https://drive.google.com/drive/folders/1Q3NOigGxSx5jlo3E18A50qFXPXOnj11p

- 2014 IEEE Aerospace Conf

  Integrated MBSE Applied to the Simulation of a CubeSat Mission

  This paper describes an integrated, executable MBSE representation of the Radio Aurora Explorer (RAX) CubeSat mission. The purpose of the RAX mission is to study the formation of magnetic field-aligned electron density irregularities in the Earth's ionosphere, which are known to disrupt tracking and communication between Earth and orbiting spacecraft.

  The RAX CubeSat model describes the configuration and properties for various systems and subsystems, and is capable of executing behavior and parametric models for analyzing subsystem functions and states of the spacecraft.

  It is comprised of a SysML model created with MagicDraw®, a set of analytical models developed in MATLAB®, and a high-fidelity space system simulation model created in STK®. ModelCenter was used to integrate the analytical and simulation models. The integrated analyses were linked to the SysML model using MBSE Analyzer, a bridge between SysML tools and ModelCenter. Behavioral models were executed for a representative RAX mission to study energy state and data collection capabilities.

- 2017 IEEE Aerospace Conf

  MBSE Approach for Defining the Behaviors of CubeSats

  This paper describes an eight-step approach for defining the behaviors of CubeSats. This approach provides a repeatable, generalized method for CubeSat development teams to follow that incorporates standard systems engineering practices such as: a top-down approach, requirements analysis, use case development, and functional analysis. to a CubeSat development effort. Since most space missions are concerned with the generation

  Systems engineering artifacts produced using this approach, such as definitions of the mission domain elements, requirements, use cases, and activities, are captured in a system model which serves as a single-source-of-truth for members of the CubeSat development team. Examples are provided which illustrates the application of this approach

- 2018 IEEE Aerospace Conf

  MBSE Approach for Technical Measurement with Application to a CubeSat

  This paper defines a MBSE approach for technical measurement that begins with a set of mission objectives derived from stakeholder concerns.

  Measures of Effectiveness (MOEs) are derived from the mission objectives. Initially, these MOEs are captured in a special model element that allows for the MOEs to be described in a natural language format that stakeholders will understand.

  Measures of Performance (MOPs) are derived from the MOEs. MOPs are also traced to system requirements. The process steps at the system-level are repeated at the subsystem-level to derive Technical Performance Measures (TPMs). These TPMs are traced back to MOPs and subsystem requirements.

- 2019 Small Sat Conf

  Developing a CubeSat MBSE System Reference Model - Interim Status #5

  This paper provides an overview of the CSRM including the requirements hierarchy, architecture hierarchy, and the incorporation of stakeholders, technical measures, and use cases. There are two modeling effort. One is the development of the CSRM with its logical architecture. The other is a mission team using the CSRM as a basis for its mission-specific logical and physical architectures. This paper addresses 1) the validation of the CSRM, 2) the application of the CSRM by a mission team, 3) and the validation and verification of the Mission-specific CubeSat Model.

- 2020 IEEE Aerospace Conf

  Development and Application of the CubeSat System Reference Model

  This paper provides the following:

  - A working definition of the CSRM, including the benefits available to university and other CubeSat development teams by adopting it in their CubeSat mission specific design.
  - Background information about the CSRM, including the history of the INCOSE project which resulted in its germination; a precis of the vetting the CSRM has received thus far from the community of interest; and a brief description of the efforts of the Object Management Group (OMG) to establish a CubeSat specification.

- 2021 IEEE Aerospace Conf

  Mission Engineering and the CubeSat System Reference Model

  Mission Engineering, a concept where the mission itself is looked at as a system is being explored as a means to maintain balance between the spacecraft system, operations (including ground systems), and the mission (the integration of needed capabilities). Now opportunities exist to extend the already-developed CSRM to enable the application of Mission Engineering to modeling a complete CubeSat mission. This paper presents the challenges and approach that the INCOSE SSWG will address.

- 2021 INCOSE IW

  Development and Application of the CSRM

  This presentation includes:

  - CSRM project objectives
  - CSRM foundation
  - CSRM fundamental elements
  - CSRM as an OMG specification
  - CSRM application
  - CSRM architecture
  - CSRM and mission engineering

- 2021 Small Sat Conf

  Mission Engineering and the CubeSat System Reference Model - Status #1

  Mission Engineering, a discipline where the mission itself is looked at as a system is being explored as a means to maintain balance between the spacecraft system, operations (including ground systems), and the mission (the integration of needed capabilities). With the CSRM nearing development completion, opportunities exist to extend the CSRM to enable the application of Mission Engineering to modeling a complete CubeSat mission.

  This paper provides the following:

  - Overview of the CSRM
  - CSRM as an OMG Specification
  - Development of a Mission-Specific CSRM
  - Defining Mission Engineering
  - CSRM and Mission Engineering
  - Mission Architecture Activity and Mission Operations

- 2022 Small Sat Conf

  Mission Engineering and the CubeSat System Reference Model - Status #2

  An earlier paper provided an initial assessment of where the CSRM supports ME activities and where there are areas that require further research. That paper proposed a way forward that included a set of activities needed to completely define what additions would be required to extend the CSRM to fully support ME. One of those activities was to analyze the CSRM for additional artifacts which could be added to the containment tree for key elements of ME activities that do not map to the CSRM. This paper provides the results of performing that activity for two ME activities: the Mission Architecting Activity and the Mission-oriented Systems-of-Systems (SoS) Implementation Activity.

- 2023 INCOSE IW

  CSRM Role and Purpose

  This presentation includes:

  - CSRM project objective
  - Project phases
  - CSRM purpose
  - CSRM formats
  - CSRM application
  - CSRM elements
  - Economies through reuse