

SAE Architecture Analysis and Design Language

AS-2C AADL Subcommittee Meeting

June 24-27, 2019

Paris, France

Upcoming **SAE/AADL** Meetings

Fall 2019 -

Need to work around the NDIA Conference, Systems and Mission Engineering conference in Tampa, Oct 21-24 .

Oct 28-31 DC alt (14-17 Oct)

Could we have another Demo Day for the DC area or Dayton Area?

Could we adopt a common Architecture to demo – Crazy Fly?

Winter 2020

European Real Time Systems Conference – Jan 29-31, 2020 Toulouse

We meet the same week for first 3 days. Jan 27-29, in Toulouse

Spring 2020 - Minneapolis (U Minn) or Pittsburgh (SEI)

Summer 2020 – June in Europe ... ESA, Nice, Brest, Conference, ?

Fall 2020 – Huntsville with Demo Day

Last Demo Day was a big success – but took lots of organization with UAH. DC and Dayton requests. 100 people, many potential customers. 10+ tools demonstrated.

AS5506 AADL Standard Published

- SAE standard AS5506 Architecture Analysis & Design Language published.
 - **Nov, 2004.**
 - **Jan, 2009 .** V2.0 Published w Graphics Annex
<http://www.sae.org/technical/standards/AS5506A>
 - SAE V2.1 AS5506B, Published, **Sept 2012**
 - SAE V2.2 AS5506C, Ballot completed, Published **Jan 21, 2017**
- SAE Annexes AS5506/1, **June 2006.** Includes Annexes for Graphics, Ada & C Programming Guidelines, Error Modeling, Meta Model
- SAE Annexes AS5506/2, **January 2011.** Includes:
 - Behavior Annex, Data Annex, ARINC 653 Annex.
 - SAE 5 year review, Need to select a status,
<https://www.sae.org/standards/development/definitions/>
 - Data Annex has not been updated, 653 and Behavior have. To be revised after V3
- AS5506/1A, Published, **Sept 2015** – Annex A: ARINC653 Annex, Annex C: Code Generation Annex, Annex E: Error Model Annex
- AS5506/3 - Behavior Annex, published **Aug 2017**
- **AS5506/4 - FACE Annex - Approved and in Council Ballot, to be published July 2019**

AS5506 AADL Roadmap

- **Need Editor for bundled Annexes.** Take the most current of each and create one document, /1B. Take /1A, add /3 and /4 plus Data and Graphics. Will make standard more affordable, Core plus Annexes documents. Or need to drop what has been replaced from each volume.
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- Update AADL Core to V3.0 AS5506D - Upward compatibility needed with translator, if downward compatibility possible, should consider. Needs to be stable as well with translator from 2.2, both maintained for a while. [Apr 2020](#)
- ARINC 653 Annex, will depend on AADL V3 multi-core, 7
- Data Annex is waiting for AADL V3, 8, depends on units,
- Code Generation Annex after AADL V3, depends on runtime also, would be 9
- Updated EMV3 with integration with Behavior Annex (cross dependency)
- [Upgrade to runtime services now, is that against 2.2 creating 2.3 or 3.0?](#)
- Formal Behavior – update to /3, would it be 3A
- [AADL Workflow Guidance Document \(include SysML high level\). Need volunteer, start is Jerome's presentation for this meeting/conference. Adventium working on SysML MagicDraw to AADL for analysis subset.](#)

AADL Working Groups

- **Requirements Annex to become Assurance Annex (50% ?)** => Peter has textual and assurance case capability in OSATE, planning to combine with Requirements Annex. **Post V3.**
- **Constraints (Analysis) Annex (50% ?) - (Open Lead)** First draft provided but not enough consensus to carry forward. Includes OSATE compatible toolset to specify.
- **Behavior Annex Updates (Etienne, Pierre D, Jean Pierre, Brian Larson).** Completed. Next phase w formal annotations (behavior constraints) sub annex. (EB, JP, BL) **after study of runtime services.**
- **Network Annex – (90%)(Alexey ...).** **Should/could have general section for network properties?.**
- **ARINC 653 Update to new ARINC for Multi-Core with Part 2 and 4.** Update when multi-core expression standard ready as part of V3. Steve Vestal, Alexey?
- **Data Annex (95%) and Code Generation Annex (Jerome)** => Some work on Data annex and experiments with code generator needed to finalize. Reviewing runtime services this meeting and current issues.
- **Security Annex (60%)– Dave Gluch .**

