SAE AADL & OSATE as Industrial Prototyping and Research Transition Platform for Architecture-Centric Engineering

By Peter H. Feiler
Software Engineering Institute
Carnegie Mellon University
phf@sei.cmu.edu
Sept 2009

Introduction

Note to the reader: My apology to any misrepresentation and anyone's work I missed. I know the historical roots, the summary of initiatives, and the list of publications is not complete and ask for your help update the document. I am also looking for ideas on how to better structure the body of work with AADL by the community. My plan is to make this material available in a public report.

This note discusses the impact the SAE Architecture Analysis & Design Language (AADL) and the Open Source AADL Tool Environment (OSATE) have had in the US., Europe, and Japan in improving the engineering practice for large-scale software-intensive embedded systems. First, we discuss the historical roots of AADL and provide a short summary of the language and the standard suite. Then, I summarize various large-scale collaborative industry/university initiatives that have leveraged AADL as a key technology in their efforts in improving architecture-centric model-based (embedded) software-intensive system validation. Then I outline some reasons for why AADL has been an effective research transition enabler. Then I list papers published in refereed conferences and journals on the use of formal specification frameworks to capture and validate the semantics of AADL, on the integration of various analytical frameworks into AADL, and on the use of the AADL in pilot projects in a range of domains. These references are papers published by SEI members, by external teams the SEI had interacted with, and by teams that have used this technology independently.

Historical Roots of AADL in DARPA Funded Research

AADL has its roots in DARPA funded research in architecture languages. Its direct ancestor is MetaH [Vestal], which was developed in the 1990s by Vestal Honeywell Technology Center under DARPA funding and first applied in 1994 to an Army missile guidance system (AMCOM SED) [Lewis]. Other early experiments with MetaH included Hybrid automata formal verification of the MetaH code generator (AFOSR, Honeywell), Missile defense application (Boeing), Fighter guidance SW fault tolerance (DARPA, CMU/SEI, Lockheed-Martin), Incremental Upgrade of Legacy Systems (AFRL, Boeing, Honeywell), Comanche study (AMCOM, Comanche PO, Boeing, Honeywell), Tactical Mobile Robotics (DARPA, Honeywell, Georgia Tech), Advanced Intercept Technology CWE (BMDO, MaxTech), Adaptive Computer Systems (DARPA, Honeywell), Avionics System Performance Management (AFRL, Honeywell), Ada Software Integrated development/Verification (AFRL, Honeywell), FMS reference architecture (Honeywell), JSF vehicle control (Honeywell), IFMU reengineering (Honeywell).

AADL also incorporates elements of ACME developed by Garlan et.al. [CMU-ACME] under DARPA funding based in insights gained when creating an ACME style of MetaH and experimenting with extending the language [FeilerSEI], integrating analyses along several dimensions [CMU-SEI-JunLiThesis], and porting a prototype implementation of an auto-pilot managed by a Simplex to provide dependable upgrade of embedded systems into MetaH as part of the INSERT project funded by DARPA EDCS [INSERT-CMU-SEI-LM] – demonstrating both implementations at the DARPA demo days in 1998 [EDCSDemoACMSigSoftSENotesJan2000]. In the late 1990sVestal validated the MetaH code generator using a hybrid automata specification of task execution and extended MetaH with an error modeling capability [MetaHUser] – the basis for the AADL Error Model Annex standard.

In the Fall of 1999 Bruce Lewis (US Army AMRDEC) started the SAE AADL committee. In the first year a requirements document for the standard was developed and approved by representatives from 10 Aerospace companies [SAE ARD 5296]. Peter Feiler teamed with Steven Vestal to create a first draft AADL document using MetaH as a starting point in 2000/2001 [copy of V0.2 available upon request for history buffs]. In 2002 two European groups – one led by the European Space Agency (ESA) and the other (COTRE) led by Airbus - had completed studies that identified the then draft AADL as a strong candidate technology for their future work and joined the committee to make it a reality. The language was initially called Avionics Architecture Description Language, but in early 2003 was changed to its current name to reflect the fact the language is not Avionics specific, retaining its initials.

Under the technical leadership of Peter Feiler the first version of the AADL standard document was approved in 2004 by 23 organizations from the US and Europe and published in Nov 2004. The first implementation of OSATE became publically available in Dec 2004 and was stress tested with a 40,000 line AADL by Rockwell Collins [Statezni]. The first collection of annex documents was approved and published in June 2006. It included Based on feedback from the user community of AADL the committee made improvements to the language – with the revised version of approved in late 2008 by 30 voting organizations and published in Jan 2009.

The AADL standard suite consists of:

- The core language standard (originally published in Nov 2004, revised V2 published Jan 2009) led by Peter Feiler (SEI).
- The AADL Meta model and XML/XMI Interchange Format Annex standard (2006, revised 2009) led by Peter Feiler (SEI).
- Language Compliance and Application Program Interface Annex standard (2006) led by Joyce Tokar (Pyrrhus Software).
- The Error Model Annex standard for modeling fault behavior and propagation (2006, in revision 2009-2010) led by Steven Vestal (Honeywell).
- Data Modeling Annex standard for representing data model information (2009 – in ballot) led by Jerome Hugues (Telecom ParisTech).
- Behavior Annex standard (2009 – in ballot) initially led by Mamoun Filali (IRIT), continued by Pierre Dissaux (ElliDiss).
- Draft UML profile of AADL (made available to the OMG MARTE team) led by Ed Colbert (USC).

- AADL UML profile as OMG MARTE subprofile (Appendix in MARTE document, in revision for AADL V2) led by Madeleine Faugere (Thales).
- AADL ARINC 653 Annex standard (in review) led by Julien Delange (Telecom ParisTech).

In April 2004 the OMG MARTE (then RFP) lead (Laurent Rioux) came to the SAE AADL Committee to explore collaboration to leverage the Meta model and semantics of the AADL standard as it provided a strong foundation for MARTE. The draft UML profile for AADL was made available to the OMG MARTE team and it was agreed that a standard UML profile for AADL would become available through MARTE, avoiding a competitive situation.

Similarly, in Dec 2008 an active dialog was started by Feiler as technical lead of AADL and Sanford Friedenthal as technical lead of SysML on establishing a common understanding of the relationship of the two architecture modeling notations. It has now evolved into a three-way dialog between SysML (Friedenthal), AADL (Feiler), and MARTE (Gerard) with interactive sessions at various venues.

Tool support is available in form of the Open Source AADL Tool Environment (OSATE) developed by SEI, a commercial tool suite (STOOD) supporting the full life cycle including AADL (originally developed for HOOD-RT and used by the European Space Agency (ESA) and Airbus, and with the UML profile graphical model creation through UML tools. As is partially evident from the list of references many analysis and code generation tools have been integrated with AADL.

