Systems Engineering Needs of the DoD Architecture Framework

Report of the

Architecture Frameworks Working Group
Systems Engineering Division
National Defense Industrial Association

Co-Leads
Carl Siel, ASN-RDA CHSENG
Joe Kuncel, Northrop Grumman

AFWG Purpose and Products

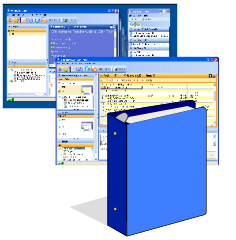
Purpose

- Recommend changes and additions to the DOD Architecture Framework (DoDAF) and related standards that will improve support for DOD systems engineering, development, and acquisition.

Products

Final report and briefing of

- Analysis of DoDAF satisfaction of SE needs
- Conclusions
- Recommendations for improvement



AFWG Members

Name	Organization
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Diane Hanf	Mitre Corp.
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John Palmer	Boeing
Kristin Giammarco	US Army AMC & US Naval Post Graduate School
Robert Curry	Raytheon
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Thomas Murphy	Silver Bullet Solutions, Inc.

* AFWG founder and sponsor

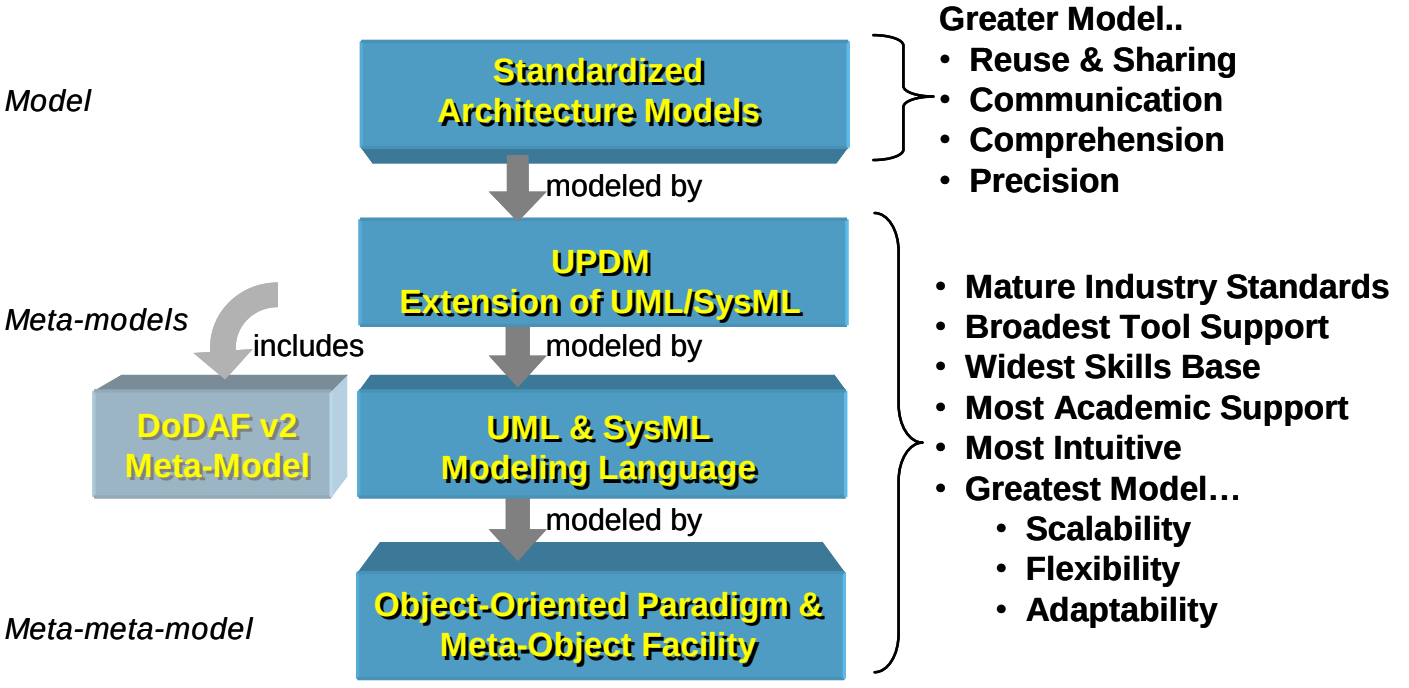
SE Needs of DoDAF

- **SE Needs**
  - Standard architecture modeling methodology
    for greater reuse/sharing, more efficient/standardized modeling
  - Greater definition and standardization of architecture elements
    incorporation of Services' "architecture elements lists"
  - Executable/simulatable architecture models
    for early and inexpensive architecture verification and validation
  - Composable/decomposable architectures
    for multiple levels of abstraction for hierarchy of stakeholders
  - More reusable architecture models
    faster, more efficient, more standard architecture development
  - Standard architecture alternatives analysis method
    for continuous architecture improvement
  - Standard architecture modeling notation and symbology
    better architecture comprehension and communication
  - Auto-generation of systems engineering artifacts
    lowering costs by leveraging architecture model's "authoritative data"

