

INCOSE

Cloud-based, integrated digital engineering system

Simplifies and accelerates SmallSat mission life cycle

Rapidly select and develop mission models

Mission Design Tool: web-based front end

Access to OT SmallSat Catalog of partner products and services

Perform trade analyses and price comparisons

Orbital Transports Mission Cloud

Mission Cloud by Orbital Transports

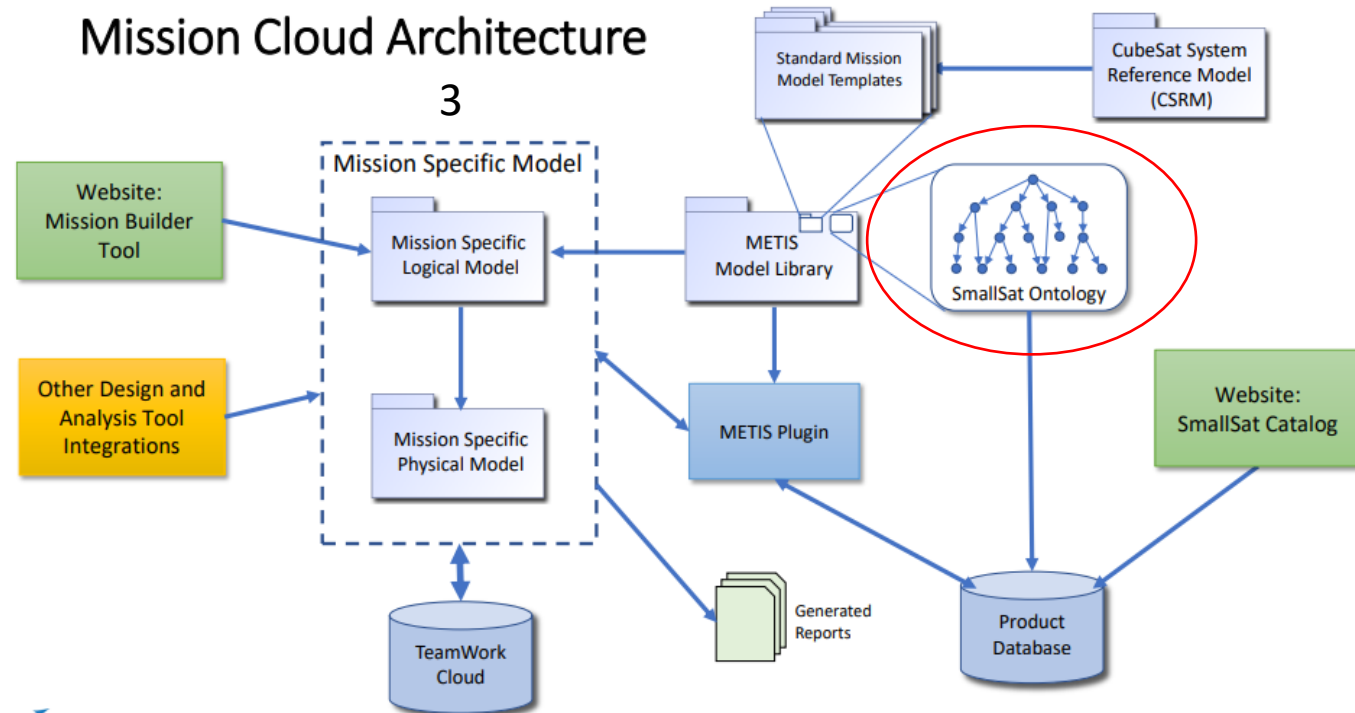
- Enterprise MBSE for small satellite missions
- Provides mission model templates based on CSRM
- Extends CSRM features significantly