The Architecture Analysis & Design Language

SAE AADL is a modeling notation with well-defined semantics for representing the architecture of large-scale software-intensive embedded systems and systems of systems, such as aircraft, spacecraft, motorized vehicles, autonomous systems, and medical devices. For example, a hybrid automats specification of thread execution in the standard document provides an unambiguous interpretation of expected runtime behavior. The standard includes a standardized XML interchange format based on a Meta model specification of AADL to facilitate model interchange and integration of analytical models and supporting tools.

To promote pilot projects in industry and at research institutions the Software Engineering Institute (SEI) has made available the Open Source AADL Tool Environment (OSATE) on top of Eclipse. It utilizes the Eclipse Modeling Framework (EMF) and has been integrated into the open source TOPCASED tool framework developed by European industry.

SAE AADL and the Open Source AADL Tool Environment have become a platform for industrial pilot projects and for university research. Companies have investigated the feasibility of representing and analyzing real systems in an architecture modeling language (proof-of-concept) and do so using an annotated architecture model to auto-generate analytical models through model transformation. Researchers have been attracted to AADL for its well-defined semantics to map their more formal specification and analysis framework into, and to make their results quickly accessible to industry.

Industry Initiatives Utilizing SAE AADL
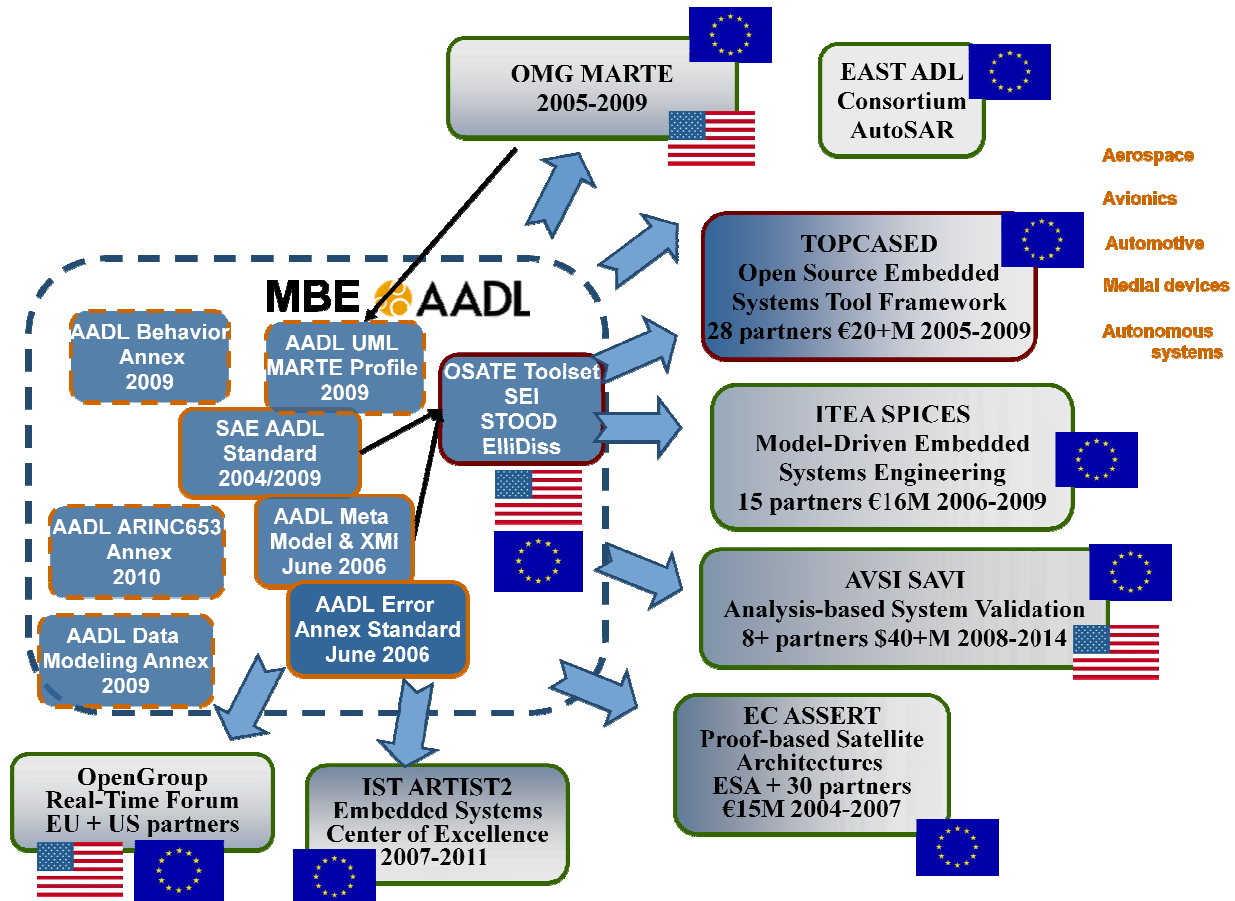
A number of industry initiatives have used AADL as key technology:

- ESA ASSERT (2004-2008): funded by the European Commission with 30 partners to pilot the development of the satellite system families with validated architectures through proof-based techniques.
- TOPCASED (2005-2009): industry initiative led by Airbus (28 partners) to build an open source industrial tool infrastructure for model-based engineering of embedded systems.
- ITEA SPICES (2006-2009): European industry/research initiative (15 partners) to put in place a model-based engineering method incorporating CCM, AADL, and SystemC,, covering both analysis and generation, as well as application to six different application domains.
- Aerospace Vehicle Systems Institute (AVSI) System Architecture Virtual Integration (SAVI) initiative with members including Boeing, Lockheed Martin, Airbus, Rollwell Collins, Honeywell, BAE Systems, GE Aviation, FAA, DoD, and SEI. Objective is to put in place a

model-based architecture-centric virtual integration focused practice for the next generation of aircraft. AADL was chosen as technology for the initial Proof Of Concept phase. This phase included the definition of a to-be acquisition process, an ROI study, and a proof of concept demonstration. The demonstration covered the creation and analysis of an aircraft model, (Tier 1), refined into an Integrated Modular Avionics (IMA) Tier 2 model, subcontracted subsystems to suppliers with AADL-based subsystem contract negotiation and validation after suppliers refine subsystems to a task-level runtime architecture and populate it with source code.

- Other industry activities include collaboration with OMG MARTE and OMG SysML towards a common industry standardization strategy for architecture-centric engineering of systems, ARTIST2 to engage the research community, and Open Group to promote the model-based engineering approach in industry.

AADL as Research Transition Enablers

Key elements that contribute to AADL as a research transition platform are well-defined semantics, a standardized Meta model and XML-based interchange format, and the ability to extend the core language with annotations relevant to different analyses. The generation of analytical models consistent with the architecture addresses the problem of multiple truths that are encountered when those models are constructed by separate teams at different times in the development and become inconsistent with the architecture and each other.

The AADL standard document includes a description of the language semantics including a hybrid automata specification of thread execution semantics. An architecture enables the development of different analysis algorithms that interpret the model in the same way. For instance, the flow latency analysis in OSATE uses the timing semantics of the delay communication connections of AADL to calculate the worst-case transmission delay by adding an full period. On the other hand, the replication verification analysis for replication architecture uses the same fact to identify an out-of-sync mode transition.

