

OBJECTIVE SIMULATION FRAMEWORK (OSF)



Overview

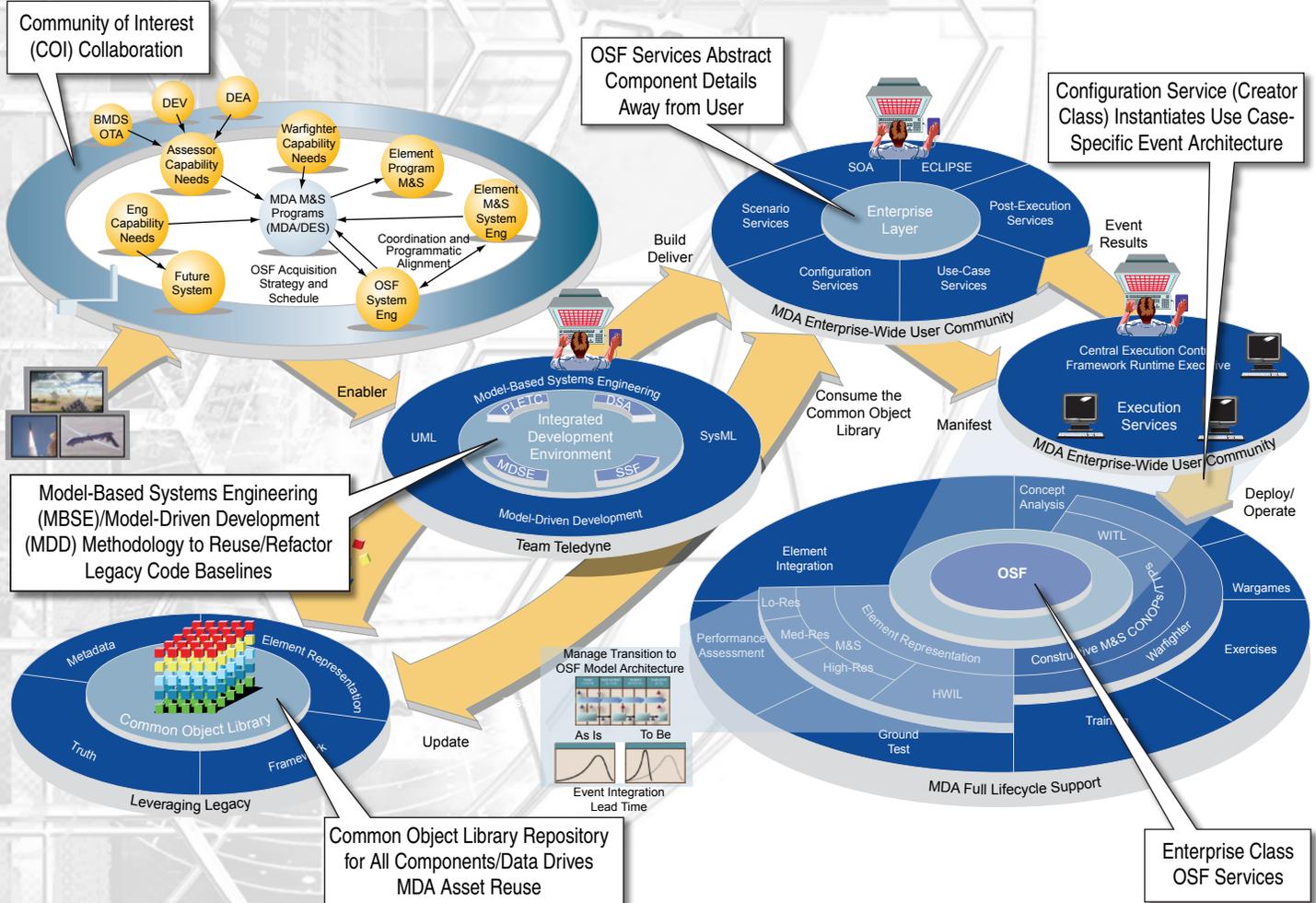
As is the case with all of the Department of Defense (DoD), the Missile Defense Agency (MDA) faces ever-tightening budget constraints. To ensure that budget constraints would not adversely impact the fielding of the Ballistic Missile Defense System (BMDs), the MDA leadership undertook robust Modeling and Simulation (M&S) capability improvement activities to complement BMDs test events.