AADL Annexes Being Developed and Brought to Committee

- Some annexes should be published, some will be developer provided and widely used without publication as part of the standard.
- **Jerome suggested other AIRs.** Safety AIR 4754 and 4761, integration with system engineering. AIR by S18 AADL equivalent. Paper by SEI on safety could be converted to an AIR. **Guidance for SysML/AADL Integrated Use.**
- Hybrid Annex – On hold as we consider need. Need the interface from world to system. Interface to Modelica. Brendan and Brian discussing. May be better to have something like the code generation annex. Ties to time domain.
- STPA and AADL – tremendous opportunity from EMV up and down abstraction levels. Related to Security annex. **Could be an AIR, who would lead?**
- Exploring FMI wrapper for AADL. OCARINA will have an FMI export. Adds an additional cyber-physical analysis approach. **May lead to annex or AIR.** FMI also being worked by Ellidiss. Jerome Hugues.
- **Ramifications of simplified metamodel – Where do we capture in a formal sense the information in the current meta-model for tools processing AADL specifications. Example – new SysML toolset wants to transform to AADL and verify correctness of containment and use of features in OCL.**

Tutorials for User Support

- Tutorials to date: BLESS (Fort Lauderdale), STOOD (Orlando), Paris (ASIIST), Toulouse (Compass), Toulouse (TASTE), Minneapolis (FUSED), Valencia (RDALITE), Jacksonville (BLESS Isolette), Montreal (MASIW), Santa Barbara (AADL Inspector 1.3), Orlando (OSATE Safety), Valencia (TASTE), San Diego 1&2 (no tutorial), Madrid (MASIW), Seattle (used for V3 discussion), Toulouse (No tutorial), Germany (MILS w std AADL or ?), Pittsburgh (will be the two day workshop), Toulouse (ALISA), Atlanta (OCARINA), Fort Worth (attend conference), Pittsburgh (Adventium tools) London (RAMSES), Huntsville (Tool Expo), Multi-Paradigm Modeling (Paris) *So many possible, may need workshop.*

Potential for future meetings:

- SysML, FACE, SCADE Integration w AADL ANSYS
- [Adventium FASTAR or TradeSpace or MILS or ... tools](#)
- MASIW
- TASTE
- [Next Tools workshop? Who would organize? \(94 acceptances for Tool Expo\). ESAC?](#)

International Joint Research

Suggestions:

- Seamless refinement from SysML requirements/functions/behavior.
- Tool Certification related
- Analysis compliant code generation
- Multi-core

Planning for Oct 2019

- Possible User ½ Day

- Trade-Space Adventium (30min)
- Space Robotics (Jerome)
- ...
- ...
- Total 1.0 hours

Standardization

- News (30m)
- Next Meeting Planning and action items (30m)
- **AADL V3.0** topics PF (11 hr)
- Errata Core plus Error Annex PF (1)
- **Runtime Services** JH, EB, JH, BL (2)
- BA Errata PD, EB, JP, BRL (30m)
- Security Annex Draft (DG) (1.5)
- Informal review of V3 Documents (2)
- Total 19 hours
- Tutorial Workshop FASTAR(?) (3.0)

AADL Tool Integrations – All - [Update Wiki](#)

Frank Singhoff - AADL/Cheddar – through Ellidiss, TASTE, and OCARINA

Jose Mesquer - AADL/MAUDE –

Jean Pierre Talpin/Brian Larson - AADL/Polychrony/Signal with BLESS

Pierre Dissaux - Ellidiss - AADL/Domain System Engineering - Graphical STOOD, Adele, GLASSES, Analysis AADL Inspector, Simulator, Behavior Annex, Error Annex, Requirements Annex.