The shared semantics established by the AADL standard has created two positive reinforcing trends in the community. On the one hand, researchers observe that their contribution has a stronger impact when their results can be combined with others in a cumulative fashion with the research from others from the same model. On the other hand, the industry is obviously enthusiastic to see that they do not need to develop different models for the different analysis they want to perform - saving them time but more importantly saving them additional validation steps to ensure consistency between models and avoid the multiple truth problem.
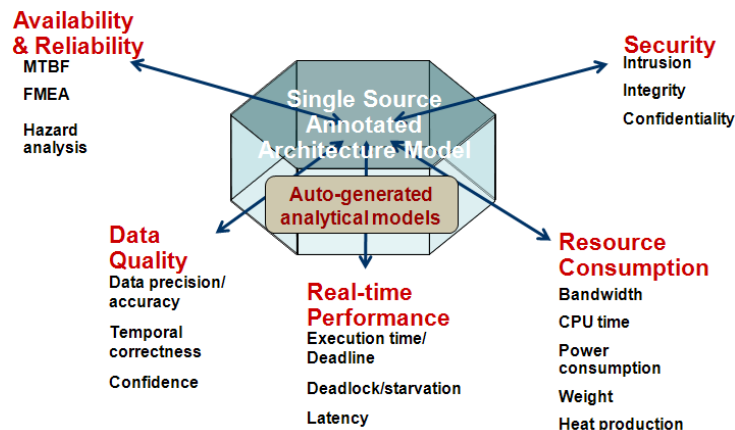
The standardized Meta model & XML representation as well as the extensibility of the core AADL language facilitate a single model source approach to architecture-centric engineering, in which analytical models for multiple dimensions of operational quality attributes are generated automatically by transformation. The figure below shows five such dimensions, for which the feasibility of this approach was demonstrated with the OSATE environment as provided by the SEI. The community has embraced the architecture-centric engineering approach and has piloted it, added analytical models and additional quality dimensions as is evidenced in the papers below.

SEI AADL/MBE Team Authored Conference & Journal Papers

The SEI has published a series of technical reports, offers a course on AADL & Model-based engineering, and is in the process of publishing a book on AADL. The SEI also maintains the website www.aadl.info.

This first list of papers reflect work by members of the SEI team on architecture-centric model-based engineering with AADL. The list is organized in reverse chronological order. It covers work on understanding the root causes of system-level problems discovered late in the process, on pilots in application of AADL to discover such problems early in the process, on incorporating different quality dimensions including security, latency, resource allocation & scheduling, validation of concurrency and redundancy logic through model checking, fault modeling and reliability analysis, use of AADL in the context of aspect-oriented engineering and executable UML, predictive analysis of sensor net applications, and architecture-centric validation of a space system reference architecture.

1. Peter H. Feiler, "Challenges in Validating Safety-Critical Embedded Systems", Proceedings of SAE International AeroTech Congress, Nov 2009.
2. Jörgen Hansson, Bruce Lewis, Jérôme Hugues, Lutz Wrage, Peter H. Feiler, and John Morley, "Model-Based Verification of Security and Non-Functional Behavior using AADL", IEEE Journal on Security and Privacy, 2009.
3. Peter H. Feiler, "Modeling the Implementation of State-Based System Architectures", Proceedings of 14th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS09), UML&AADL Workshop, June 2009.
4. Dio De Niz, Peter H. Feiler, "Verification of Replication Architectures in AADL", Proceedings of 14th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS09), UML&AADL Workshop, June 2009.

5. Julien DeLange, Laurent Pautet, and Peter Feiler, "Validating safety and security requirements for partitioned architectures", Proceedings 14th International Conference on Reliable Software Technologies (RTS2009) - Ada Europe, June 2009.

6. Feiler P., Gluch D., Weiss K., Woodham K., "Model-Based Software Quality Assurance with the Architecture Analysis and Design Language", Proceedings of AIAA Infotech @Aerospace 2009 (April 2009).

7. Lewis B., Feiler P. « Multi-Dimensional Model Based Engineering for Performance Critical Computer Systems Using the AADL", Revue de l'Electricite et de l'Electronique (REE) Special Issue, Mar 2009.

8. Rugina A.(EADS Astrium), Feiler P., Kanoun K.(LAAS), Kaaniche M.(LAAS), "Modélisation de la sûreté de fonctionnement avec AADL– un langage standardize de description d'architectures", Revue de l'Electricite et de l'Electronique (REE) Special Issue Mar 2009.

9. Lydia Michotte, Peter Feiler, Robert France, Thomas Vergnaud, "Aspect Oriented Modeling of Component Architectures Using AADL", Proceedings of Second International Conference on New Technologies, Mobility and Security, Nov 2008.

10. J. Hansson, P. Feiler, J. Morley, "Building Secure Systems using Model-Based Engineering and Architectural Models", CrossTalk 2008.

11. Lewis, B. and Feiler, P. 2008. Multi-dimensional Model Based Engineering Using AADL. In *Proceedings of the 2008 the 19th IEEE/IFIP international Symposium on Rapid System Prototyping.*

12. John J. Hudak, Lutz Wrage, Jörgen Hansson "Analyzable Architectural Models of Service-Based Embedded Systems", DSN 2008.

13. de Niz, Dionisio, "Architectural Concurrency Equivalence with Chaotic Models". Budapest, Hungary : 2008. International Workshop on Model-Based Methodologies for Pervasive and Embedded Software (MOMPES 2008). Vol. 2008.

14. Dio Deniz, Peter Feiler, "On Resource Allocation in Architectural Models", Proceedings of the 11th IEEE International Symposium on Object/service-oriented Real-time distributed Computing, May 2008.

15. Lewis, B., Feiler, P., "Multi-dimensional Model Based Engineering Using AADL", The 19th IEEE/IFIP International Symposium on Rapid System Prototyping, 2008. RSP '08.

16. Peter H. Feiler, "Efficient Embedded Runtime Systems through Port Communication Optimization", Proceedings of 13th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS08), UML&AADL Workshop, April 2008.

17. Peter H. Feiler, Jörgen Hansson, "Impact of Runtime Architectures on Control System Stability", Proceedings of 4th International Congress on Embedded Real-Time Systems, Jan 2008.

18. Jörgen Hansson, Peter H. Feiler, A. Greenhouse, "Enforcement of Quality Attributes for Net-centric Systems through Modeling and Validation with Architecture Description Languages", Proceedings of 4th International Congress on Embedded Real-Time Systems, Jan 2008.

19. Bruce A. Lewis, Peter H. Feiler, "Multi-Dimensional Model Based Development for Performance Critical Computer Systems Using the AADL", Proceedings of 4th International Congress on Embedded Real-Time Systems, Jan 2008.

