# SAE Architecture Analysis & Design Language (AADL)

## Fact Sheet

**What it is**

The SAE AADL is an international standard for predictable model-based engineering of real-time and embedded computer systems.

Intended fields of application are automotive systems, avionics and space applications, medical devices, and industrial process control equipment.

The SAE AADL international standard consists of

- a textual and graphical language with precise execution semantics for modeling the architecture of embedded software systems and their target platforms
- an XML/XMI interchange format to support AADL model delivery between contractors and interoperability with commercial and in-house tools
- a UML 2.0 profile for AADL that adds real-time embedded systems semantics of AADL to UML
- an Error Model annex as a standardized AADL extension to support fault/reliability modeling and hazard analysis

  **For more information about AADL and its use, please go to http://www.aadl.info.**

**What AADL can do**

- Represent embedded systems as component-based system architecture
- Model component interactions as flows, service calls, and shared access
- Model task execution and communication with precise timing semantics
- Model execution platform and specify application binding
- Represent operational modes and fault tolerant configurations
- Support component evolution and large-scale development
- Accommodate analyses such as reliability and safety criticality through extensions

**What are the benefits**

- Prediction and validation of runtime characteristics such as availability, timeliness, security
- Validated system architectures and implementations
- Improved development process through a single annotated architecture model
- AADL as part of a model-based engineering enterprise solution
- AADL models as deliverables and subcontractor management
- Interoperability and integration of commercial and in-house tools

**Who will benefit**

- Software systems engineers responsible for architecting and integrating embedded and real-time software systems on their target platforms
- Program managers responsible for successful development and maintenance of large-scale performance-critical systems
- Commercial tool vendors and engineering firms interested in providing design, analysis, and generation solutions to the embedded computing systems community
- Researchers in academia, industry, and government looking for an architecture research platform with a direct link to the practitioner community

**Tool support strategy**

Open Source AADL Tool Environment (OSATE)

- Eclipse-based low entry-cost open source solution
- Integrated with open source European TOPCASED tool initiative
- Extensible AADL front end with XML generation
- Vehicle for in-house prototyping and research
- Jumpstart for STTR, SBIR, and commercial tool projects

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| **Tool support strategy** *Continued* | Emerging tool market<br><br>• Extend existing commercial tools with AADL (HOOD/STOOD by Ellidiss)<br>• Support UML profile of AADL in commercial toolset (ILogix, Rational, Artisan)<br>• Interface AADL models with research tools (U. Penn, U. Brest, ENST, CMU)<br>• Interoperate with in-house and commercial tools (Rockwell-Collins, Honeywell) |
| **Who is involved in the AS-2C (AADL) Subcommittee** | Bruce Lewis (U.S. Army AMRDEC): Chair of subcommittee<br>Peter Feiler (SEI): technical lead, author and co-editor AADL language, XML/XMI<br>Steve Vestal (Honeywell): co-author of AADL language, author of Error Model Annex<br>Ed Colbert (USC): author of UML Profile of AADL<br>Joyce Tokar (Pyrrhus Software): co-editor of AADL language, author of Ada and C Implementation Annex<br><br>*Other Voting Members and Users*<br>Rockwell-Collins, Lockheed Martin, Smith Industries, General Dynamics, Airbus, Axlog, European Space Agency, Ellidiss, Dassault, EADS, ENST, Eaton, Ford, Toyota, U. Penn, Boeing, Raytheon<br><br>*Coordination with*<br>NATO Aviation, French Government COTRE, European Commission ASSERT consortium, TOPCASED initiative, SAE AS-1 Weapons Plug and Play, OMG MARTE, ITEA SPICES Initiative, ARINC653, ARIST2 Network of Excellence |
| **Who is using AADL** | Performance studies: Honeywell, Rockwell-Collins<br>Safety/reliability studies: Honeywell, LAAS, Embry-Riddle U.<br>Reference architecture modeling: EADS, General Dynamics<br>Validated system families: Honeywell, Airbus, European Space Agency, Axlog<br>Tool environment investment: Honeywell, Airbus, TNI, Rockwell-Collins<br>Classroom use: Embry-Riddle U., MIT, Clemson U., USC |
| **What is next for the AADL Standard** | • A standard partitioning and layering annex to support partitioned and reference architectures<br>• A standard behavior and contract annex to support behavior validation<br>• Improvements to the AADL language based on user feedback<br><br>For more information on the SAE AS-2C (AADL) Subcommittee, contact<br>Bruce Lewis, U.S. Army AMRDEC, Huntsville, 256-876-3224, bruce.a.lewis@us.army.mil |
| **More Information** | For more information about the SAE AADL Standard and the Open Source AADL Tool Environment:<br>http://www.aadl.info<br><br>To purchase the SAE AADL Standard (SAE AS-5506):<br>1-877-606-7323 (U.S.A. and Canada)<br>1-724-776-4970<br>http://store.sae.org<br>customerservice@sae.org |