Adventium Labs rolls out software suite to improve embedded systems design

07 September 2017

Adventium Labs recently announced its Curated Access to Model-based Engineering Tools (CAMET) Library. CAMET™ hosts software tools that help improve quality, reduce costs, and meet schedules for developing, integrating, and upgrading software in embedded, real-time complex systems like spacecraft, aircraft, vehicles, medical devices, and networks. Cost and schedule overruns for complex systems, such as commercial and defense aircraft, have been widely-reported in the press. Studies have shown that much of this is due to unplanned rework during the late stages of the program, when subsystems from multiple suppliers are integrated together and subjected to acceptance testing[1]. Most of this expensive rework is not due to defects confined to a single software application, but rather due to inconsistencies between multiple pieces of software and hardware – they are architectural defects.

The newly announced CAMET Library is a collection of model-based engineering tools that system designers will be able to use to analyze detailed models of the system architecture, its subsystems, and its components. The idea behind model-based engineering is to enable the end customer (e.g., the U.S. Government) and its contractors and suppliers to verify that the interfaces between subsystems and components are consistent with each other and analyze a variety of performance metrics against the requirements. With a suitably detailed model, problems can be identified early in the system design phase that previously would have gone undetected until much further in development, where cost-to-repair can be orders of magnitude higher.

The Government has been investing in architecture centric model-based engineering to develop the technology to the point where industry can adopt it. Minneapolis-based Adventium Labs is a national leader in this effort. Since 2013, Adventium Labs has received over 10 million dollars of competitive R&D funding from several Government agencies to develop and mature analysis tools for spacecraft, aircraft, and medical device systems and networks. In addition, earlier this year Adventium was awarded a DoD task order contract, with a ceiling of 10 million dollars, to mature and assist in the use of these analysis prototypes.

CAMET's first sponsor is an Army research group within the Army Aviation and Missile Research Development and Engineering Command (AMRDEC). They have selected several tools available on the CAMET Library for use on an innovative Army Science and Technology (S&T) program called the Joint Multi-Role Mission System Architecture Demonstration (JMR MSAD). Starting in 2018, the Army anticipates spending nearly $30M to fund a group of contractors to apply model-based engineering technology and open systems technology to a realistic military system design challenge. As part of proposals submitted by bidders and during the JMR MSAD program itself, the Army will require delivery of system models that will be analyzed using tools from Adventium and other suppliers.

A major goal of JMR MSAD's culminating demonstration called Capstone is to research the ability for model-based engineering, including Architecture Centric Virtual Integration, to improve quality, reduce

[1] http://savi.avsi.aero/wp-content/uploads/sites/2/2015/08/SAVI-AFE58-00-001_Summary_Final_Report.pdf

Distribution A: Approved for public release; distribution unlimited.

costs, and meet schedules for developing (and upgrading) military systems. It is a risk reduction effort for future military vertical lift programs.

Adventium's CAMET tools analyze system models represented in the Architecture Analysis & Design Language (AADL), an SAE international standard that focuses on software intensive parts of real-time safety or mission critical computing systems. Adventium's staff has deep experience in using AADL to solve challenging analysis problems, including having two of AADL's founders on its staff: Steve Vestal, Ph.D. and Bruce Lewis. Dr. Vestal led the Defense Advanced Research Projects Agency (DARPA)-funded research project on which AADL was based and currently leads the application of CAMET tools to the Army JMR MSAD program. Mr. Lewis, the chairperson of the AADL standards committee and a founder of AADL, stated: "AADL supports analysis to evaluate the effect of integrating software, computer hardware and the connected physical system elements during the design phases on resource utilization, interface correctness, timing, scheduling, safety, security, and reliability. It also supports trade space analysis, qualification and assurance of correctness. We call this virtual integration since this is prior to these components' physical existence. After the components are developed, AADL supports the generative integration of the physical system to the verified specification. It is a natural choice for Adventium's analysis tools."

Adventium created CAMET (pronounced 'camay') to encourage use of these tools by other system designers. Rather than sell licenses to the individual tools, CAMET sponsors will have access to all tools and materials on CAMET for a nominal annual fee. According to Kyle Nelson, Adventium's CEO, "This model was selected for two main reasons: First, the Government, and by extension taxpayers, have invested a considerable amount of money in developing these tools. The sponsorship model enables the tools to be broadly accessible and provides funds to maintain the library. Second, because the tools are advanced research prototypes, a community of first adopters is needed to help identify and prioritize the improvements needed. The sponsorship model provides a low cost way to establish this community."

As tools are enhanced and new tools are developed, they will be added to CAMET for the benefit of all sponsors. Third party R&D contracts will continue to fund major upgrades, added functionality, and new tool development. Academic instructors that incorporate CAMET tools in their classes will be able to apply for no-cost access to CAMET.

Currently, seven tools are available in CAMET covering capabilities such as generating and analyzing trade spaces and design alternatives, verifying and generating schedules for real-time avionics software, and assessing security compliance for system and network designs. More tools are in the works. To learn more about the offerings, including videos of the tools, please see www.camet-library.com.

About Adventium Labs: Adventium Labs is an award-winning, research and development company that blends automated reasoning, systems engineering, and cyber security to solve challenges of national importance.

About AMRDEC: U.S. Army Aviation and Missile Research, Development, and Engineering Center provides increased responsiveness to the nation's Warfighters through aviation and missile capabilities and life cycle engineering solutions.

Distribution A: Approved for public release; distribution unlimited.