20. Ana-Elena Rugina, Karama Kanoun, Mohamed Kaaniche, Peter Feiler, "Software Dependability Modeling using an Industry-Standard Architecture Description Language", Proceedings of 4th International Congress on Embedded Real-Time Systems, Jan 2008.

21. Gérard Sébastien, Peter Feiler, Jean-François Rolland, Mamoun Filali, Marc-Olivier Reiser, Didier Delanote, Yolande Berbers, Laurent Pautet, Isabelle Perseil. *UML & AADL '2007 Grand Challenges. ACM SIGBED Review*, ACM, *Special issue : A Special Report on UML & AADL Grand Challenges*, V. 4 N. 4, O*ctober* 2007.

22. Lutz Wrage, "AADL: Domain specific language and UML profile", Revue Génie logiciel ,March 2007, Vol.8.

23. Vibha Prasad, Ting Yan, Praveen Jayachandran, Zengzhong Li, Sang H. Son, John A. Stankovic, Jorgen Hansson, Tarek Abdelzaher, "ANDES: An ANalysis-Based DEsign Tool for Wireless Sensor Networks," rtss, pp.203-213, 28th IEEE International Real-Time Systems Symposium (RTSS 2007), 2007

24. Peter H. Feiler, Dio DeNiz, Chris Raistrick, Bruce Lewis, "From PIMs to PSMs", Proceedings of 12th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS07), UML&AADL Workshop, July 2007.

25. Dio DeNiz, Peter H. Feiler, "Aspects in the Industry Standard AADL", Proceedings of 10th International Workshop on Aspect-Oriented Modeling Vancouver, Canada, March 2007.

26. Peter H. Feiler, Bruce A. Lewis, Steve Vestal, "The SAE Architecture Analysis & Design Language (AADL) A Standard for Engineering Performance Critical Systems", IEEE International Symposium on Computer-Aided Control Systems Design (CACSD), Oct 2006.

27. Peter H. Feiler, David P. Gluch, John Hudak, Bruce A. Lewis, "Pattern-Based Analysis of an Embedded Real-time System Architecture", Proceedings of IFIP World Computer Congress - Workshop on Architecture Description Languages (WADL04), Volume 176/2005, Springer Boston, August 2004.

28. Peter H. Feiler, Bruce Lewis, Steve Vestal, Ed Colbert, "An Overview of the SAE Architecture Analysis & Design Language (AADL) Standard: A Basis for Model-Based Architecture-Driven Embedded Systems Engineering", IFIP TC-2 Workshop on Architecture Description Languages (WADL), World Computer Congress, Aug 2004.

Papers Authored by Outside Teams (with SEI AADL/MBE Team Interaction)

The second list of references represents work by outside teams that have used AADL (and in many case OSATE) in their work and have had direct interactions with members of the SEI team. In this list references to a particular project are grouped together. The papers cover reconfigurable avionics systems, mapping the industrial COTRE approach into AADL, generation of high integrity distributed runtime systems from AADL, integration of Petrinet-based analytical frameworks (colored, timed, stochastic), validation of the operational runtime architecture of space applications, integration of resource allocation, schedulability, and fault analysis frameworks, integration of model checking technologies to validate behavior and safety, security modeling, and power consumption.

29. E. A. Strunk, J. C. Knight, and M. A. Aiello. "Distributed reconfigurable avionics architectures". 23rd Digital Avionics Systems Conference (DASC 04), volume 2.

30. Patrick Farail and Pierre Gaufillet (Airbus), "COTRE as an AADL Profile", IFIP TC-2 Workshop on Architecture Description Languages (WADL), World Computer Congress, Aug 2004.

31. Jean-François Tilman, "Building Tool Suite for AADL", IFIP TC-2 Workshop on Architecture Description Languages (WADL), World Computer Congress, Aug 2004.

32. T. Vergnaud, L. Pautet, F, Kordon, "Using the AADL to Describe Distributed Applications from Middleware to Software Components" Reliable Software Technology – Ada Europe 2005.

33. Vergmaud, T., Hugues, J., Pautet, L., and Kordon, F. 2005. Rapid Development Methodology for Customized Middleware. In *Proceedings of the 16th IEEE international Workshop on Rapid System Prototyping* (June 08 - 10, 2005). RSP.

34. Jérôme Hugues, Fabrice Kordon, and Laurent Pautet. Towards Proof-Based Real-Time Distribution Middleware. Proceedings of the *13th International Conference On Real-Time Systems* (RTS'05), pages 51-70, Paris, France, April 2005.

35. Thomas Vergnaud, Khaled Barbaria, Irfan Hamid, Laurent Pautet, Sylvie Vignes and Elie Najm. Modeling and generating tailored distribution middleware for embedded real-time systems. Proceedings of *ERTS'06*. Toulouse January 2006.

36. Irfan Hamid and Elie Najm. Real-time Connectors for Deterministic Data-flow. Proceedings of the *13th IEEE International Conference on Embedded and Real-time Computing Systems and Applications*. August 2007.

37. Thomas Vergnaud. Modélisation des systèmes temps-réel répartis embarqués pour la génération automatique d'applications formellement vérifiées. PhD thesis, École nationale supérieure des télécommunications, December 2006.

38. Jérôme Hugues, Fabrice Kordon, and Laurent Pautet. Revisiting COTS middleware for DRE systems. Proceedings of the *8th IEEE International Symposium on Object-oriented Real-time distributed Computing* (ISORC'05), pages 72-79, Seattle, WA, USA, May 2005. IEEE.

39. J. Hugues, B. Zallila, L. Pautet, and F. Kordon. Rapid Prototyping of Distributed Real-Time Embedded Systems Using the AADL and Ocarina. *Proceedings of the 18th International Workshop on Rapid System Prototyping*, pages 106-112, IEEE Computer Society, June 2007

40. Pierre Dissaux. Applying the AADL to Space Software Standards. Proceedings of DASIA 2007. Naples, May 2007.

41. Jérôme Hugues, Bechir Zalila, and Laurent Pautet. Rapid Prototyping of Distributed Real-Time Embedded Systems Using the AADL and Ocarina. In Proceedings of the 18th IEEE International Workshop on Rapid System Prototyping (RSP'07), Porto Alegre, Brazil, May 2007.

42. Jerome HUGUES, Laurent PAUTET, Bechir ZALILA, Pierre DISSAUX Maxime PERROTIN , "Using AADL to Build Critical Real-time Systems: Experiments in the IST-ASSERT Project",Proceedings of 4th International Congress on Embedded Real-Time Systems, ERTS 2008.

43. Jérome HUGUES, Bechir ZALILA Julien DELANGE, Laurent PAUTET,, "Code Generation Strategies from AADL Architectural Descriptions Targeting the HI Domain", Proceedings of 4th International Congress on Embedded Real-Time Systems, ERTS 2008.

44. Zalila, B. Pautet, L. Hugues, J., "Towards Automatic Middleware Generation" 11th IEEE International Symposium on Object Oriented Real-Time Distributed Computing (ISORC), 2008.

