MDA for Real-Time – Really?

Using MDA for Real-Time,
Embedded Systems

MDA Potential

- Model-centric design and development
- Provisions for automation
- Sounds like the “real stuff”

Confusion Abounds

- PIM/PSM concepts
  - Even the “experts” appear confused; ADTF has an email thread that has been running for three weeks (150 messages)!
  - How is this different for transformations?
  - Do PIMs exist for real-time, embedded systems?
- UML 2
  - Relationship to MDA
  - UML 2 is MDA?
  - MDA is UML 2?
- Focus on UML 2
  - Only one MOF-derived language
- What about MOF?
- Incomplete Specifications
  - QVT
  - Diagram Interchange
- Executable UML
- Rush to Market
  - Old tools with “fresh lipstick?”
  - Not MOF-based
  - The critical features are non-standard and/or proprietary
    - Code generation
    - Action semantics language
    - Frameworks

Things that Must Change

- Compliance
  - Unverified assertions
  - Need well-defined levels
- Interoperability
  - None of the three tools we have tested can reliably import the XMI that they export
  - One does not furnish XMI export
- Long-term support and sustainment
  - Ten year development span, forty year life span
  - Adapt to critical changes
    - Capabilities
    - Vendors come and go
    - Target (Hardware, RTOS, Middleware, Communication)
    - Software Tools
  - Versions
    - Tools
    - System enhancements
  - Persistent repository
    - Versions

Required Features

- Interface to legacy
- Requirements
  - Allocation, Flow-down, Traceability (bi-directional), Derived requirements
- Analysis
  - Model structure
  - Hazard, safety, information security, fault isolation, fault tolerance, dependency relationships
  - Schedulability, performance, worst-case execution paths
  - Parameterization
  - Formal proofs
- Verification and Validation
  - Build the Right Thing … Right
- Complex deployment configurations
- Composable tool chain(s)
- QVT is key for automation
  - Transformation
  - Views
  - Code generation
- Scalable
  - Repository
  - User interface