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Mission Cloud Architecture



Primary Model Elements Provided by Mission Template Models

Stakeholders

Technical Measures

Use Cases

Requirements

Logical Architecture

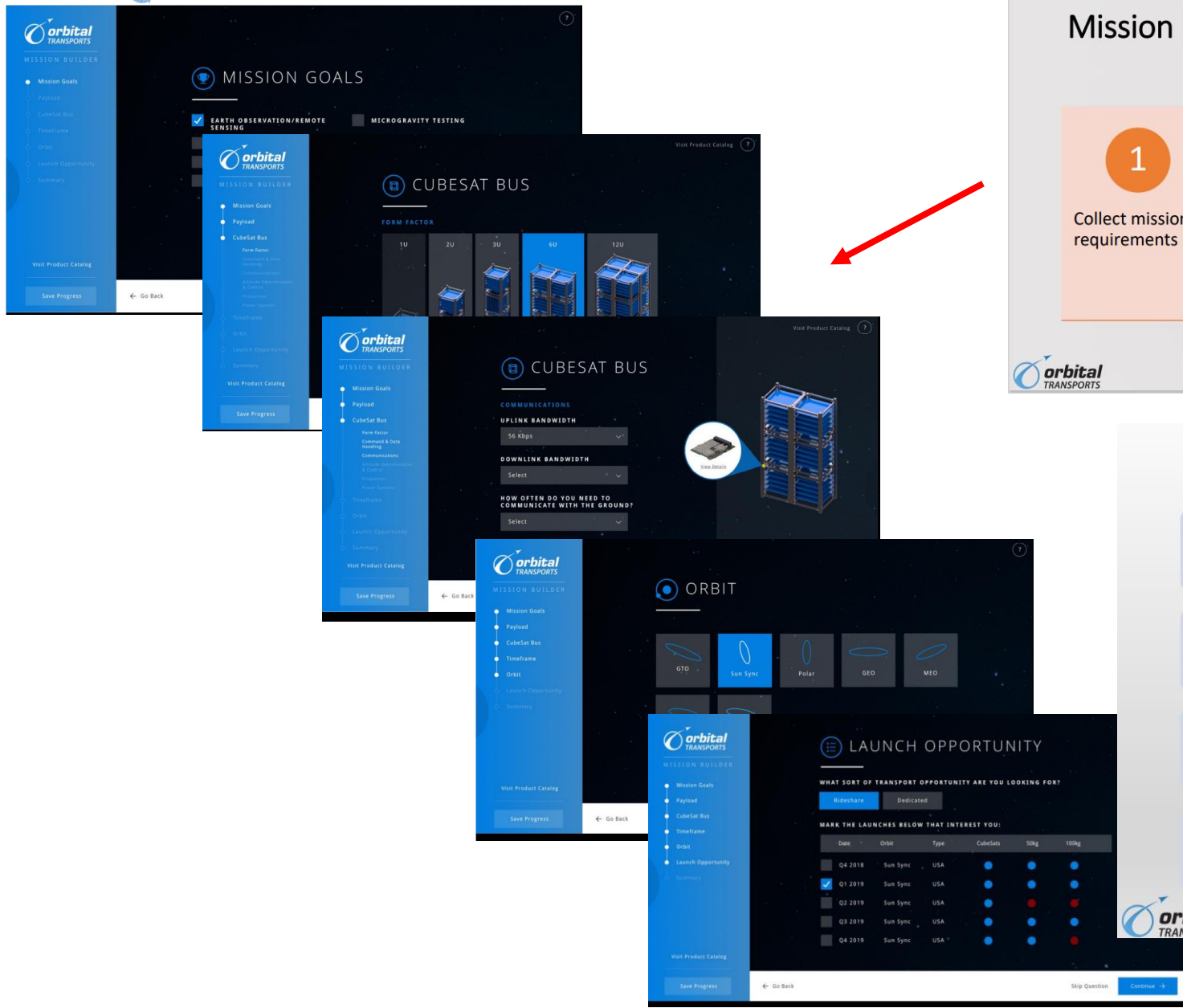
Validation and Verification

Physical Design

Project Plan and Schedule

CSRM

Mission life cycle methodology from Requirements to Logical Architecture to Physical Architecture