AADL/Real, Lute, Agree – Integrated into OSATE

Brian Larson - AADL/BLESS

Etienne Borde - AADL/Behavior Annex, RAMSES

Peter Feiler, Julien - AADL/SAVI – Updated for V2, extended, new analyses for Safety (FHA, FMEA, Reliability, FTA, Prism) , Simulink to AADL and reverse.

Jerome Hugues - AADL/Mast/Cheddar/FMI ... as part of OCARINA Generator

Alexey Khoroshilov- AADL/MASIW – Modular Avionics System Integrator Workplace, plus verification tools.

Rockwell Collins – SysML to AADL, Lute, Agree, Resolute, Spear, QuasiSyn...

ESA – TASTE, COMPASS (upgraded to use standard AADL)

D-MILS – Security and Safety with compositional verification and system synthesis

WWT – Editor and analysis tools

SCADE – has added AADL, [released commercial version Jan 2018](#)

Dassault Systems – [Translator to AADL, Integration with AADL Inspector](#)

Actions

Action	Date	Lead	OK
Denis to provide Peter with default semantics for ports in ARINC653, related to a more abstract port	1/18	DB	
Jerome to send Peter FMI description language for continuous and discrete ports when available mid 2018.	1/18	JH	
Network Annex using Data volume but should we use data rate unit type? Peter will supply recommendation to Alexey	1/18	PF	
Alexey to email Steve Vestal to get needed definition for Max_Supported_VLS.	1/18	AK	x
Alexey to contact Eric Jenn to see if he needs TTE example but we have the properties defined now.	1/18	AK	na
V3 Configuration Parameter Match and Replace, Denis to provide example patterns to Peter	1/18	DB	
AADL Core Errata – Peter will contact Steve Vestal to understand purpose of priority extension request.	1/18	PF	x

Actions

Action	Date	Lead	OK
AADL Code Gen Annex questions – RTS to make type safe, report error types, send output detection, periodic dispatch management. Jerome will coordinate with Mike, Etienne, Brian	1/18	JH	x
Jerome to discuss new concepts in ARINC 653 related to Binding	5/18	JH	
Etienne to discuss ARINC 653 related to managing errors/recovery points	5/18	EB	
Confirm June 10-13 for next meeting	11/18	DB	x
Generate UUID from AADL to FACE in Annex	11/18	TS	x
Next Meeting discuss V3 flows	11/18	PF	x
Next meeting Set up day for tool demonstrations	11/18	BL	x

Actions

Action	Date	Lead	OK
Do we need to use BA in Security Annex for state machine for control of Key	11/18	DG	
Produce draft document for Security Annex	11/18	DG	
Session on SysML/AADL Guidance for next meeting	11/18	BL, TL, JH	x
Develop concept for safety layer on Network, coordinate with Mirko	11/18	BH	
Simplifications for OSATE that would allow it to run stand alone.	11/18	DB, LW	
ANT tasks for the workflow language of ParisTech	11/18	DB, TS	
Need Errata for Code Generation Annex, it's out of date, example subprogram parameters rather than input port	11/18	JH	

Actions

Action	Date	Lead	OK
Send draft FACE annex to Kyle, Kevin, Arron, John	02/19	BL	x
An integrated Test bench with AADL, FMI, and Modelica, send info	02/19	DB, JH	
Update AADL webpage, at SEI in progress	02/19	PF	
API for instance model being developed by SEI	02/19	PF	
Asymmetrical feature group support in V3?	02/19	PF	
Issues found in Modes related to Robotics project, provide	02/19	JH	
Brian will provide Peter with a product line version of MetaH	02/19	BLarson	

Actions

Action	Date	Lead	OK
Dave Gluch will get MILS tool to review relative to Sec Annex	02/19	DG	
Send Peter ideas related to functions, Physical features (like propagation port, abstract port) that can support what we need to integrate with physical modeling.	06/19	John Hatcliff, Larson, Jer Hugues	
Peter, verify real-time messaging semantics preserved with simplified Event port, read write semantics.	06/19	PF	
	06/19		
	06/19		
	06/19		
	06/19		