Recommendations

Standard architecture modeling methodology

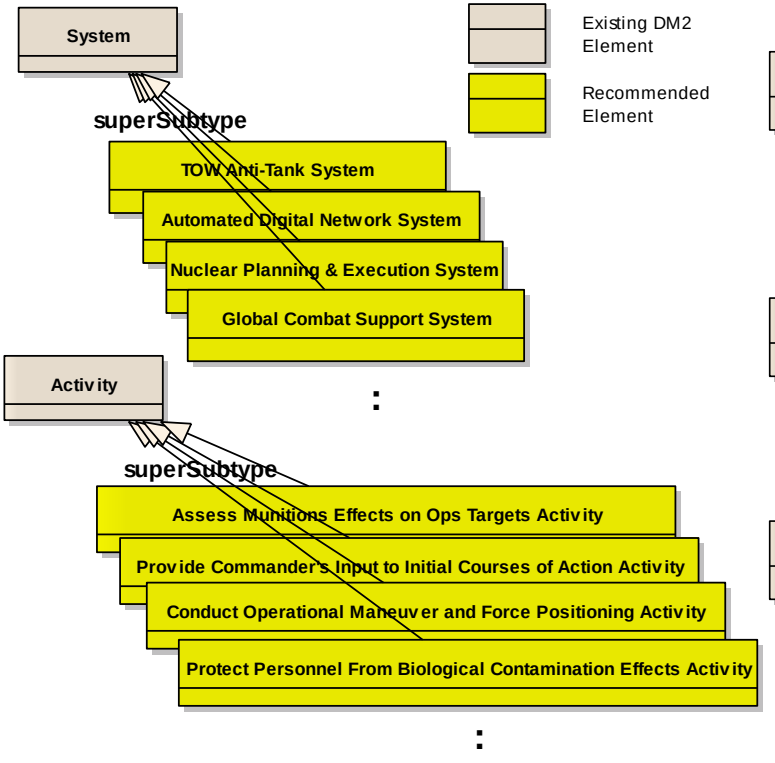
- Object-Oriented, UML, SysML, UPDM implementation of DM2

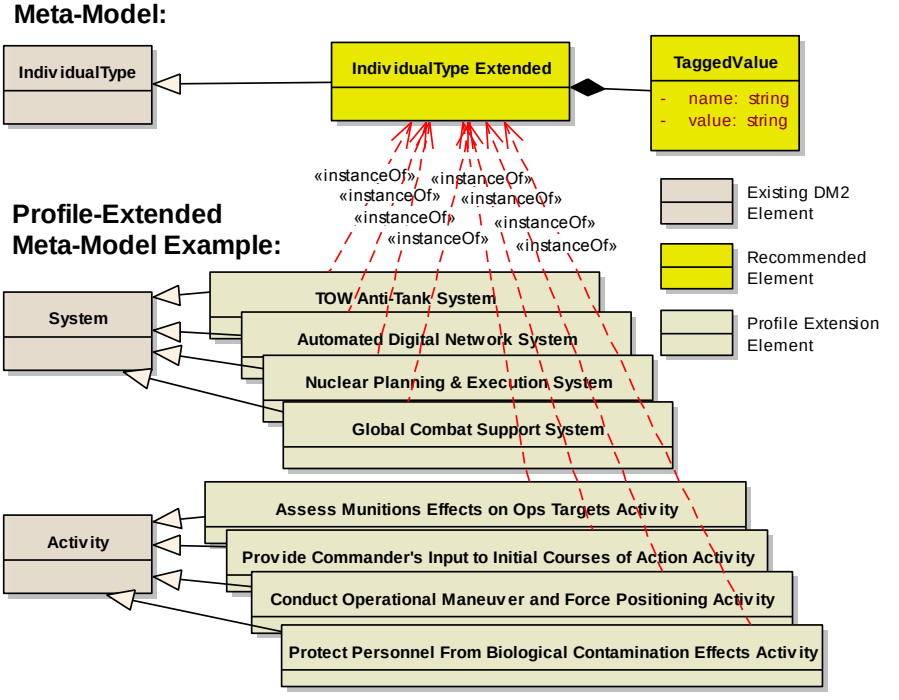


Recommendations

Greater definition, standardization of architecture elements

- Integrate JFCOM's standard architecture elements into the DM2
  - by adding elements to meta-model OR
  - by enabling user extension (profile) of meta-model



