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Conceptual Data Modeling for the Functional Decomposition of Mission Capabilities

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To have a complete understanding of implementation-agnostic functional decompositions of mission capabilities, the data elements consumed and produced by functions must be captured and explained. This paper details a method employing a conceptual data modeling approach to formally document data elements and the interactions between those elements with a structured data architecture. This approach uses the concepts of entities, relationships, and the observable characteristics of those entities and relationships to clearly define the context of the data interchanges and represents the interchanges through different views of the conceptual data model. An example of developing a conceptual data model including views using the Future Airborne Capability Environment (FACETM) data architecture is demonstrated. Finally, the data model and functional decomposition are linked together to give a complete context for the mission capability. The process of developing and linking to the data model improves the functional decomposition and enables communication of decomposition context.

Biographies

Mr. Andrew Battigaglia is a research engineer with the Defense Open Systems Division of the Electronic Systems Laboratory at the Georgia Tech Research Institute. He has nearly a decade of experience in the defense industry. His current work focuses on data modeling in support of multiple open architecture programs, such as the Future Airborne Capabilities Environment. Mr. Battigaglia has previously worked on software interface testing to support an embedded electronic warfare system fielded on multiple United States Air Force aircraft platforms. He earned a Bachelor of Science in Electrical Engineering from the Georgia Institute of Technology and a Master of Business Administration from Kennesaw State University, with honors.

Ms. Erika Brimhall is a research engineer in the Electronic Systems Laboratory at the Georgia Tech Research Institute. She has over a decade of experience in aerospace and defense, including working on the Space Shuttle main propulsion system at Kennedy Space Center, exoatmospheric and air-to-air missiles at Raytheon Missile Systems, and systems modeling at the Georgia Tech Research Institute. Mrs. Brimhall earned a Bachelor of Science in Aerospace Engineering from the Florida Institute of Technology and a Master of Science in Systems Engineering from the Johns Hopkins University, with honors. She is currently the task lead for an open architecture functional decomposition project.

Mr. Terry Ogle is a senior research engineer with the Air and Missile Defense Division in the Sensors and Electromagnetic Applications Laboratory at the Georgia Tech Research Institute. His current work involves sensor integration, track correlation, and data fusion. He earned both a Master and Bachelor of Science in Electrical and Computer Engineering from the Georgia Institute of Technology. Mr. Ogle has more than fifteen years of experience in the development and application of the Benchmark software including the JCTN, BMD, IAMD, ESM, MIMO, and AAV versions. He has performed numerous trade studies in the areas of target tracking, detection and estimation of targets, electronic support measures, jammers, data fusion algorithms, track metrics, tracklets, and the development of advanced techniques such as the multi-hypothesis tracking algorithms.