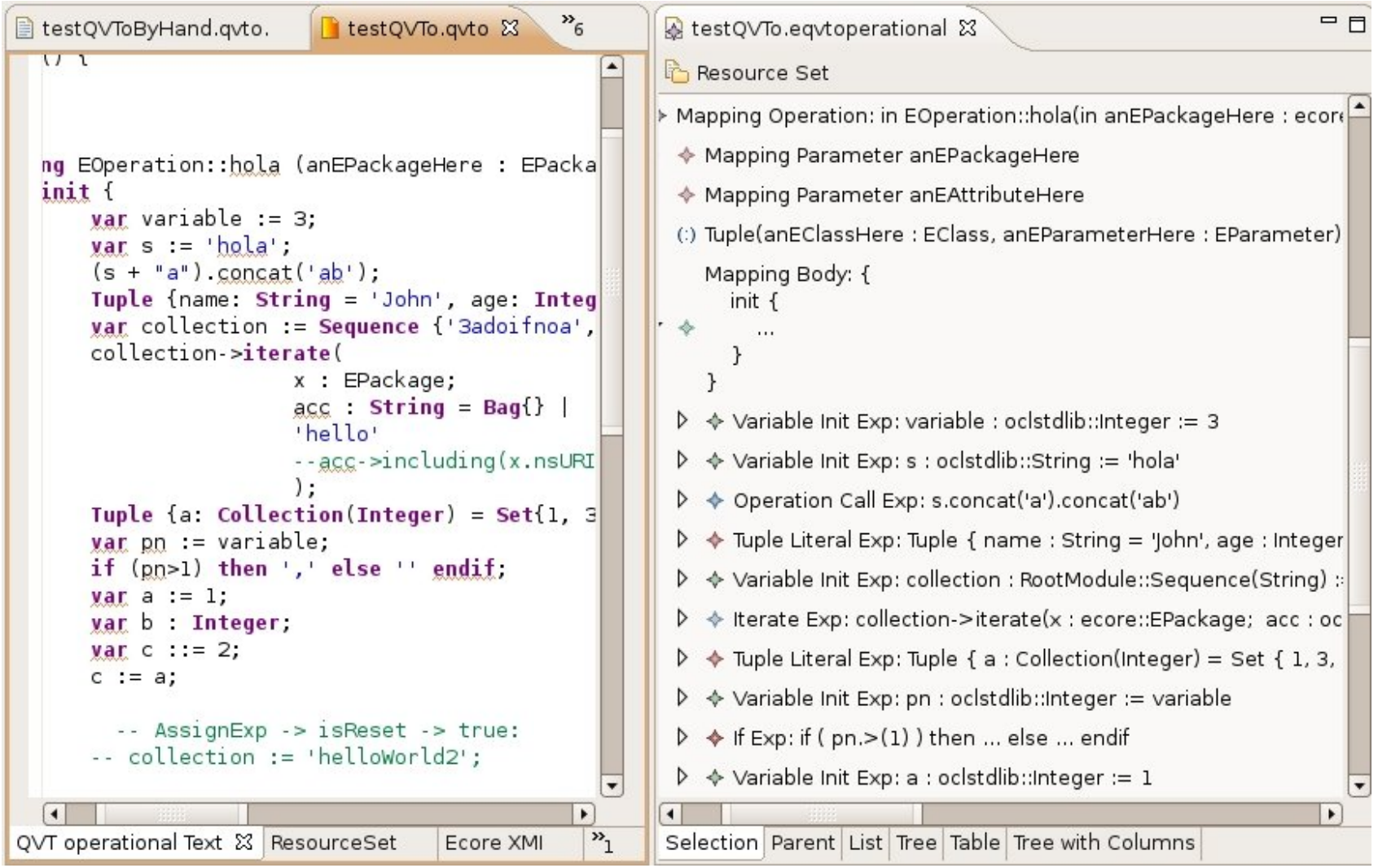
Our Support to QVT (II)



Support to QVT: Editors (I)

- Hosted at UMLX:
  - Dr. Edward D. Willink
    - Relations (QVTr)
    - Core (QVTc)
  - Adolfo Sánchez-Barbudo
    - Operational Mappings (QVTo)
- Multipage Editors
  - Output Models conforming to Ecore and EMOF
  - XMI-executable
- Reuse of the Eclipse MDT OCL parser