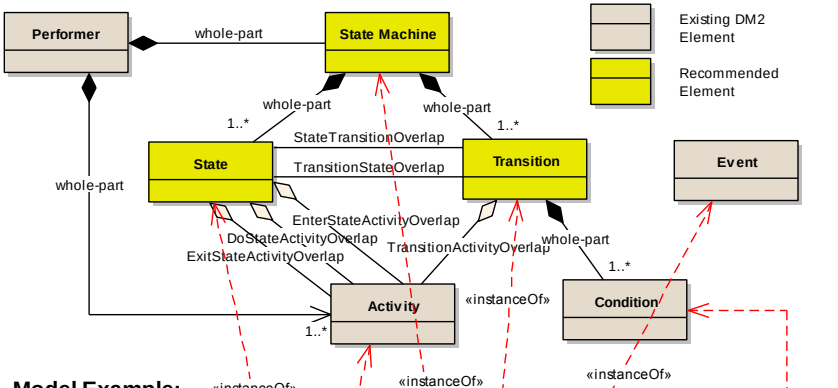


Recommendations

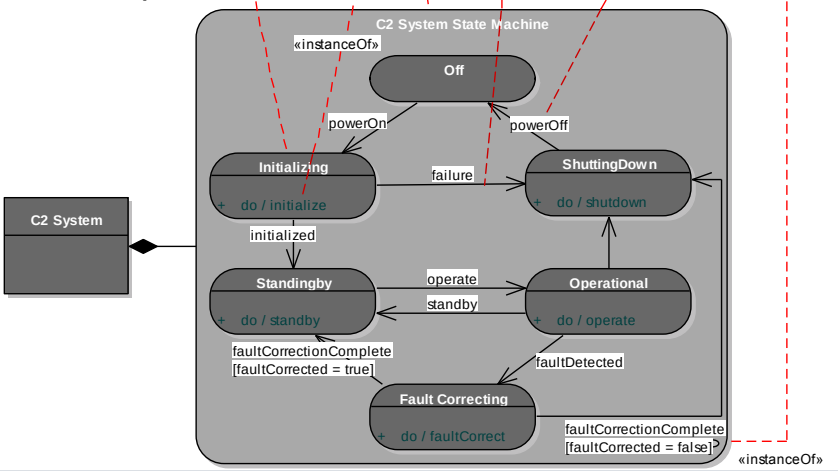
Executable/simulatable architecture models

- Add behavioral semantics for state-machine …

Meta-Model:



Model Example:

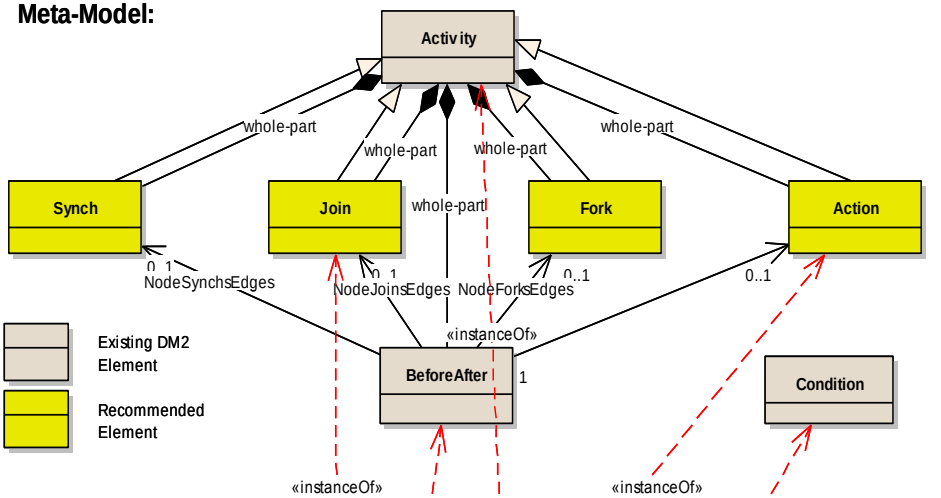


Recommendations

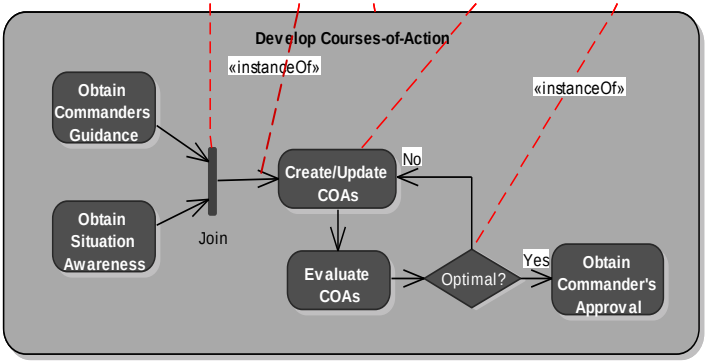
Executable/simulatable architecture models (cont'd)