45. J. Hugues, B. Zalila, L. Pautet, and F. Kordon. "From the Prototype to the Final Embedded System Using the Ocarina AADL Tool Suite". *Transactions on Embedded Computing Systems, 7(4)*, pages 1-25, ACM, July 2008

46. Perseil, I. and Pautet, L. 2007. Co-Modeling Methodology Designed for RT Architecture Models Integration. In *Proceedings of the 12th IEEE international Conference on Engineering Complex Computer Systems* (July 11 - 14, 2007). ICECCS.

47. X. Renault, F. Kordon, and J. Hugues. Adapting models to model checkers, a case study: Analysing AADL using Time or Colored Petri Nets. *Proceedings of the 20th International Workshop on Rapid System Prototyping*, pages 26-33, IEEE Computer Society, June 2009

48. X. Renault, F. Kordon, and J. Hugues. From AADL architectural models to Petri Nets: Checking model viability. *12th IEEE International Symposium on Object-oriented Real-time distributed Computing (ISORC'09)*, pages 313-320, IEEE Computer Society, March 2009

49. Eric Conquet "ASSERT: a step towards reliable and scientific system and software engineering" Proceedings of 4th International Congress on Embedded Real-Time Systems, ERTS 2008.

50. P.Bieber, JP.Blanquart, G.Durrieu, D.Lesens, J.Lucotte, F.Tardy, M.Turin, C.Seguin, E.Conquet, "Integration of formal fault analysis in ASSERT: Case studies and lessons learnt", Proceedings of 4th International Congress on Embedded Real-Time Systems, ERTS 2008.

51. Maurice Heitz, Sebastien Gabel, Julien Honoré, Xavier Dumas/CS, Iulan Ober/IRIT and David Lesens/ASTRIUM-ST Supporting a Multi-formalism Model Driven Development Process with

Model Transformation, a TOPCASED implementation, Proceedings of 4th International Congress on Embedded Real-Time Systems, ERTS 2008.

52. Singhoff, F. and Plantec, A. 2007. AADL modeling and analysis of hierarchical schedulers. In *Proceedings of the 2007 ACM international Conference on Sigada Annual international Conference* (Fairfax, Virginia, USA, November 04 - 08, 2007). SIGAda '07.

53. Singhoff, F., Legrand, J., Nana, L., Marcé, L.: Scheduling and Memory requirements analysis with AADL. In: ACM SIGAda Ada Letters, vol. 25(4), pp. 1–10. ACM Press, New York (2005)

54. Singhoff F, Plantec A, Dissaux P (2008) "Can we increase the usability of real time scheduling theory? The Cheddar project". 13th international conference on reliable software technologies, Ada-Europe, Venice. LNCS, vol 5026. Springer, Berlin, pp 240–253.

55. Plantec, A. and Singhoff, F. 2006. Refactoring of an Ada 95 library with a Meta CASE tool. In *Proceedings of the 2006 Annual ACM Sigada international Conference on Ada* (Albuquerque, New Mexico, USA, November 12 - 16, 2006). SIGAda '06.

56. P. Dissaux, F. Singhoff, "Stood and Cheddar: AADL as a Pivot Language for Analysing Performances of Real Time Architectures", Proceedings of 4th International Congress on Embedded Real-Time Systems, ERTS 2008.

57. Frank Singhoff, Alain Plantec, Pierre Dissaux, Jérôme Legrand, "Investigating the usability of real-time scheduling theory with the Cheddar project" Journal Real-Time Systems, Springer. June 2009.

58. Faugere, M., Bourbeau, T., Simone, R. d., and Gerard, S. 2007. MARTE: Also an UML Profile for Modeling AADL Applications. In *Proceedings of the 12th IEEE international Conference on Engineering Complex Computer Systems* (July 11 - 14, 2007). ICECCS.

59. Matthias BRUN, Jérôme DELATOUR, Madeleine FAUGERE, Thomas VERGNAUD, "From UML to AADL : A Need for an Explicit Execution Semantics Modelling with MARTE", Proceedings of 4th International Congress on Embedded Real-Time Systems, ERTS 2008

60. Sokolsky O, Lee I, Clark D (2006) "Schedulability analysis of AADL models". International parallel and distributed processing symposium, IPDPS 2006, vol 2006.

61. Oleg Sokolsky; Alexander Chernoguzov, "Analysis of AADL Models Using Real-Time Calculus with Applications to Wireless Architectures," Technical Report MS-CIS-08-25, University of Pennsylvania Department of Computer and Information Science, 23 July 2008

62. Oleg Sokolsky, Insup Lee, Duncan Clarke, "Process-Algebraic Interpretation of AADL Models", Proceedings of the 14th Ada-Europe International Conference on Reliable Software Technologies 2009.

63. JF. Rolland, D. Thomas, D. Chemouil. "Utilisation d'AADL pour la conception de logiciels de vol satellite". Revue Génie logiciel, Number 80, March 2007.

64. J.P.Bodeveix, M.Filali and J.F.Rolland. "AADL execution model semantics, AADL communication semantics in TLA", Technical Report, IRIT, 2007.

65. Frana, R.B. Bodeveix, J.-P. Filali, M. Rolland, J.-F. "The AADL behaviour annex -- experiments and roadmap" 12th IEEE International Conference on Engineering Complex Computer Systems, 2007.

66. Jean-Francois ROLLAND, Jean-Paul BODEVEIX, Mamoun FILALI, David CHEMOUIL,Dave THOMAS, "Towards a formal semantics for AADL execution model", Proceedings of 4th International Congress on Embedded Real-Time Systems, ERTS 2008.

67. Jean-François Rolland, Jean-Paul Bodeveix, Mamoun Filali, David Chemouil, Dave Thomas, 'Modes in Asynchronous Systems', Proceedings of 13th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS08), UML&AADL Workshop, April 2008.

68. J.-F. Rolland, J.-P. Bodeveix, M. Filali, D. Chemouil, D. Thomas, "AADL modes for space software", Data Systems In Aerospace (DASIA 2008), Palma de Majorca, Spain, 27-30 May 2008

69. Jean-François TILMAN, Amélie SCHYN, Romain SEZESTRE,,"Simulation of System Architectures with AADL", Proceedings of 4th International Congress on Embedded Real-Time Systems, ERTS 2008.

70. Jahier, E., Halbwachs, N., Raymond, P., Nicollin, X., and Lesens, D. 2007. „Virtual execution of AADL models via a translation into synchronous programs". In *Proceedings of the 7th ACM &Amp; IEEE international Conference on Embedded Software* (Salzburg, Austria, September 30 - October 03, 2007). EMSOFT '07.

71. M.Y.Chkouri, A.Robert, M.Bozga, and J.Sifakis. "Translating AADL into BIP - Application to the Verification of Real-time Systems". The proceedings of the ACESMB 2008 workshop conjunction with MODELS 2008.