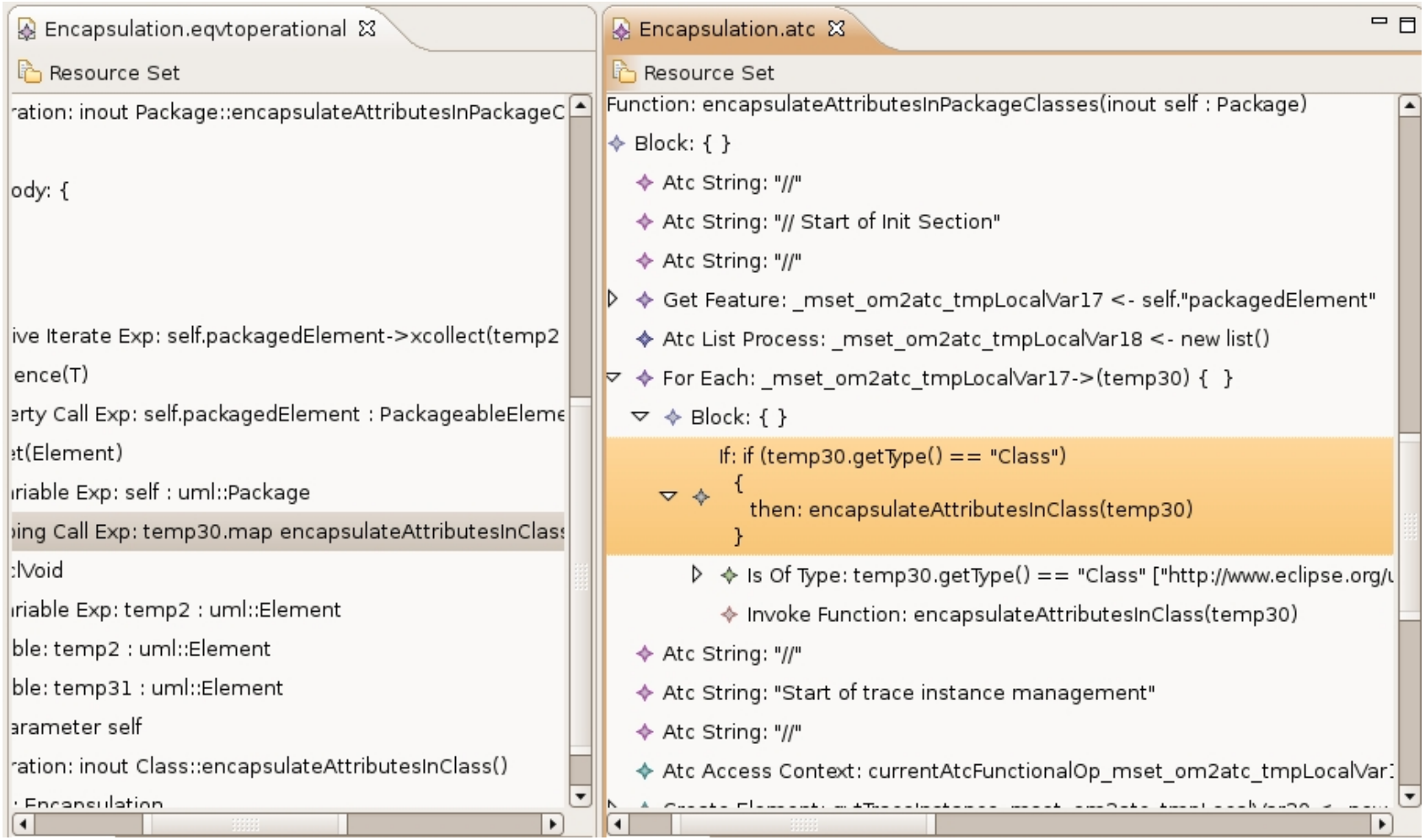
Support to QVT: Editors (II)