- And add behavioral semantics for activity definition …

Meta-Model:



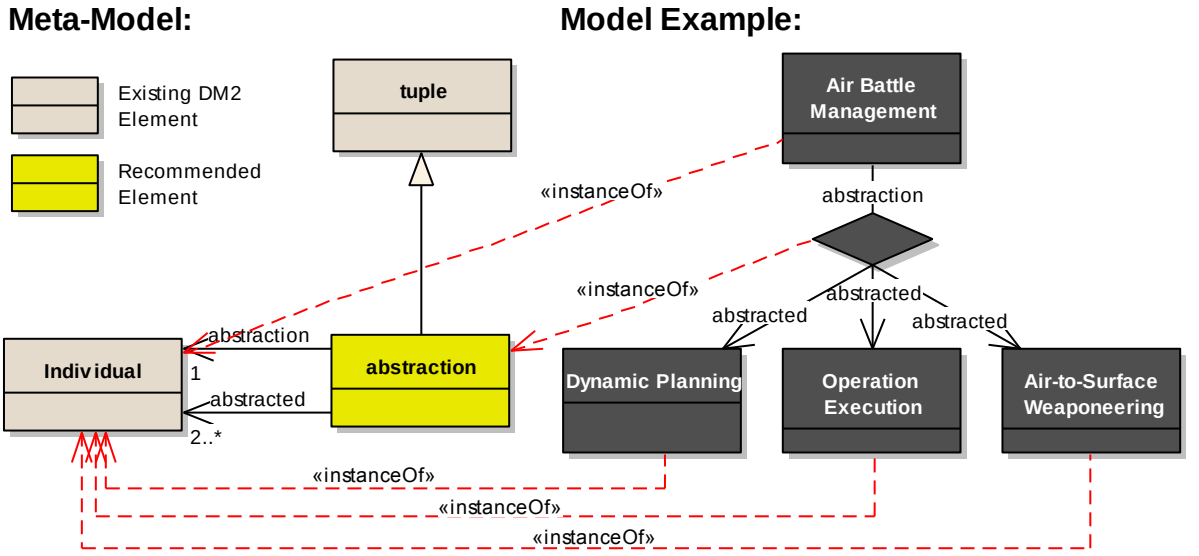
Model Example:



Recommendations

Composable/decomposable architectures

- Add abstraction relationship…

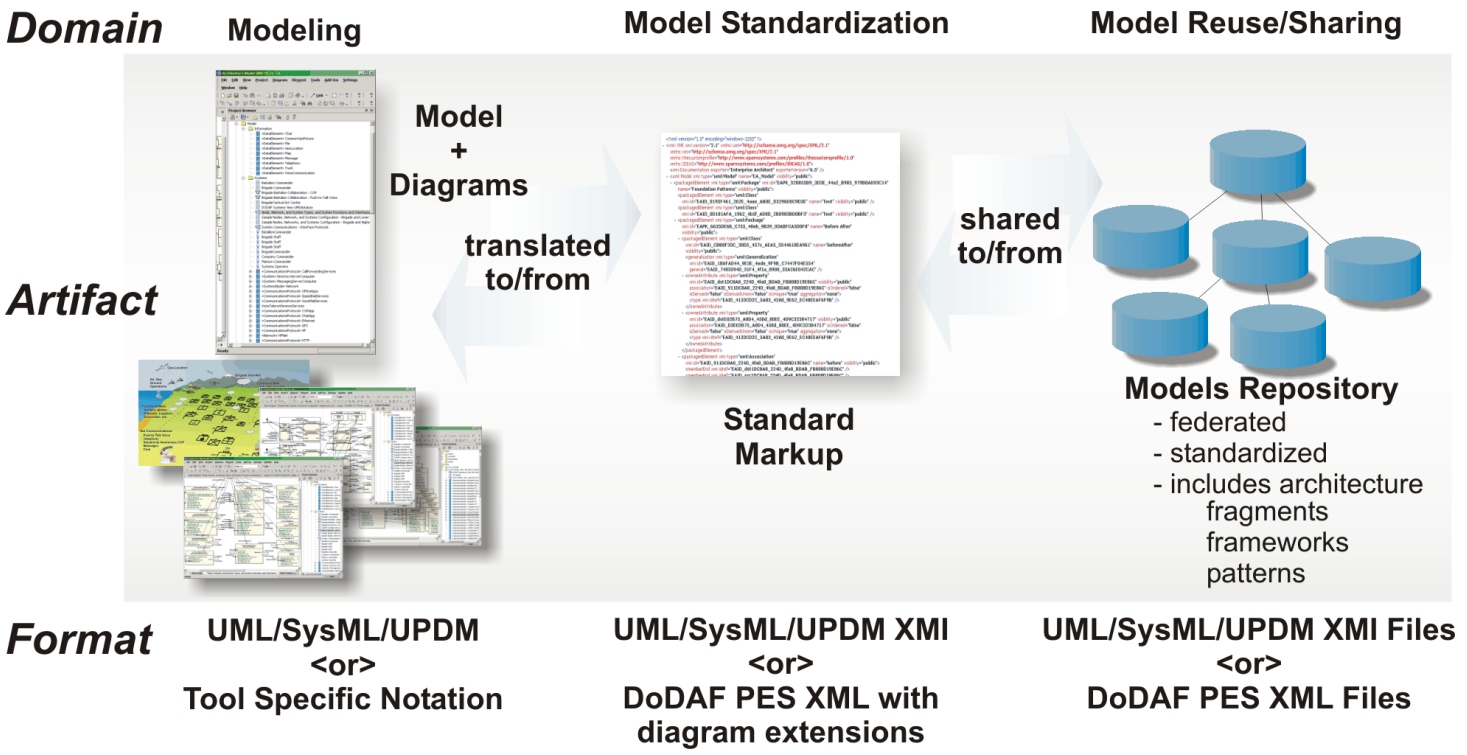


Note: DM2 deemed to satisfy need for structural composition/decomposition of architectures

Recommendations

More reusable architecture models

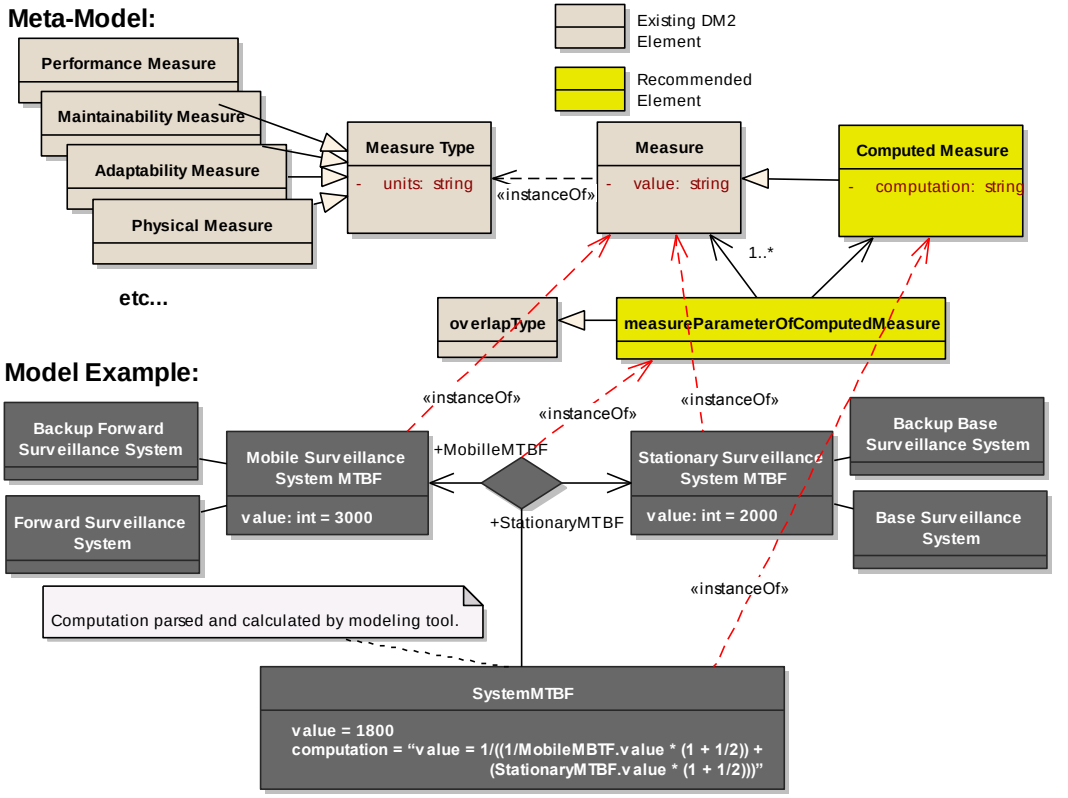
- Extend physical exchange standard (PES) to include diagrams exchange (XMI for UPDM already includes diagram exchange)
- Standardize DARS on PES (prefer XMI)
- Add patterns and frameworks support to DARS