The screenshots illustrate the workflow of the Mission Design Tool:

- MISSION GOALS:** Selecting mission goals like "EARTH OBSERVATION/REMOTE SENSING" and "MICROGRAVITY TESTING".
- CUBESAT BUS (FORM FACTOR):** Choosing bus configurations (1U, 2U, 3U, 6U, 12U).
- CUBESAT BUS (COMMUNICATIONS):** Configuring uplink/downlink bandwidth and communication frequency.
- ORBIT:** Selecting orbit types (GTO, Sun Sync, Polar, GEO, MEO).
- LAUNCH OPPORTUNITY:** Viewing a table of launch opportunities.

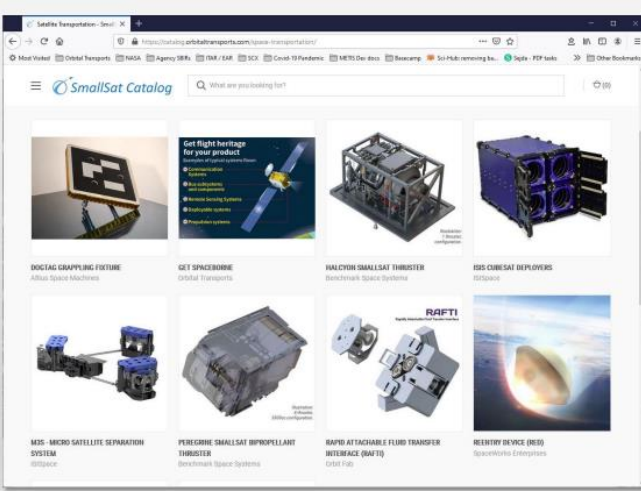
Mission Design Tool

- 1 Collect mission requirements
- 2 Select and configure smallsat components
- 3 Compare pricing
- 4 Find launch options




SmallSat Catalog

- Bringing the smallsat supply chain online
- One-stop shop for all your smallsat mission needs
- Hardware, software, services and engineering expertise
- Convenient go-to resource to check out the latest and greatest

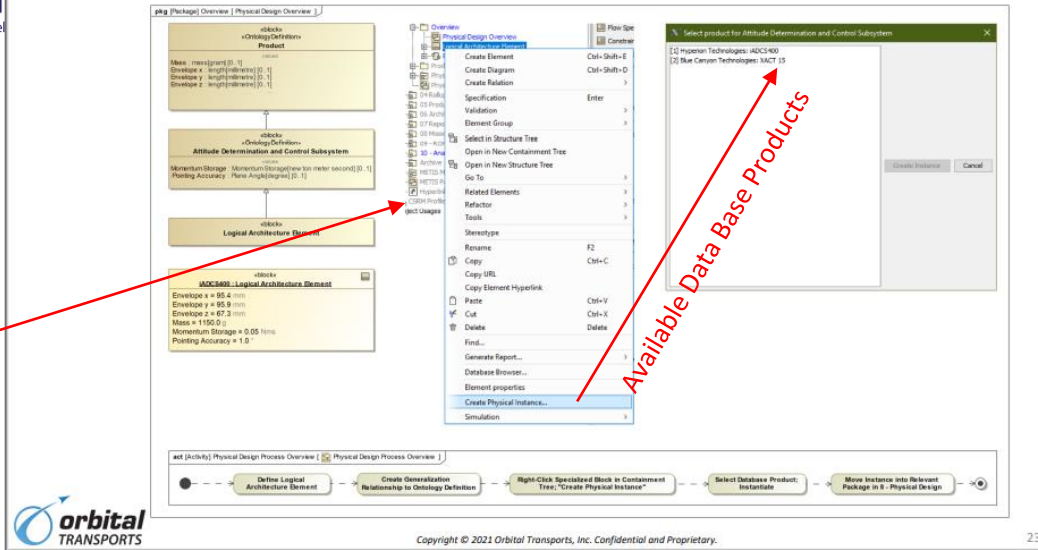


The catalog website displays various satellite components and launch opportunities, including:

- SOCKET GRAPPLING FIXTURE
- GET SPINERBITE
- WALKEYE SMALLSAT THRUSTER
- ISS CUBESAT DEPLOYER
- MINI-MICRO SATELLITE SEPARATION SYSTEM
- PERFORMER SMALLSAT BIPROPPELLANT THRUSTER
- RAPID ATTACHABLE FLUID TRANSFER INTERFACE (RAFTI)
- RELIERY DEVICE (RED)

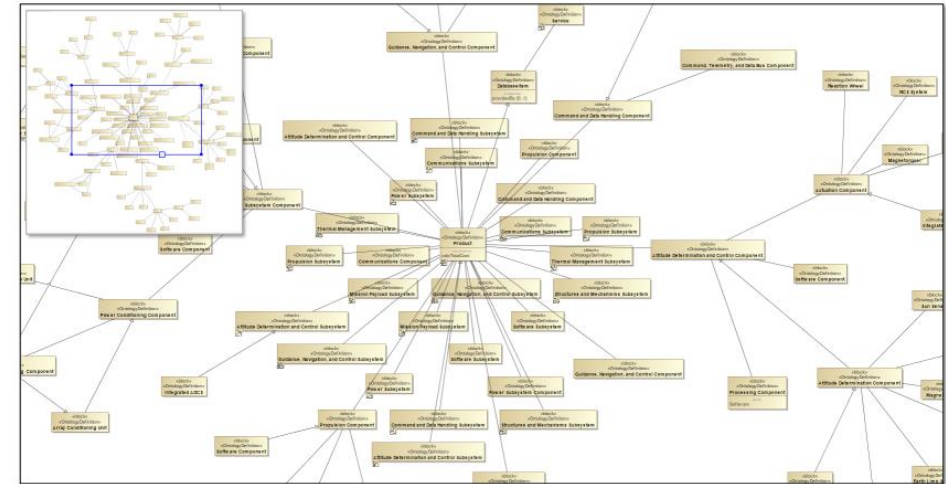


Logical Architecture to Physical Design Process



Containment Tree

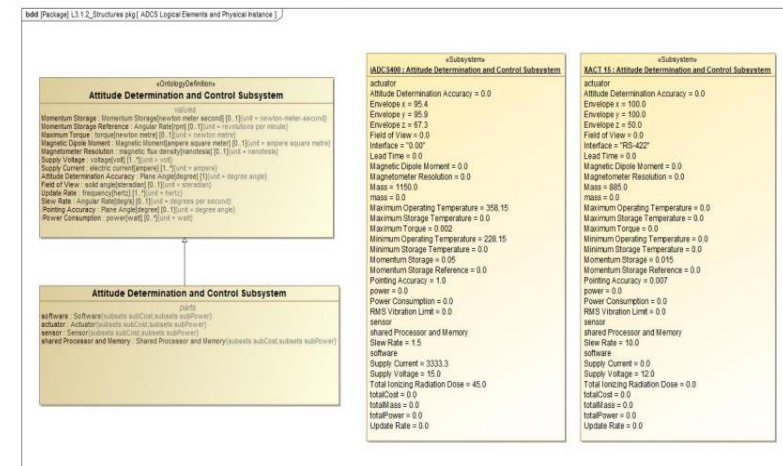
Product Ontology



What is the story here ?

