AADL is an Integration Focal Point

Adventium Labs

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The Problem

Teams working on a safety critical systems often encounter challenges working together.

Different stakeholders have different

- Tools
- Workflows
- Standard practices
- Viewpoints

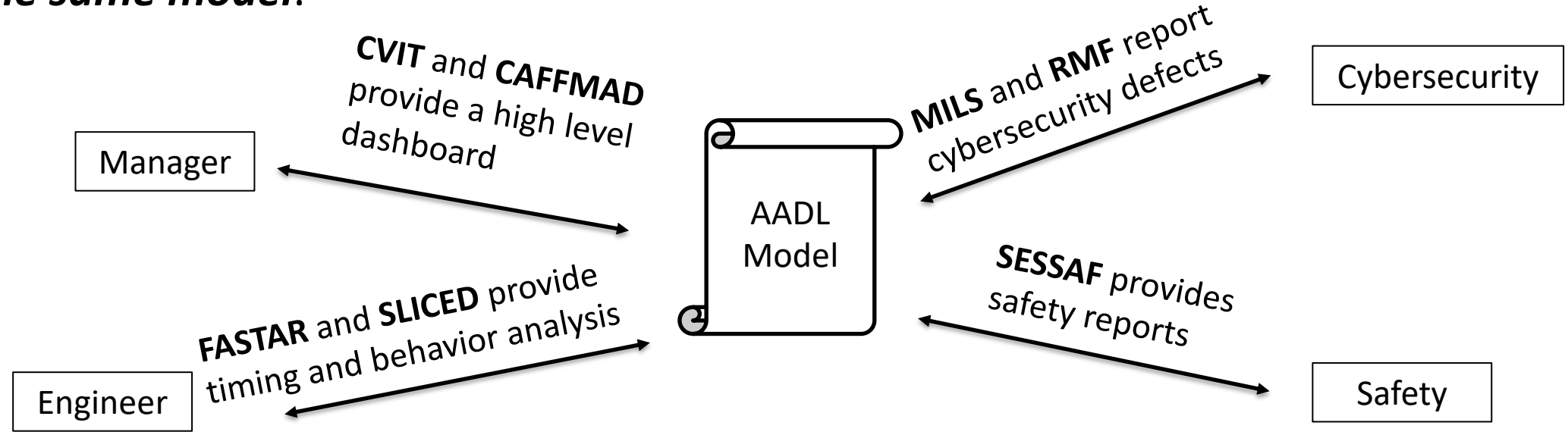
The result is often

- Duplicated information
- Degraded information quality
- Slow development iterations

The Solution

AADL is an **integration focal point** that brings embedded systems stakeholders together

- Adventium Labs builds tools that bring stakeholders together by leveraging AADL.
- With Adventium's CAMET library tools, Managers, Engineers, and Reviewers all use ***the same model***.



AADL is the Optimal Integration Focal Point

- It is not **vendor locked -** AADL models written in one tool will work in other AADL environments
- It is human **readable**
- It is designed to help identify **integration** issues in cyber-physical systems
- It enables **portable** analyses on the **compositional** architectures
- It is a **well defined** language for description and analysis of real time systems

CAMET Tools

The tools in Adventium's CAMET Library enable use of AADL as an integration focal point for multiple stakeholders.

- **SESSAF** brings systems engineers and safety analysts together around common AADL models.
- **MILS** and **RMF** ease coordination between engineers and cybersecurity analysts by highlighting architectural defects that pose a risk to cybersecurity qualification.
- **CVIT** provides a common operating picture for managers and engineers alike using AADL models and automated model analysis.
- **SLICED** detects behavioral incompatibilities between multiple software providers.
- **CAFFMAD** uses AADL's flexible type system to help engineers avoid locking onto a design trajectory too early and to provide systems engineers with a view of the design space.
- **ISOSCELES** uses AADL's consistent semantics to generate source code for safety-critical embedded systems, keeping software design consistent with system design.
- **FASTAR** evaluates constraints to ensure that software and hardware designs are mutually satisfactory.

Least Commitment Design Workflow

Models of Systems
(e.g., hardware, software, requirements)

AADL Models

SysML Models

(1) Designer specifies:
- Top level design
- Design variants to evaluate
- Parametric studies
- Analysis tools to apply

- Risk Management Analysis
- Systems-Theoretic Process Analysis
- Reliability Analysis
- Power & Weight Analysis
- Latency Analysis
- Schedulability Analysis

CAFFMAD

(2) As models are subsequently updated and refined during the design process, CAFFMAD:
- Automatically rebuilds design variants
- Applies analysis tools to each variant
- Tabulates results for trade study