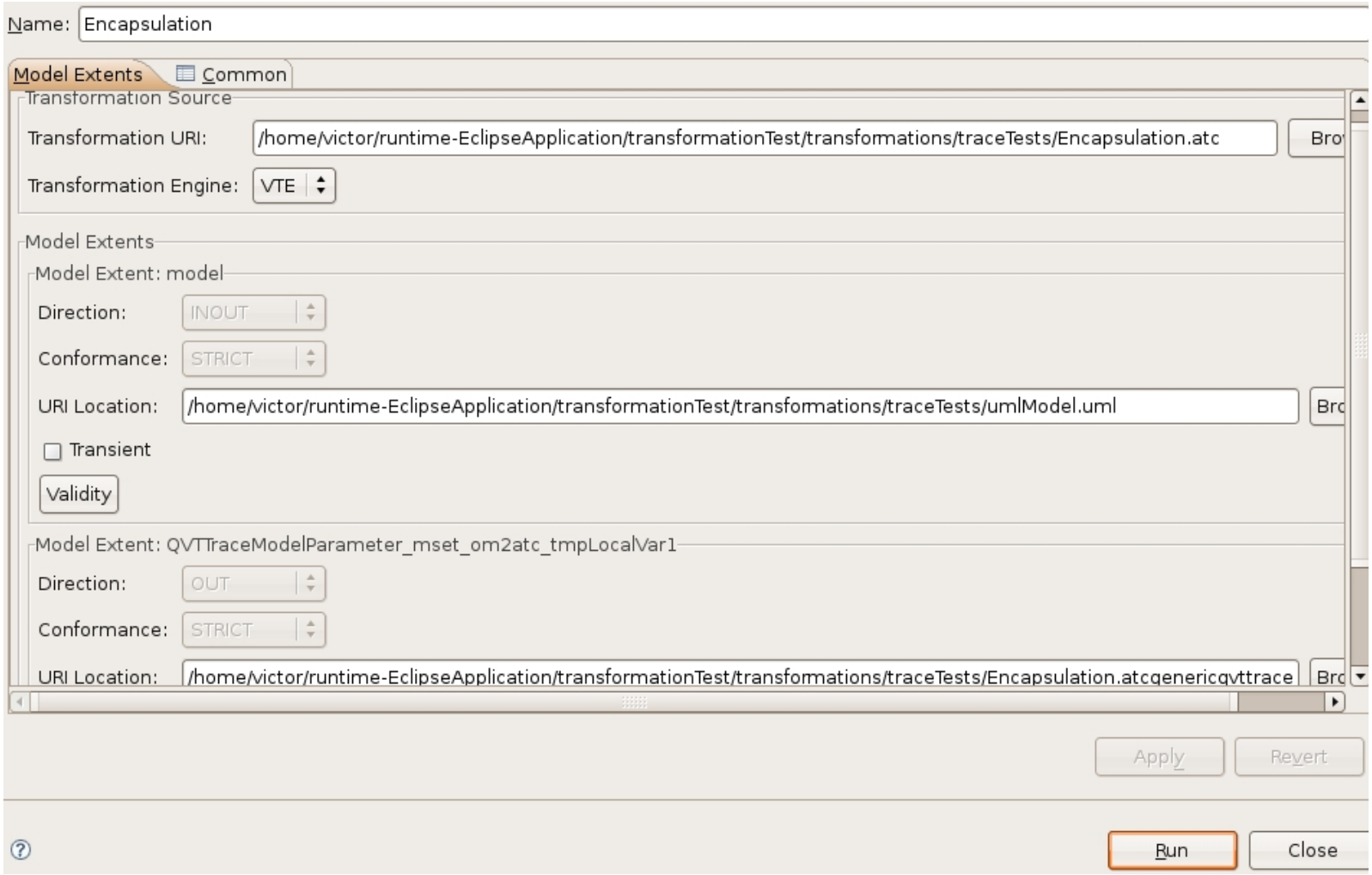
Support to QVT: Translation (I)

- Models are Translated into ATC
  - Via Model (to Model) Transformations
  - Semantically equivalent (of course!)
  - Translation comprises:
    - Victor Sánchez:
      - OCL + MOF (Ecore) + OCLStdLib
      - Operational Mappings (QVTo) + StdLib
        - Includes Trace Infrastructure
    - Víctor Roldán: Core (QVTc) + OCLStdLib
  - Written in GATC
  - Support for QVT Relations: Indirect
    - Via the Relations to Core transformation

Support to QVT: Translation (II)



Support to QVT: Execution



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Overcoming Challenges

- Syntactic and Semantic Ambiguities
  - Issues to MOF 2.0 QVT Task Force
- OCL language extensibility
  - Several Open Bugs in the Eclipse Bugzilla
  - It also Affects the QVT 2 ATC model transformations!
- ATC Alignment with Source Languages
  - Declarative vs. Imperative
- Trace Support
  - Relying on Unique Trace Metamodel
  - Trace Infrastructure Injection

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EPL Contribution

- ATC and GATC
- Operational Mappings Editor and Parser
- QVT2ATC model Transformations
  - Includes OCL2ATC!
- Everything under the EPL!!! (Coming soon)

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Thank you very much!!!

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- Víctor Roldán: **Core_2_ATC** model transformation
- Adolfo Sánchez-Barbudo: **Operational Mappings** (OM) parser & editor
- Victor Sánchez: **ATC** language & **OM_2_ATC** model transformation

Special Thanks:

- Nuria Verde: **MOF2Text** parser & editor
- Orlando Avila-García: **MTTL** implementor, user feedback & insight
- Christian Damus: **OCL** project & personal patience
- Ed Merks: **EMF** project & personal patience
- Ed Willink: **UMLX QVT** editors & overall kindness

and

- **Eclipse & EclipseCON**