- The logical architecture defines logical elements corresponding to an abstract architecture.
- The block elements describe relatively generic subsystems and components (e.g. OBC, ADCS, etc.). These items are linked by generalization relationships to corresponding definitions in the Ontology, so they inherit the attributes and properties from the Ontology definitions.
- Physical instances are created from the logical elements to represent a specific physical implementation (e.g. Hyperion iADCS 400). The instance properties are defined by the ontology definitions and their values are populated with data retrieved from the product database.
- The Logical Architecture to Physical Design slide is representative of the process of selecting an element from the Logical Architecture, choosing a product from the product database corresponding to the selected architecture element, and automatically creating the physical instance using the product data retrieved from the database.
- The Logical Elements and Physical Instances slide shows the ontology and logical architecture block defining the ADCS subsystem and two physical instances with the property values populated for two different products.

Logical Elements and Physical Instances



The Model is the Source of Truth

Project Planning and Scheduling
Schedule Estimation

#	Name	StartDate	EndDate	Subtask	Pre-Condition
1	Overview				
2	WP	08/02/20 09:00 AM	08/09/20 13:00 AM	WP.1: WP.Package	WP.1: WP.Package
3	WP.1	08/02/20 09:00 AM	08/09/20 13:00 AM	WP.1.1: WP.Package	WP.1.2: WP.Package
4	WP.1.1	08/02/20 09:00 AM	08/03/20 03:00 PM		
5	WP.1.2	08/02/20 03:00 PM	08/03/20 03:00 PM		
6	WP.1.3	08/02/20 09:00 AM	08/09/20 03:00 AM		
7	WP.2	08/02/20 09:00 AM	08/02/20 09:00 AM		

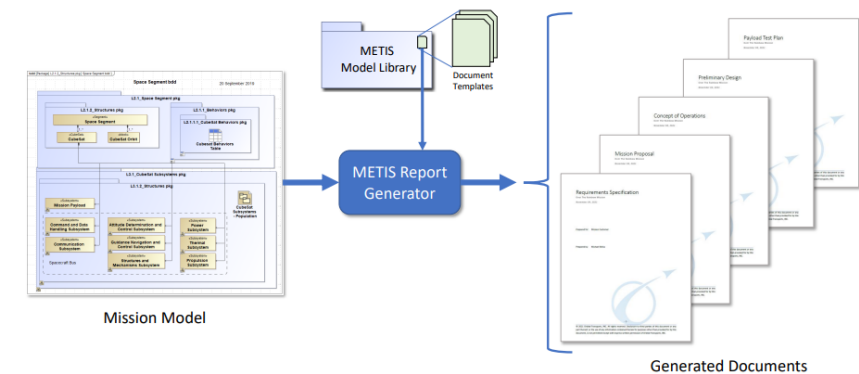
Once the previous SE steps are completed, then cost & schedule are estimated, Document Generation is printed for review

