Welcome
Welcome to AADL User Day

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CMU SEI is a DoD R&D Federally Funded Research and Development Center

Our mission: Engineering and securing software

Established in 1984 at Carnegie Mellon University

~700 employees

Offices in Pittsburgh and DC, with locations near customer facilities in MA, MD, TX, and CA

~$145M in annual funding (~$20M USD(R&E) 6.2 and 6.3 Line funding)
CMU SEI is critical to DoD’s ability to acquire, develop, operate, and sustain software systems that are

- innovative,
- affordable,
- trustworthy, and
- enduring

(CMU SEI Sponsoring Agreement)
CMU SEI: 30 Years in Software Engineering Leadership

Mid-1980s
- Repeatability of delivery of platforms

Late 1980s
- Establishing a basis for software reuse

Mid 1990s
- Evidence-based developer output

Early 1990s
- Verification and validation of real-time scheduling

Late 1990s
- Strategic design; reuse and evolution; measurement and analysis

Mid 2000s
- Ultra large scale systems research; AADL

Early 2000s
- Managing the operational risk of fielded systems

Late 2000s
- SOA; secure design patterns; framework for architectural decisions

2010s
- Lifecycle automation, Agile/DevOps; assuring complex systems; continuous integration/continuous deployment

Today
- Artificial Intelligence Engineering; Engineering for AI; AI for Mission

2020+
- Ultra large scale systems research; AADL
- AI Engineering; Engineering for AI; AI for Mission
Before You Even Write a Line of Code…

AADL allows you to design the entire system and see where the problems may occur. Then you can change the design of the system to eliminate those errors.

Being able to perform a virtual integration of the software, hardware, and system is the key to identifying problems early – and changing the design to ensure those problems will not occur.

About AADL

• SAE Avionics AADL standard adopted in 2004
• Focused on embedded software system modeling, analysis, and generation
• Strongly typed language with well-defined semantics
• Used for critical systems in domains such as avionics, aerospace, medical, nuclear, automotive, and robotics
Modern embedded systems need to be both safe and secure. As we have seen, the pace and scale of the development of these systems means traditional methods cannot keep up.

**Research to Practice**
The SEI works to rapidly move ideas from research in embedded systems – conducted either here at the SEI, in academia, or in industry – to practice.
Model, Integrate, Analyze…Then Build

Virtual integration makes issues visible throughout development, decreasing risk and reducing development and sustainment costs by more than 25%.

Benefits of AADL & ACVIP (via Alex Boydston)

- Decreased fielding time by finding problems early
- Early risk reduction by discovering performance issues early
- Increased cybersecurity by using AADL/ACVIP to improve system security
- Decreased development costs and support for MOSA and certification by transforming procurement supporting MBE and ACVIP

Virtual integration of software, hardware, and system supports verification, airworthiness, safety, and cybersecurity certification
Revolutionizing Army Aviation

Over many years, the SEI has had an outstanding partnership with the US Army, who is at the vanguard of applying AADL and ACVIP to the Army’s future vertical lift challenge.
Looking Ahead

The need for model-based engineering for embedded systems is increasing as systems become larger and more complex. The SEI is looking forward to working on the future of AADL:

- Engaging more collaborators to use AADL tools and to provide real world input
- Leveraging model-based techniques (including AADL/ACVIP) to improve DoD procurement practice, revisit acquisition policies, and contribute to the Digital Engineering strategy
- Conducting research to explore the use of architecture modeling with emerging technologies (e.g., ML / AI, DevOps, formal verification of behavior)
About Today

AADL User Day 2019

OCTOBER 28, 2019 | ARLINGTON, VIRGINIA

Agenda