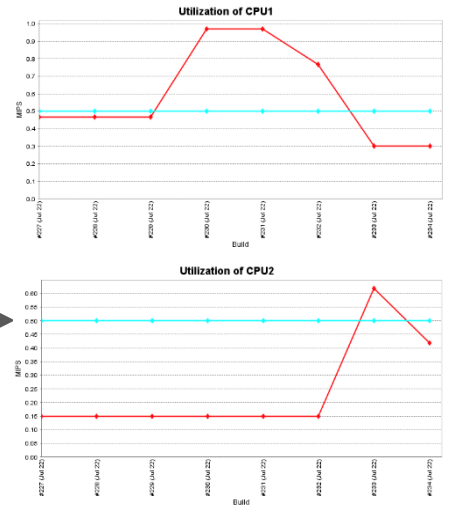
Design Space Explorer

Trade Space Explorer

Analysis Tools

	Instance	Property1	P2	P3	...	Result1	R2	R3	...
Design Variants	simplex								
	duplex								
	triplex								
	quad								
	n-version								
	ECC								
Property Variants	10 KWH								
	20 KWH								
	30 KWH								
	40 KWH								

Property Values | Analysis Results



CAFFMAD supports a **least-commitment** design approach

Safety Analysis

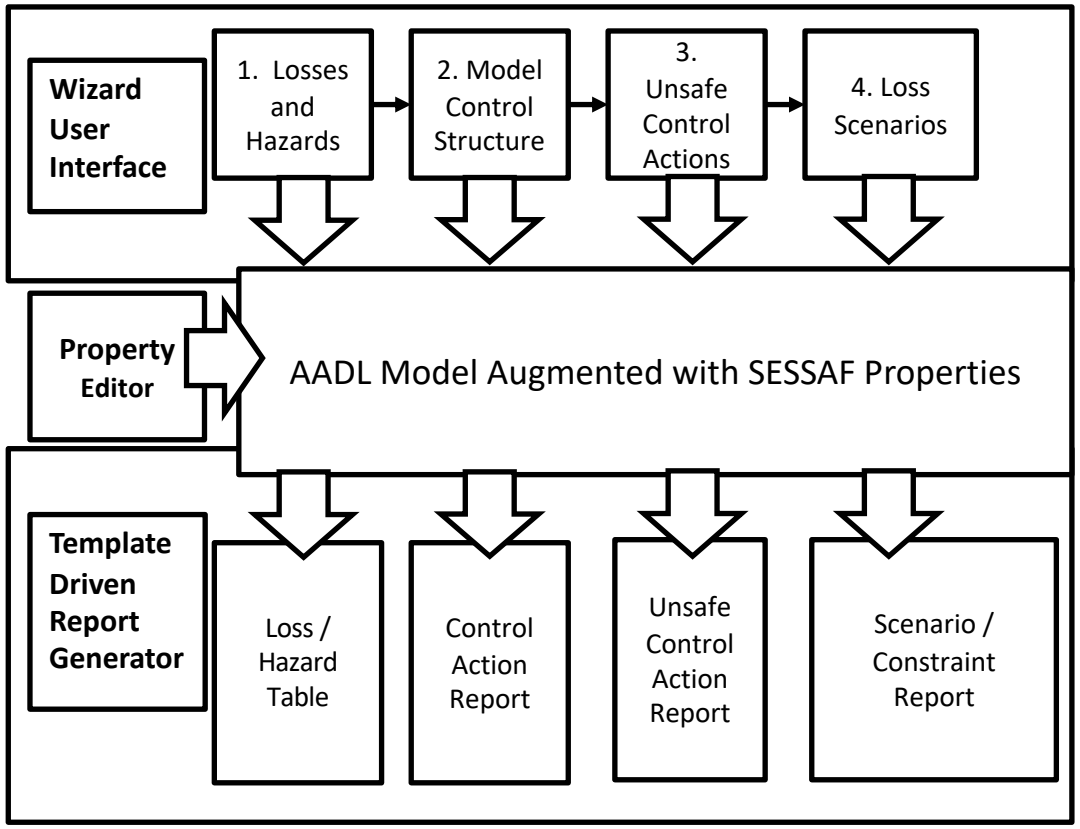
Supports top down safety and security risk analysis of embedded system models by Subject Matter Experts throughout the development process.

SESSAF Inputs:

- System Physical Architecture model
  - Mixed fidelity
- Control loops modeled as end-to-end flows