72. Jahier, E., Halbwachs, N., and Raymond, P. 2009. Synchronous Modeling and Validation of Priority Inheritance Schedulers. In *Proceedings of the 12th international Conference on Fundamental Approaches To Software Engineering: Held As Part of the Joint European Conferences on theory and Practice of Software, ETAPS 2009* (York, UK, March 22 - 29, 2009).

73. Ana-Elena Rugina, Karama Kanoun and Mohamed Kaâniche, System dependability modeling using (the) AADL language 15th French IMdR Congress on Risk Mastering and Dependability October 2006.

74. A. E. Rugina, K. Kanoun, and M. Kaâniche, "A System Dependabiliy Modeling Framework using AADL and GSPNs," in Architecting Dependable Systems IV, vol. 4615, LNCS, Springer-Verlag, 2007, pp. 14-38.

75. A. E. Rugina "Dependability modeling and evaluation - From AADL to stochastic Petri nets", Ph.D., Thesis, LAAS/CNRS, 2007.

76. Rugina, A., Kanoun, K., and Kaâniche, M. 2008. The ADAPT Tool: From AADL Architectural Models to Stochastic Petri Nets through Model Transformation. In *Proceedings of the 2008 Seventh European Dependable Computing Conference - Volume 00* (May 07 - 09, 2008). EDCC-7.

77. Amitabha GHOSH, Luis PEREIRA, Ting YAN, Hui CAO, "Modelling Sensor Network Architectures using AADL", Proceedings of 4th International Congress on Embedded Real-Time Systems, ERTS 2008.

78. J.F. Rolland, "Developpement et validation d'architectures dynamiques", Ph.D. Thesis, Universite Toulouse III (Paul Sabatier).

79. Hong Liu, D. Gluch, "Formal verification of AADL behavior models: a feasibility investigation", Proceedings of the 47th Annual Southeast Regional Conference, March 2009.

80. Ivano Malavolta, Henry Muccini, Patrizio Pelliccione, "Integrating AADL within a Multi-domain Modeling Framework," ICECCS, pp.341-346, 2009 14th IEEE International Conference on Engineering of Complex Computer Systems, 2009.

81. Eby, M., Werner, J., Karsai, G., and Ledeczi, A. 2007. Integrating Security Modeling into Embedded System Design. In *Proceedings of the 14th Annual IEEE international Conference and Workshops on the Engineering of Computer-Based Systems* (March 26 - 29, 2007). ECBS.

82. Marco Bozzano, Alessandro Cimatti, Marco Roveri, Joost-Pieter Katoen, Viet Yen Nguyen and Thomas Noll. "Codesign of Dependable Systems: A Component-Based Approach", Seventh ACM-IEEE International Conference on Formal Methods and Models for Codesign (MEMOCODE'2009).

83. Marco Bozzano, Alessandro Cimatti, Joost-Pieter Katoen, Viet Yen Nguyen, Thomas Noll, and Marco Roveri, " COMPASS Approach:Correctness, Modelling and Performability of Aerospace Systems", 28th International Conference on Computer Safety, Reliability, and Security, , SAFECOMP 2009.

84. Yves LaCerte and Yang Zhu, "FPGAs: Quality through Model Based Design and Implementation" International Conference 2006 MAPLD.

85. L. Sha, J. Meseguer, "Design of Complex Cyber Physical Systems with Formalized Architectural Patterns", Software-Intensive Systems and New Computing Paradigms, Springer Verlag, 2008.

86. T. Crenshaw, "Architecture Reference models for Early Safety Analysis', Ph.D. thesis, UIUC, 2008.

87. Stanley Bak, Deepti K. Chivukula, Olugbemiga Adekunle, Mu Sun, Marco Caccamo, Lui Sha, "The System-Level Simplex Architecture for Improved Real-Time Embedded System Safety," pp.99-107, 2009 15th IEEE Real-Time and Embedded Technology and Applications Symposium, RTAS 2009

88. Nam, M., Pellizzoni, R., Sha, L., and Bradford, R. M. 2009. ASIIST: Application Specific I/O Integration Support Tool for Real-Time Bus Architecture Designs. In *Proceedings of the 2009 14th IEEE international Conference on Engineering of Complex Computer Systems - Volume 00* (June 02 - 04, 2009). ICECCS.

89. Anjali Joshi , Pam Binns, Steve Vestal, "Automatic Generation of Fault Trees from AADL Models"*,* 1st International Workshop on Aerospace Software Engineering (AeroSE 07), in conjunction with ICSE 2007.

90. Allen, R., Vestal, S., Cornhill, D., and Lewis, B. 2002. Using an architecture description language for quantitative analysis of real-time systems. In *Proceedings of the 3rd international Workshop on Software and Performance* (Rome, Italy, July 24 - 26, 2002). WOSP '02.

91. Bruce Lewis, "System Engineering Approaches for Performance Critical Avionics Embedded Computer Systems Using the Architecture Analysis and Design Language (AADL)" American Helicopter Society 63rd Annual Forum, AHS 2007.

92. Hui Cao, Ting Yan, Luis R. Pereira, Sujit R. Das, and Bruce Lewis "Use AADL to analyze and design embedded systems", Journal for Embedded Systems Design ,Aug. 2007.

93. Gui, S., Luo, L., Liu, Q., Guo, F., and Lu, S. 2008. UCaS: A Schedulability Analysis Tool for AADL Models. In *Proceedings of the 2008 IEEE/IFIP international Conference on Embedded and Ubiquitous Computing - Volume 02* (December 17 - 20, 2008). EUC.

94. Gui, S., Luo, L., Li, Y., and Wang, L. 2008. Formal Schedulability Analysis and Simulation for AADL. In *Proceedings of the 2008 international Conference on Embedded Software and Systems - Volume 00* (July 29 - 31, 2008). ICESS.

95. Ma, L., Gui, S., Luo, L., and Yin, L. 2008. Research of Automatic Code Generating Technology Based on AADL. In *Proceedings of the 2008 international Conference on Embedded Software and Systems Symposia - Volume 00* (July 29 - 31, 2008). ICESSSYMPOSIA.

96. Gui, S., Ma, L., Luo, L., Yin, L., and Li, Y. 2008. UCaG: An Automatic C Code Generator for AADL Based upon DeltaOS. In *Proceedings of the 2008 international Conference on Advanced Computer theory and Engineering* (December 20 - 22, 2008). ICACTE.

97. Saadia Dhouib, Eric Senn, Jean-Philippe Diguet, Johann Laurent, Dominique Blouin, "Model Driven High-Level Power Estimation of Embedded Operating Systems Communication Services," icess, pp.475-481, 2009 International Conference on Embedded Software and Systems, 2009.

Papers Authored by Outside Teams without Direct SEI Involvement

The final list cites papers on work that applies and leverages AADL, SEI reports and articles on AADL, and in many cases OSATE. These papers cover integrating AADL with semantically formal execution and timing models, mapping the architectural dynamics of AADL modes into temporal logic frameworks, integration with UML-based technology, AADL-based simulation of the runtime architecture, use of model transformation in code generation, safety evaluation, architecture optimization, and flow analysis. The list also includes papers on applying AADL with these extensions to model real-time kernels,

protocol stacks, high-fidelity co-simulation of aircraft, bio sensor networks, space critical systems, integration with requirements, CCM, generation to SystemC.

