Integration of ArchiMate and UML

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What is UML?

- The Unified Modeling Language (UML®) is a visual language for specifying, constructing, and documenting the artifacts of systems
  - most widely used modeling notation in software industry
  - an Object Management Group (OMG) standard
  - covering system requirements, application architecture, software and infrastructure design, and deployment models
Diagrams in UML

• Part I – Structural Diagrams: to define static architecture, consisting of static constructs such as classes, objects, and components

• Part II – Behavioral Diagrams: to represent dynamic architecture, comprising behavioral constructs such as activities, states, timelines and the messages exchanged.

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Diagrams in UML

Diagram
  ▲
  Structure Diagram
    ○ Class Diagram
    ○ Component Diagram
    ○ Object Diagram
      ▲ Composite Structure Diagram
      ▲ Deployment Diagram
      ▲ Package Diagram
  ▲ Behaviour Diagram
    ○ Activity Diagram
    ○ Use Case Diagram
    ○ State Machine Diagram
      ▲ Interaction Diagram
        ▲ Sequence Diagram
        ▲ Interaction Overview Diagram
          ▲ Communication Diagram
          ▲ Timing Diagram

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Some examples...
Benefits of ArchiMate-UML Integration

• Provide a common, shared understanding and communication medium to describe how the organization will pursue an initiative to develop capabilities
• Create different, unique viewpoints for each stakeholder that correspond to their own concerns with regard to supporting the initiative
• Ensure that the solution architecture can be traced to the enterprise architecture and create reuse opportunities for enterprise artifacts and patterns
• Verify that changes to the enterprise architecture can be formally traced to the solution design that implements it
• Define a standard means for organizations to communicate with other external groups to improve collaboration

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Scope of ArchiMate and UML

- Information
- Behaviour
- Structure
- Motivation

Enterprise Architecture
Solution Architecture
Solution Design

ArchiMate
UML

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Positioning of UML Diagrams in the ArchiMate Framework

<table>
<thead>
<tr>
<th>Passive Structure</th>
<th>Behaviour</th>
<th>Active Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td>Use case diagram</td>
<td>Component diagram</td>
</tr>
<tr>
<td>Application</td>
<td>Sequence / Communication diagram</td>
<td>Activity diagram</td>
</tr>
<tr>
<td>Technology</td>
<td>State machine diagram</td>
<td>Deployment diagram</td>
</tr>
</tbody>
</table>

Class diagram
Object diagram
Timing diagram

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Informal Integration
Formal Integration

- Definition of a UML profile for ArchiMate concepts
  - Stereotyping of UML concepts and relationships to represent ArchiMate concepts and relationships
- Definition of a formal transformation
  - Unidirectional or bidirectional mappings between concepts and relationships in the two languages

This integration is currently investigated by a working group within The Open Group
Example of a UML Profile for ArchiMate

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Archimate concepts Inspired on UML

Archimate

Application interface

Application component

UML

Provided Interface 1

Provided Interface 2

Component 1

Required Interface 1

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Other Examples of Possible Mappings

ArchiMate

UML

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• Different tool vendors may support relating ArchiMate and UML in various ways

• Example BiZZdesign: explicit relations between ArchiMate concepts and UML concepts
  – Business Object can be refined into a UML class
Conclusions

• UML encourages modellers to express technical details, which are irrelevant in an enterprise architecture
• ArchiMate models hide the technical details
• ArchiMate focuses on enterprise architecture, while UML focuses on solution architecture and design
• ArchiMate and UML can be used in combination:
  – ArchiMate concepts at the lower levels of decomposition map onto UML concepts at the higher levels of decomposition
  – ArchiMate as an “umbrella language”: an ArchiMate model expresses the relationships between the various UML diagrams
  – The UML diagram types cover most of the “cells” of the ArchiMate framework

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