MDA's Enterprise M&S approach has at its core a joint element and system BMDs M&S Framework, which is a composable, transparent, and configurable architecture that

facilitates various stakeholder applications and events. Additionally, the required M&S Framework incorporates necessary legacy functions from the Single Simulation Framework (SSF), Digital Simulation Architecture (DSA), Missile Defense System Exerciser (MDSE), integrated Element digital, hardware-in-the-loop (HWIL) representations, and core truth and data models.

Objective Simulation Framework (OSF)

Team Teledyne has been selected to develop MDA's goal of a flexible M&S Architecture – the Objective Simulation Framework. OSF is configurable to support all Stakeholder



Applications to include Ground Test (GT), Performance Assessment (PA), Exercises (Ex), War Games (WG), Training (Tr), Element Integration (EI), and Concept Analysis (CA). OSF provides Truth Stimulation and Integration to support interoperability, performance assessment testing, and training events. OSF is made up of Execution Services that support event preparation and assessment activities as well as Execution Services that support event execution. The Communities of Interest (COI) provide Government-Furnished Equipment/Information (GFE/GFI), requirements, schedule, and funding. The Common Object Library (COL) serves as the central repository for BMDS M&S assets such as: Core Truth data and models, Element representations, and

OSF Features

- Single framework for all Stakeholder Applications
- Standard Interfaces – New publish/subscribe interfaces for all participants
- Inclusive – Able to integrate with all participant representations
- Modular – Loosely coupled, cohesive HW/SW components comprise implementation
- Scalable – No limit (within HW/network constraints) to number of representations in architecture
- Reconfigurable – Quickly, easily reconfigure event assets during pre-mission, run-time initialization, and run-time
- Composable – Add to mix/match representations and/or Core Truth Model (CTM) components
- Extensible – Able to easily, quickly add new participant representations
- Seamless Integration – Able to use current framework-defined interfaces

resultant data from test and training events. Each Element representation, whether it is a sensor, weapon, or Command and Control, connects to the OSF through a Participant Interface (PI).

MBSE/MDD Approach

Team Teledyne development methodology uses an integrated Model-Based Systems Engineering (MBSE) and Model-Driven Development (MDD) approach. Our MBSE methodology is a formalized application of modeling that supports system requirements, design, analysis, and verification and validation activities that continue throughout all phases of the product lifecycle. Work

products from the systems engineering activities, such as hardware (HW) and software (SW) specifications, will be generated to support subsequent HW and SW engineering activities. This disciplined and integrated development methodology and tools-based approach is necessary to allow the potential reuse of over eight million lines of legacy framework code and data. We will then separate the tightly coupled code baselines into composable objects to be hosted in the common repository, the COL.

Legacy M&S Sustainment/Enhancements

As the OSF is being developed, Team Teledyne is providing sustainment and enhancement support to SSF and MDSE under a separate task order on the OSF contract. Our support ensures that the SSF continues to provide a modular test framework interconnecting BMDS Elements/Components and HWIL facilities. SSF supports distributed and non-distributed test events, including ground test, flight test, element integration, exercises, and training. The SSF allows for the tactical systems to be exercised in a realistic theater and/or global conditions by utilizing tactical HW and SW. Ultimately, OSF will replace SSF, providing greater modularity and composability.

Meeting the Challenge through Experience and Innovation

Teledyne Brown Engineering (TBE) has designed and built complex, integrated test and assessment tools for missile defense since the mid-1980's. We built and operated the Integrated System Test Capability (ISTC) and the MDSE, which are accredited for the testing of legacy missile systems. These frameworks have qualified for the Software Engineering Institute's Capability Maturity Model Integration (CMMI) Level 3 certification. Teledyne has also developed the widely used Extended Air Defense Simulation (EADSIM) many-on-many simulation of air, missile, and space warfare.

Through past work, TBE has built positive working relationships with the MDA, Missile Defense Integration and Operations Center (MDIOC), all branches of the military, Project Offices, and the element developers. Team Teledyne has the experience, capabilities, and professional skilled staff required to develop and deploy the OSF for MDA. Likewise, we are prepared to apply our knowledge and innovative techniques to develop, integrate, and enhance System Frameworks for future clients.

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