Recommendations

Standard architecture alternatives analysis method

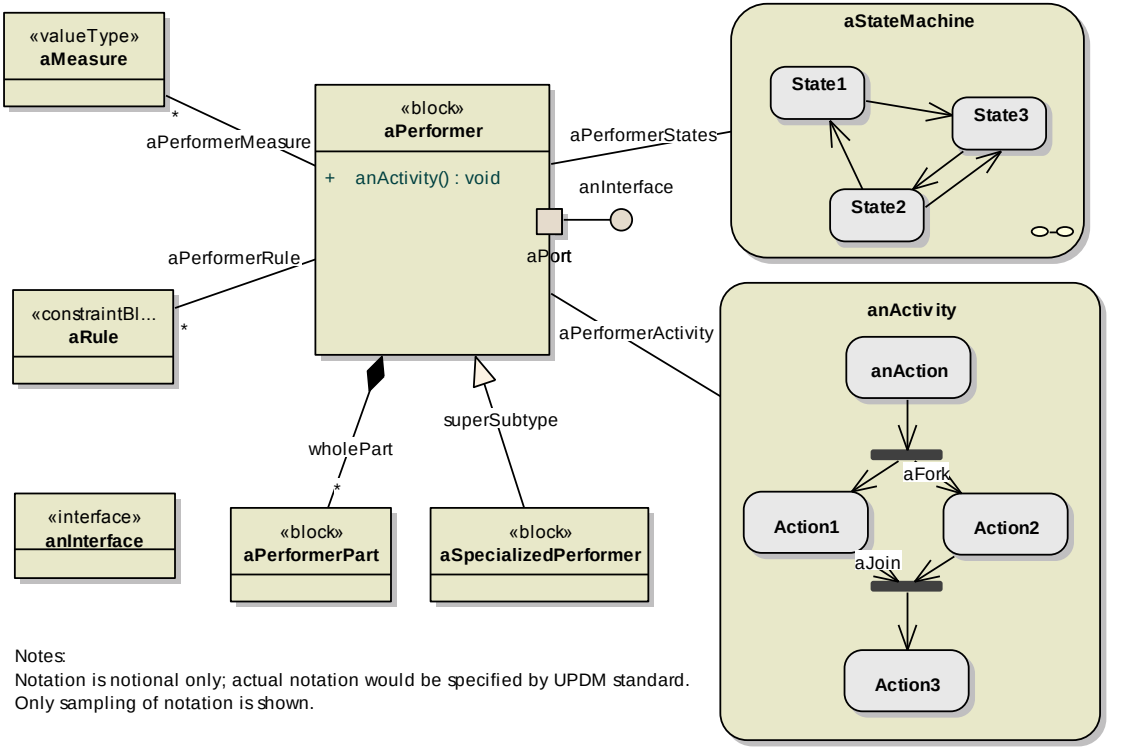
- Extend meta-model with parametric analysis semantics
- Standardize on SEI's Systems and Software ATAM



Recommendations

Standard architecture modeling notation and symbology

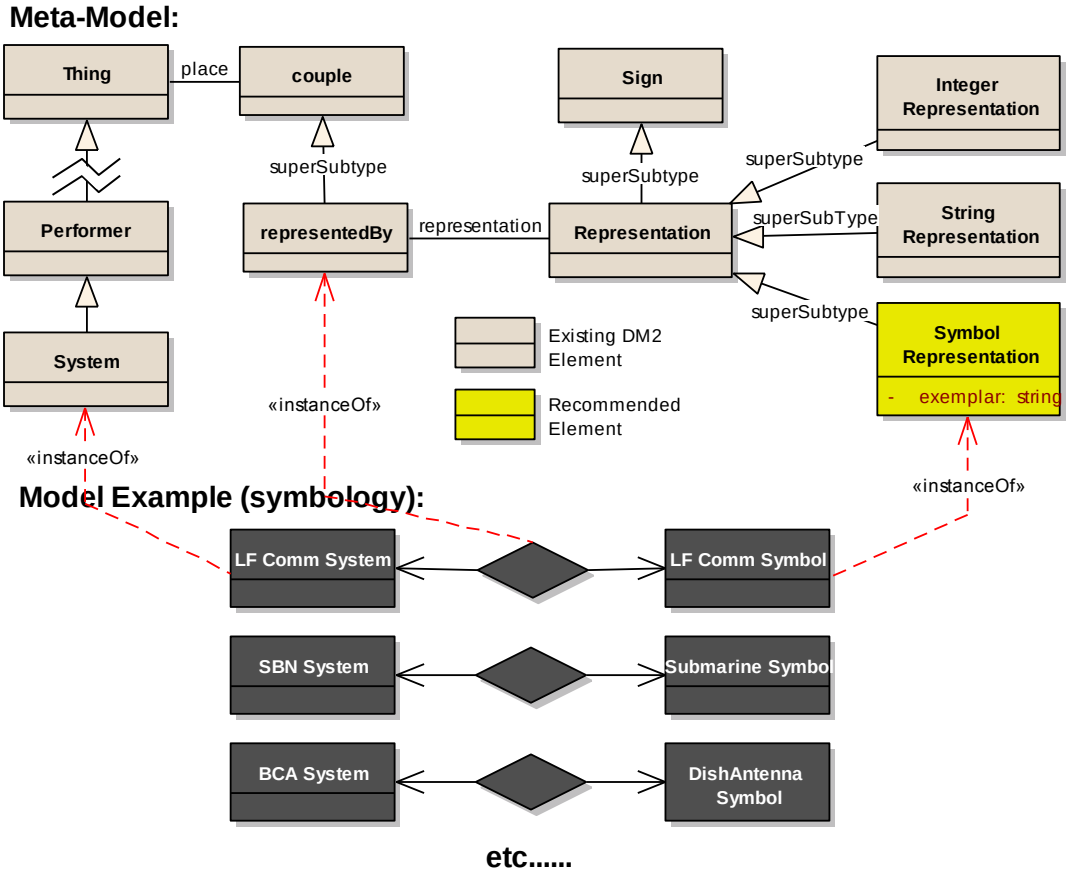
- Establish UML/SysML/UPDM as standard notation …