98. Yue Ma   Talpin, J.-P.   Gautier, T.   „Virtual prototyping AADL architectures in a polychronous model of computation", 6th ACM/IEEE International Conference on Formal Methods and Models for Co-Design, 2008. MEMOCODE 2008.

99. Yue Ma, Jean-Pierre Talpin, Sandeep K. Shukla, Thierry Gautier, "Distributed Simulation of AADL Specifications in a Polychronous Model of Computation," ICESS 2009, pp.607-614, 2009 International Conference on Embedded Software and Systems, 2009.

100.   Bertrand, D.   Deplanche, A.-M.   Faucou, S.   Roux, O.H. "A Study of the AADL Mode Change Protocol", 13th IEEE International Conference on Engineering of Complex Computer Systems, 2008. ICECCS 2008.

101.   José A. Pulido, Santiago Urueña, Juan A. de la Puente, and Juan Zamorano. Using an Architecture Description Language to Model Real-Time Kernels. In J.A. de la Puente (ed.), I Simposio sobre sistemas de tiempo real (CEDI 2005).

102.   Jean-Paul Blanquart, Alain Rossignol, Dave Thomas, Toward model-based engineering for space embedded systems and software, Proceedings of the *Embedded Realtime Software Conference ERTSS 2006*, Toulouse January 2006.

103.   J.-M. Bruel : Composition logicielle à l'aide de machines à état. UML et AADL. Revue Génie logiciel ,March 2007, Vol.80.

104.   N. Halbwachs, L. Mandel Simulation and verification of asynchronous systems by means of a synchronous model, *Proceedings of Sixth International Conference on Application of Concurrency to System Design, ACSD 2006* Turku, Finland, June 2006.

105.   Hugues, J.   Zalila, B.   Pautet, L., "Combining Model Processing and Middleware Configuration for Building Distributed High-Integrity Systems", 10th IEEE International Symposium on Object and Component-Oriented Real-Time Distributed Computing, 2007. ISORC '07.

106.   M. Monperrus, J-M. Jezequel, J. Champeau, B. Hoeltzener "Model-driven Engineering Metrics for Real Time Systems" Proceedings of the 4th European Congress on Embedded Real Time Software (ERTS'2008)

107.   Casteres J., Ramaherirariny T. (Airbus), "Aircraft integration real-time simulator Modeling with AADL for architecture tradeoffs", Proceedings of 9th Design, Automation & Test in Europe Conference, April 2009.

108.   Frédéric Mallet, Charles André, Julien DeAntoni, "Executing AADL models with UML/Marte", Proceedings of 14th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS09), UML&AADL Workshop, June 2009.

109.   Roberto Varona-Gomez, Eugenio Villar, "AADL Simulation and Performance Analysis in SystemC", Proceedings of 14th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS09), UML&AADL Workshop, June 2009.

110.   Lei Pi, Zhibin Yang, J-P Bodeveix, M.Filali, Kai Hu, Dianfu Ma,"A comparative study of FIACRE and TASM to define AADL real time concepts" Proceedings of 14th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS09), UML&AADL Workshop, June 2009.

111.   Ivano Malavolta, Henry Muccini, and Patrizio Pelliccione, "Integrating AADL within a multi-domain modeling framework" Proceedings of 14th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS09), UML&AADL Workshop, June 2009.

112. Mathieu Delehaye, Christophe Ponsard, "Towards a Model-Driven Approach for Mapping Requirements on AADL Architecture" Proceedings of 14th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS09), UML&AADL Workshop, June 2009.

113. Su-Young Lee, Frédéric Mallet, Robert de Simone "Dealing with AADL End-to-end Flow Latency with UML MARTE". Proceedings of 13th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS08), UML&AADL Workshop, April 2008.

114. Matthias Brun, Jérôme Delatour, Yvon Trinquet,: 'Code Generation from AADL to a Real-time Operating System: An Experimentation Feedback on the Use of Model Transformation', Proceedings of 13th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS08), UML&AADL Workshop, April 2008.

115. Thomas Abdoul, Joël Champeau, Philippe Dhaussy, Pierre-Yves Pillain, Jean-Charles Roger "AADL Execution Semantics Transformation for Formal Verification", Proceedings of 13th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS08), UML&AADL Workshop, April 2008.

116. Hugues Balp, Étienne Borde, Grégory Haïk, Jean-François Tilman : 'Automatic Composition of AADL Models for the Verification of Critical Component-Based Embedded Systems', Proceedings of 13th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS08), UML&AADL Workshop, April 2008.

117. Didier Delanote, Stefan Van Baelen, Wouter Joosen, Yolande Berbers : 'Using AADL to Model a Protocol Stack', Proceedings of 13th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS08), UML&AADL Workshop, April 2008.

118. Dominique Bertrand, Anne-Marie Déplanche, Sébastien Faucou and Olivier H. Roux : 'A Study of the AADL Mode Change Protocol', Proceedings of 13th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS08), UML&AADL Workshop, April 2008.

119. Grunske, L., Han, J.: "A Comparative Study into Architecture-Based Safety Evaluation Methodologies Using AADL's Error Annex and Failure Propagation Models:.11th IEEE High Assurance Systems Engineering Symposium, HASE 2008, pp. 283–292. IEEE Computer Society, Los Alamitos (2008)

120. Charles Andre, Frederic Mallet, Robert de Simone. "Modeling of immediate vs. delayed data communications: from AADL to UML MARTE". ECSI Forum on specification & Design Languages (FDL),September 2007.

121. M. Belala, F.Latreche, F.LATRECHE. "AADL behavioral annex based on generalized rewriting logic". Research Challenges in Information Science, 2008. pp.1-8.

122. Stefan Björnander, Lars Grunske, Kristina Lundqvist, "Timed Simulation of Extended AADL-Based Architecture Specifications with Timed Abstract State Machines". QoSA 2009: 101-115

123. J.-P. Bodeveix, R. Cavallero, D. Chemouil, M. Filali, and J.-F. Rolland, "A mapping from AADL to Java-RTSJ", The 5th International Workshop on Java Technologies for Real-time and Embedded Systems (JTRES 2007), Vienna, Austria, 2-3 September 2007, ACM.

124. Gregory Haik, V. Watine, V. Seignole, O. Hachet, J.-L. Gilbert, H. Balp"Experience Report on Implementing and Applying a Standard Real-Time Embedded Component Platform", OMG RTE Systems Workshop Washington, July 2007.

125. D. Delanote, S. Van Baelen, W. Joosen, and Y. Berbers, "Using AADL in Model Driven Development", A. Canals, S. Gerard, and I. Perseil, editors, IEEE-SEE International Workshop on UML and AADL 2007, International Conference on Engineering Complex Computer Systems (ICECCS07), Auckland, New Zealand, 11-14 July 2007

126.   E. de las Heras, and E. Villar, "Specification for SystemC-AADL interoperability", IEEE Proceedings of the 5th International Workshop on Intelligent Solutions in Embedded Systems (WISES'07).