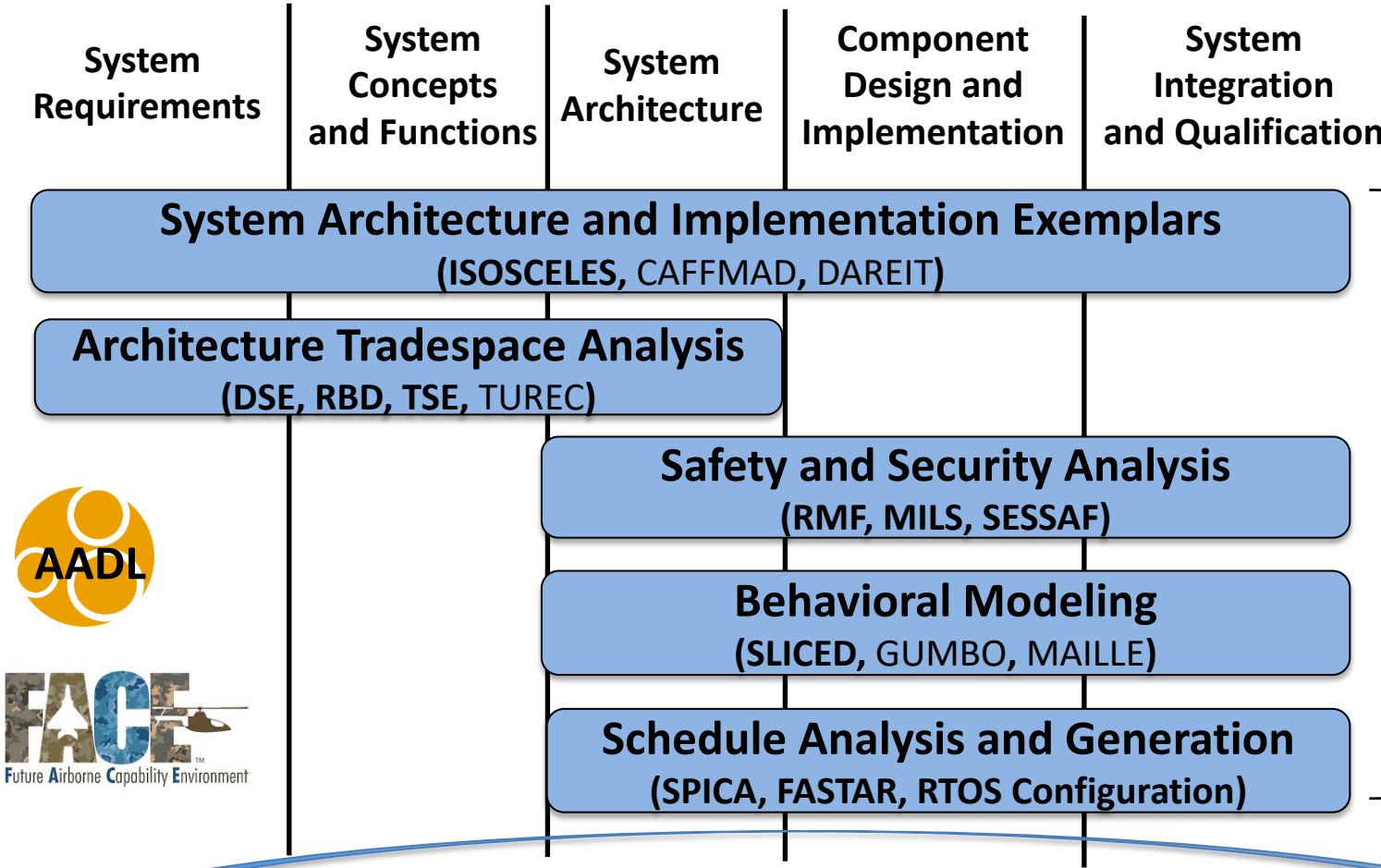
SESSAF Output Includes:

- Reports of unsafe control actions which lead to hazards and losses
- Reports assigning constraints to components to mitigate unsafe control actions
- Process status
- Reports and Mind Map



SESSAF brings safety and engineering closer together around common AADL models

Adventium Portfolio of Tools Supporting ACVIP



Boldface tools are available now.

Model-Based Digital Engineering Infrastructure

- Integration of multiple analyses into a shared workflow.
- Continuous virtual integration with mixed developer models.
- Automated model verification, report generation, and code generation.

Backup

Acronyms and Abbreviations

- AADL Architecture Analysis and Design Language
- ACVIP Architecture Centric Virtual Integration Process
- CAFFMAD Continuous Architecture Framework for Fault Management Assessment And Design
- CAMET Curated Access to Model-based Engineering Tools
- CASE Cyber Assured System Engineering
- CVI Continuous Virtual Integration
- DAREIT Design Analysis for Rapid, Effective Integration and Test
- DARPA Defense Advanced Research Projects Agency
- DHS Department of Homeland Security
- DoD Department of Defense
- DSE Design Space Explorer
- FACE Future Airborne Capability Environment
- FASTAR Framework for Analysis of Schedulability, Timing and Resources
- GUMBO Grand Unified Modeling of Behavioral Operators
- ISOSCELES Intrinsically Secure, Open, and Safe Cyber-physically Enabled, Life-critical Essential Services
- JMR Joint Multi-Role
- MAILLE Microkernel Application Information fLow with Logic-based Enforcement
- MBSE Model-Based System Engineering
- METAL-V Model-based Engineering Tools for an Affordable Lifecycle - Vertical
- MILS Multiple Independent Levels of Security
- MSAD Mission System Architecture Demonstration
- NASA National Aeronautics and Space Administration
- OSATE Open Source AADL Tool Environment
- RBD Reliability Block Diagram
- RMF Risk Management Framework
- RTOS Real-Time Operating System
- SESSAF Systems Engineering Safety and Security Analysis Framework
- SLICED State Linked Interface Compliance Engine for Data (SLICED)
- SPICA Separation Platform for Integrating Complex Avionics
- SysML System Modeling Language
- TD Technology Demonstrator
- TSE Trade Space Explorer
- TUREC Tooling to Understand Ripple Effect Costs
- VM Virtual Machine