Recommendations

Standard architecture modeling notation and symbology

- Extend meta-model with symbolic representation semantics ….

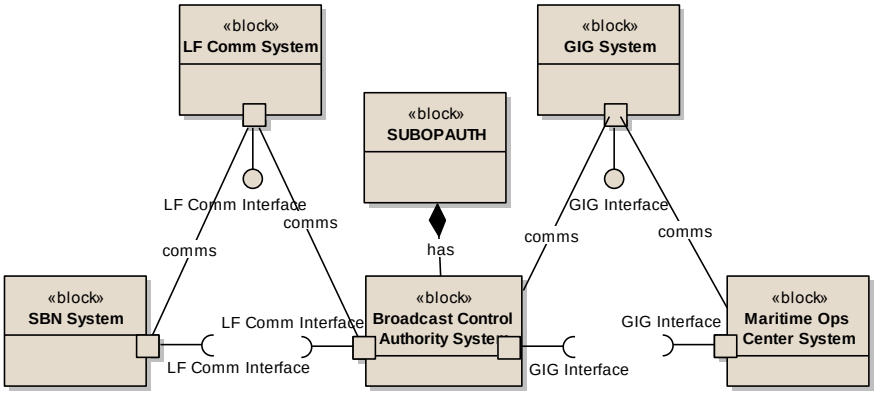


Recommendations

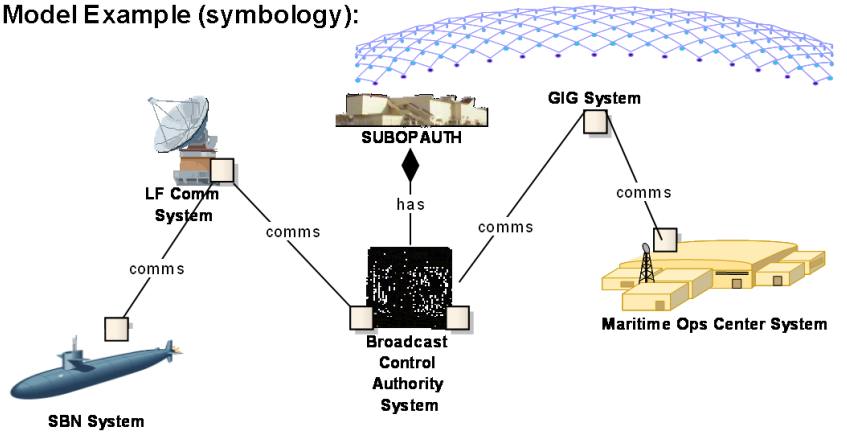
Standard architecture modeling notation and symbology

- Establish DoD Metadata Registry-like standard symbology library

Model Example (notation):