127.   R.B. França, J.-M. Farines, J.-P. Bodeveix, L. Becker, and M. Filali, "Modelling a bus protocol an incremental approach", 9th Workshop on Real-Time Systems (WTR 2007)

128.   Im, K. and McGregor, J. D. "Debugging support for security properties of software architectures". *Proceedings of the 5th Annual Workshop on Cyber Security and information intelligence Research: Cyber Security and information intelligence Challenges and Strategies* (Oak Ridge, Tennessee, April 13 - 15, 2009).

129.   Aldeida Aleti, Stefan Bjornander, Lars Grunske, Indika Meedeniya, "ArcheOpterix: An extendable tool for architecture optimization of AADL models," MOMPES, pp.61-71, 2009 ICSE Workshop on Model-Based Methodologies for Pervasive and Embedded Software, 2009

130.   Muhammad, Naeem, Vandewoude, Yves, Berbers, Yolande,van Loo, Sjir, "Modelling composite end-to-end flows with AADL". Proceedings Euromicro Conference on Real-Time Systems (ECRTS 09) July 2009.

131.   D. Chemouil and N. Pontisso. Vérification formelle d'un modèle AADL à l'aide de l'outil UPPAAL. Revue Génie Logiciel (80):36--40, March 2007.

132.   J.-P. Bodeveix, M. Filali, M. Rached, D. Chemouil, and P. Gaufillet "Experimenting with an AADL Behavioral Annex and a Verification Method", Proc. of the DASIA 2006 – DAta Systems In Aerospace – Conference, Berlin, Germany22-25 May 2006

133.   Senn, J. Laurent, and J. P. Diguet "Multi Level Power Consumption Modelling in the AADL Design Flow for DSP, GPP, and FPGA", E. MoDELS'08 ACES-MB Workshop Proceedings

134.   D. Monteverde, A. Olivero, S. Yovine, and V. Braberman. "VTS-based specification and verification of behavioral properties of AADL models", MoDELS'08 ACES-MB Workshop Proceedings.

135.   Hassan Reza, Emanuel S. Grant, "Toward Extending AADL-OSATE Toolset with Color Petri Nets (CPNs)," itng, pp.1085-1088, 2009 Sixth International Conference on Information Technology: New Generations, 2009

136.   Sandeep K. S. Gupta "A Tool for Designing High-Confidence Implantable BioSensor Networks for Medical Monitoring", Technical Report, Arizona State University.

137.   Kholgade, Sudhanwa White, Jamie Reza, Hassan, "Comparing the Specification of a Near-Real Time Commanding System Using Statecharts and AADL" Fourth International Conference on Information Technology, 2007. ITNG '07.

138.   Nemer, F. Casse, H. Sainrat, P. Awada, A. , "Improving the Worst-Case Execution Time Accuracy by Inter-Task Instruction Cache Analysis" International Symposium on Industrial Embedded Systems, 2007. SIES '07.

139.   Bozzano, M., Cimatti, A., Roveri, M., Katoen, J., Nguyen, V., and Noll, T. 2009. "Verification and performance evaluation of aadl models". In *Proceedings of the 7th Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering on European Software Engineering Conference and Foundations of Software Engineering Symposium* (Amsterdam, The Netherlands, August 24 - 28, 2009). ESEC/FSE '09.

140.   Mohamed Yassin Chkouri and Marius Bozga. "Prototyping of Distributed Embedded Systems Using AADL", The proceedings of the ACESMB 2009 workshop conjunction with MODELS 2009.

141.   Dries Langsweirdt, Yves Vandewoude and Yolande Berbers. "Towards Intelligent Tool-Support for AADL Based Modeling of Embedded Systems", The proceedings of the ACESMB 2009 workshop conjunction with MODELS 2009.

142. Grunske, L. and Han, J. 2008. A Comparative Study into Architecture-Based Safety Evaluation Methodologies Using AADL's Error Annex and Failure Propagation Models. In *Proceedings of the 2008 11th IEEE High Assurance Systems Engineering Symposium* (December 03 - 05, 2008). HASE.

143. Song, W. and Dong, Y. 2008. On Designing and Verifying Smart Home Embedded Software Model Based on AADL. In *Proceedings of the 2008 Second international Conference on Future Generation Communication and Networking - Volume 02* (December 13 - 15, 2008). FGCN.

144. Chkouri, M. Y. and Bozga, M. 2009. "Deterministic Data Flow Communication in AADL". In *Proceedings of the 2009 international Conference on Embedded Software and Systems - Volume 00* (May 25 - 27, 2009). ICESS.

145. Sun, H., Hauptman, M., and Lutz, R. 2007. Integrating Product-Line Fault Tree Analysis into AADL Models. In *Proceedings of the 10th IEEE High Assurance Systems Engineering Symposium* (November 14 - 16, 2007). HASE.

146. Pi, L., Bodeveix, J., and Filali, M. 2009. Modeling AADL Data Communication with BIP. In *Proceedings of the 14th Ada-Europe international Conference on Reliable Software Technologies* (Brest, France, June 08 - 12, 2009).

147. Zhang, C., Yang, Z., and Dong, Y. 2008. Research and Assessment of the Reliability of a Fault Tolerant Model Using AADL. In *Proceedings of the 2008 Advanced Software Engineering and Its Applications* (December 13 - 15, 2008). ASEA.

148. Berthomieu, B., Bodeveix, J., Chaudet, C., Zilio, S., Filali, M., and Vernadat, F. 2009. Formal Verification of AADL Specifications in the Topcased Environment. In *Proceedings of the 14th Ada-Europe international Conference on Reliable Software Technologies* (Brest, France, June 08 - 12, 2009).

149. Kholgade, S., White, J., and Reza, H. 2007. Comparing the Specification of a Near-Real Time Commanding System Using Statecharts and AADL. In *Proceedings of the international Conference on information Technology* (April 02 - 04, 2007).

150. Hugues, J., Perrotin, M., and Tsiodras, T. 2008. Using MDE for the Rapid Prototyping of Space Critical Systems. In *Proceedings of the 2008 the 19th IEEE/IFIP international Symposium on Rapid System Prototyping* (June 02 - 05, 2008). RSP.

151. Rasmus Ask Sørensen, Jasper Moltke Nygaard, "On the Use of AADL for System Engineering",IHA, March 2007.

152. Cuenot, P., Chen, D., Gerard, S., Lonn, H., Reiser, M., Servat, D., Sjostedt, C., Kolagari, R. T., Torngren, M., and Weber, M. 2007. Managing Complexity of Automotive Electronics Using the EAST-ADL. In *Proceedings of the 12th IEEE international Conference on Engineering Complex Computer Systems* (July 11 - 14, 2007). ICECCS.

History References

To be added.