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Identifying Architectural Challenges in System of Systems Architectures

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Abstract

We present lessons learned from using mission thread workshops (MTW) as an early architecture development step for a number of DoD systems of systems (SoS). The approach is based on defining a number of critical warfare vignettes, then developing some associated end-to-end mission threads that stress the envisioned capabilities of the SoS, and finally, augmenting these threads with quality attribute and capability considerations elicited from the SoS and system stakeholders in a facilitated workshop. Each mission thread is comprised of a number of steps (typically 15 to 25), where each step describes an activity, and a number of engineering considerations and use cases are associated with each step. The MTW explores these threads with the stakeholders in a number of half-day or full-day sessions to determine gaps in the functional and non-functional capabilities (e.g., performance, availability, usability, security) at each step and from an end-to-end perspective. Architectural challenges are derived from the resulting augmented mission threads which can be used to drive follow-on efforts, such as, prototyping, modeling and simulation, and building out the DoDAF views and products. The MTW is organized into three activities: preparation for the workshop, conducting the workshop and follow-on analysis activities. We will present an outline of the workshop and summarize the lessons learned in conducting MTWs. We have reviewed, analyzed, and organized the challenges from over 50 mission threads and will describe some of these challenge areas.

Biography

Mr. Michael Gagliardi has over 25 years of experience in real-time, mission critical software architecture and engineering activities on a variety of DoD systems. Mike is currently working in the SEI Research, Technology, and System Solutions Program on a Software Architecture Technology initiative involved in the development of architecture evaluation methods for System of Systems Architectures and System Architectures, based on the key principles from the SEI Architecture Trade-off Analysis Method (ATAM). While at the SEI, Mr. Gagliardi served as the Chief Engineer for Navy Programs in the Acquisition Support Program and was also a member of the Rate Monotonic Analysis (RMA) project. Prior to joining the SEI, Mike had been involved in the software design, development, and integration of real-time radar, sonar and command and control systems at General Electric Company.