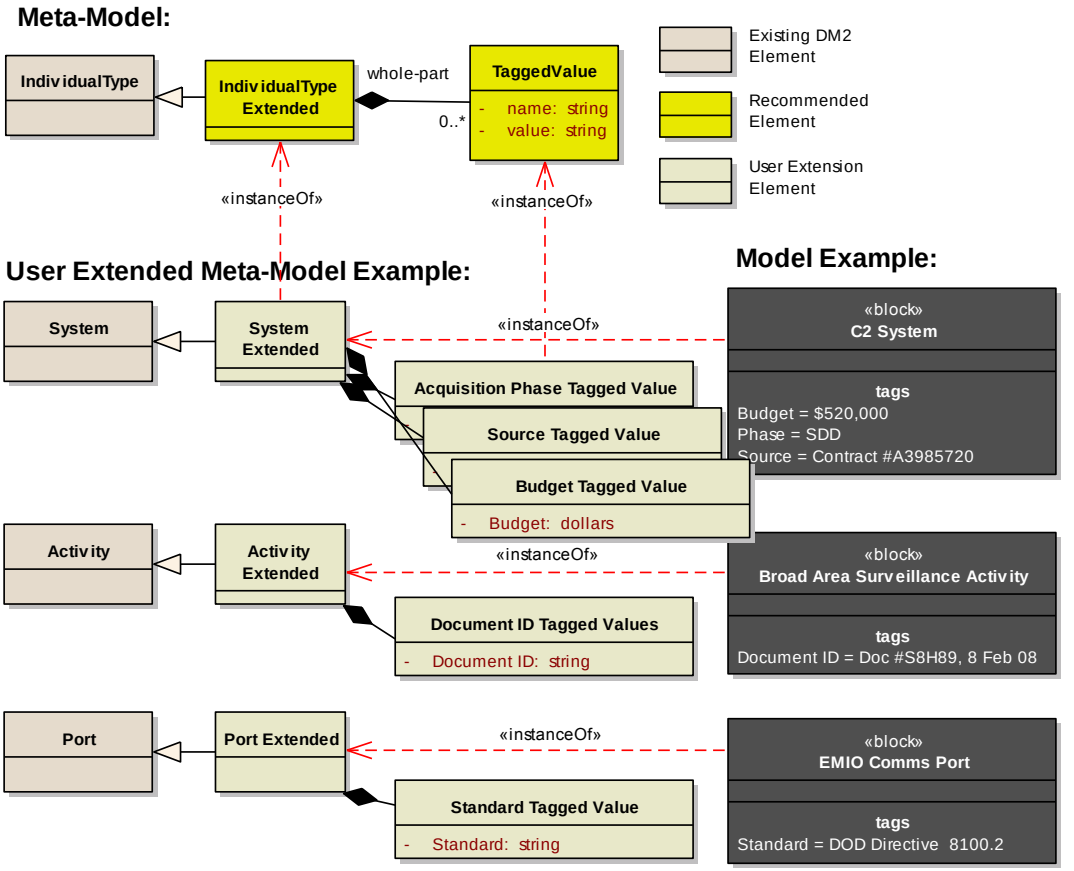
Model Example (symbology):



Recommendations

Auto-generation of systems engineering artifacts

- Extend meta-model with user-definable extensions (tagging) …

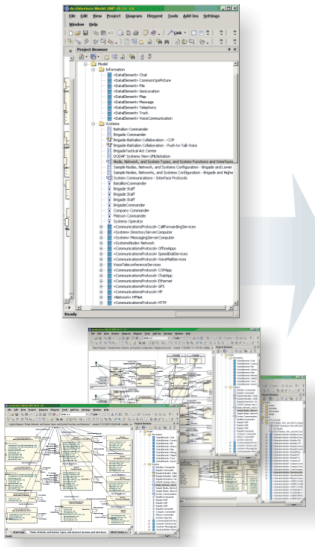


Recommendations

Auto-generation of systems engineering artifacts (cont'd)

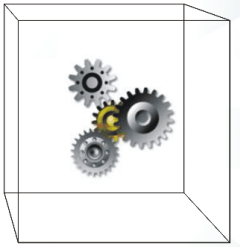
- Establish standard model reporting capability

Detailed Architecture Model with Custom Meta-model Extension Information

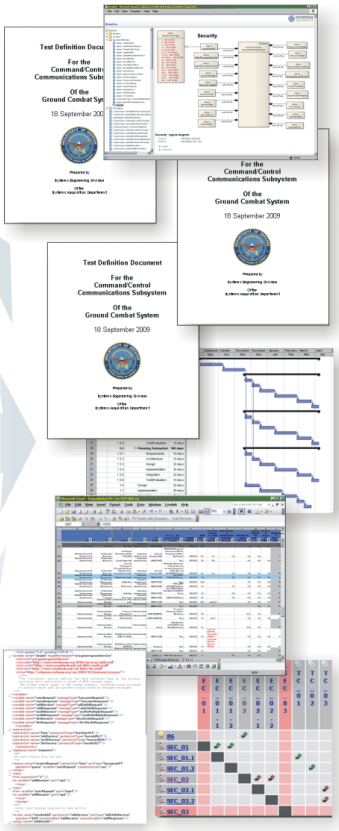


Standard Model XML

Standard Reporting & Scripting Tools



Artifacts



- Web-Based Model Views
- Interface Specifications
- Architecture Descriptions
- Test Procedures
- Acquisition & Program Plans
- Architecture Metrics
- Requirements Trace Matrices
- Business Process Automation Scripts

Summary

In summary…

DoDAF v2 improves on satisfaction of SE needs, but systems engineers need greater definition and standardization of semantics and methods that are important to them.

Comments, questions, feedback are solicited. Contact…

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