Dynamic Object Modeling for Orchestration (DOMO)

A prototype system modernizing Riverside Research's Collective Processing Suite (CPS) algorithms and back end

Dynamic Object Modeling for Orchestration (DOMO) focuses on the development of a prototype system that modernizes our Collection Processing Suite (CPS) algorithms and back end, replacing outdated technology and providing increased use cases.

The development process is unique—blending existing computer graphics techniques, projective geometry, orbital physics, and computational geometry methods to enable building superior, efficient, and scalable Modeling & Simulation applications and results.

Procedure

- Determine the ability of existing CPS and MPS code base to incorporate new forward-looking features
- Evaluate and normed on potential implementation languages and frameworks (JAVA)
- Develope the necessary algorithms for a modular efficient back end design

Observations

Initial results: orbital propagation

- Development of generalized Taxonomy and Class Structure
- Multithreaded orbitology computations removes dependencies on expensive 3rd party libraries (example rendering at right)
- The camera is positioned representing the GOES 2
- The green dot is positioned at the ISS
- Sun, Moon, and Earth all positioned correctly, with correct physical properties such as mass, etc.





Key Features

- Simple, but powerful, modeling and descriptive capability for objects of interest
- Incorporates articulated, generalized, and conceptual object, modeling of moving and probabilistic target locations, non-terrestrial targets, and context-based target groupings
- Modern implementation for collection opportunity scheduling
- Can handle more complex and time-dominant problems
- Automated, scalable, and efficient processing
- Sets the stage for Collection Planning Suite (CPS) and Mission Processing Suite (MPS) upgrades
- Removes 3rd party library dependencies and licensing costs
- Enables consistent modeling and simulation framework across electromagnetic spectrum

Dynamic Object Modeling for Orchestration (DOMO)

The DOMO IRAD project is a forward-looking project focused on how we can best address developing collection opportunity and scheduling computation services and applications as intelligence needs shift to more complex and time-dominant problems. Examples of these problems include the incorporation of Object Based Orchestration (OBO), handling moving and probabilistic targets of interest, and the need for more automated, scalable, and efficient processing.

Working with IT team to stand up a local enclave for rapid R&D. First task will be to instantiate a development and test copy of legacy CPS in order to profile, test, and compare with developed JAVA solution.

Next Steps

Recommendation is to create a separate, new development effort and new OPP-GEN and SCD-GEN services to handle moving, probabilistic, and 3D target types, etc.

- Development of taxonomy, class structures, and data models
- Development of processing core utilities
- Development of application main loop(s)
- Development of RESTful service wrappers
- Containerization and deployment
- Test and measurement
- Final demonstration



Critical Tech Areas



DoD Priorities

5 1 2 3 4 6 7 9 10 12 8 11 13 14 15 16 17

- 1. Southwest Border Activities
- . Combating Transnational Criminal Organizations in the Western Hemisphere Audit
- Audit
- Nuclear Modernization (including NC3)
 Collaborative Compativity (CCAc)
- 6. Virginia-class Submarines
- 7. Executable Surface Ship
- 8. Homeland Missile Defense
- 9. One-Way Attack/Autonomous System
- 10. Counter-small UAS Initiatives
- 11. Priority Critical Cybersecuri
- 12. Munitions
- 13. Core Readiness, including full DRT funding
- 14. Munitions and Energetics Organic Industrial Bases
- 15. Executable INDOPACOM MILCON
- Combatant Command support agency funding for INDOPACOM, NORTHCOM, SPACECOM, STRATCOM, CYBERCOM, and TRANSCOM
- 17. Medical Private-Sector Care