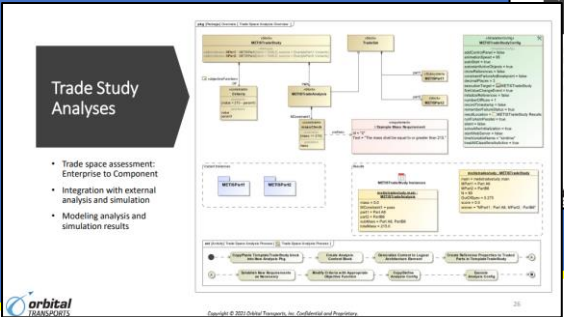
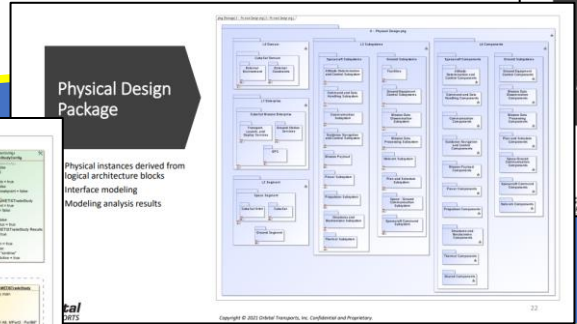
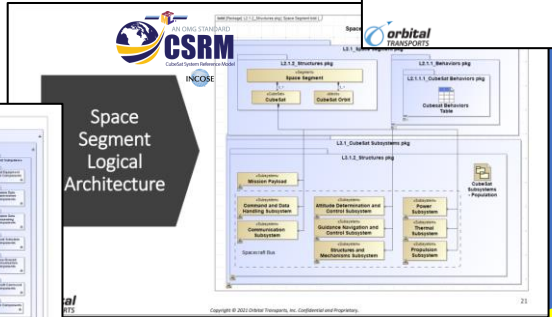
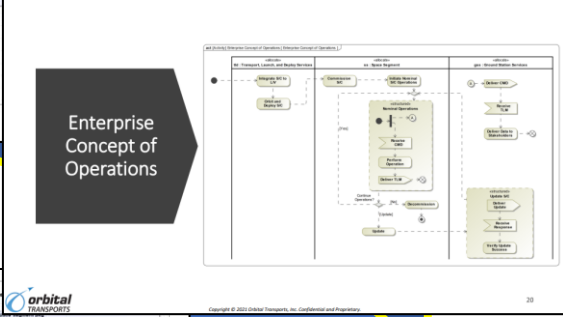
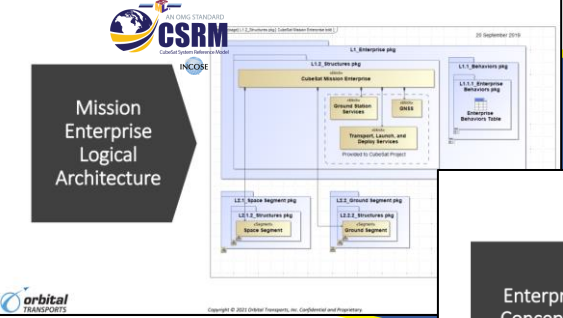
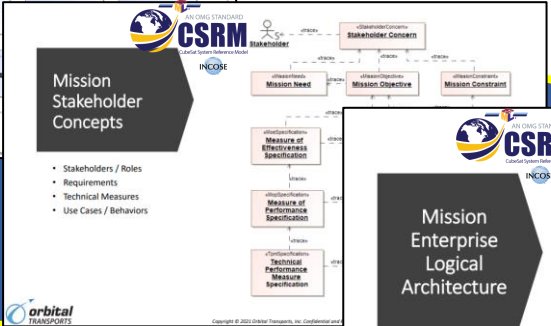
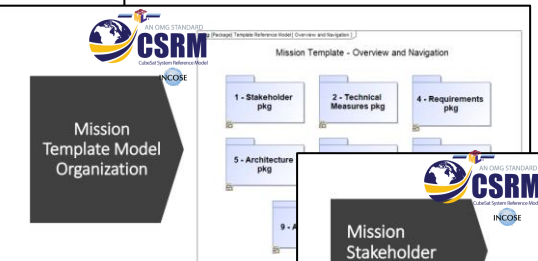
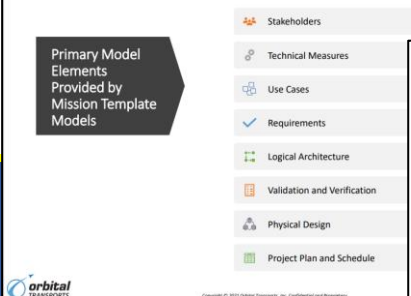
Orbital Transports' Mission Model
Drives the Documents
(Docs do NOT Drive the Process)

Project Planning and Scheduling
Cost Estimation

#	Name	Equipment	totalEquipment	totalNRE	totalCost
1	Overview				
2	WP		38000	4300	22300
3	WP.1	EM OBC - Command and Data Handling Subsystem	38000	3900	21000
4	WP.1.1		0	200	200
5	WP.1.2	EO Payload Flight Test Article: Mission Payload Subsystem	17000	1000	38900
6	WP.1.3		0	300	300
7	WP.2		0	800	800

Systems Engineering Document Generation





Once QAE Council Review Completed – Documents are Submitted to Customer