



### Introduction

CubeSat, a type of nanosatellite, is a low-cost, standardized satellite. The basic unit is 10x10x10 centimeters with mass of about 1.3 kilograms. They can be joined to form a larger satellite. CubeSats originated in the university community as a means to design, build, and launch a satellite using primarily off-the-shelf components. More recently, the worldwide community has adopted the CubeSat standard as a means of performing scientific, surveillance, and technology demonstration missions at significantly reduced cost.

Currently, there is no common reference model for building a CubeSat, resulting in each CubeSat development team working on its own to find the best combination of size, weight, components and capabilities. This limits interoperability, slows development times and forces constant research to remain current on the latest innovations.

### A Standard Emerges for Faster, More Reliable CubeSat Development

The Space Domain Task Force (<https://www.omg.org/space/>) of the Object Management Group® (OMG®) has partnered with the International Council on Systems Engineering (INCOSE) to draft the CubeSat Systems Reference Model (CSRM). Incorporating the OMG extensive family of modeling standards, including Unified Modeling Language™ (UML®) and Systems Modeling Language™ (SysML®). Requirements across the industry are addressed with the CSRM providing a step-by-step guide from concept to orbit.

The CSRM provides logical architecture elements that can be reused as a starting point for mission-specific CubeSats, permitting the physical architecture and CubeSat development. The CSRM accommodates an external provider providing transportation to the launch site, integration into the launch vehicle, launch, and deployment. The CSRM also accommodates a CubeSat project developing its own ground station or operating with an existing ground station that provides uplink and downlink services.

### Influence the CubeSat Systems Reference Model

Following the OMG process for standardization, there will be a short period for all member organizations to submit input during the request for comments. The CSRM status and progress can be found at [www.omgwiki.org/space/doku.php](http://www.omgwiki.org/space/doku.php).

### Value Proposition of OMG Standards for CubeSat Systems Reference Model

- **Modular Capability** provides for known effective system builds among designed CubeSat systems;
- Provides ready **Building Blocks** to reduce costs and quickly rebuild unique new assets;
- Allows **Reprogrammable Repeatable Products for Changing Requirements and Missions**;
- **Reduces Risks** by ensuring known quality, with valued expertise from a trusted advisor;
- Allows Building **Unique, Disparate and New Products** to assess integration impacts to other systems and subsystems;
- Provides **Annuity Business Opportunities** not possessed by those without standards, once CubeSat RM is completed.

### Architectural Elements

The CubeSat CSRM specification contains architectural elements for:

- Model development stakeholders
- Mission stakeholders
- CubeSat domain and enterprise
- CubeSat and ground: segments and subsystems: behaviors and structures
- Requirements definition, management, validation, and verification
- Model validation and verification
- Model guidance and navigation

### Next Step

We are happy to discuss how OMG membership will benefit your organization! Please explore our website at [www.omg.org](http://www.omg.org) and when you are ready, please contact [bd-team@omg.org](mailto:bd-team@omg.org) or call + 1-781-444-0404 to get started.

### About OMG

The Object Management Group (OMG) is an international, open membership, not-for-profit computer industry standards consortium with representation from government, industry and academia. OMG Task Forces develop enterprise integration standards for a wide range of technologies and an even wider range of industries. OMG modeling standards enable powerful visual design, execution and maintenance of software and other processes. Visit [www.omg.org](http://www.omg.org) for more information.



### About INCOSE

The International Council on Systems Engineering (INCOSE) is a not-for-profit membership organization that promotes international collaboration in systems engineering practice, education and research. INCOSE's mission is to "address complex societal and technical challenges by enabling, promoting and advancing systems engineering and systems approaches." Founded in 1990, INCOSE has more than 70 chapters and over 10,000 members worldwide. To learn more visit: [www.incose.org](http://www.incose.org).



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