

Resource And Operations Analysis Model (ROAM)

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Resource And Operations Analysis Model (ROAM)

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Resource And Operations Analysis Model (ROAM)

Purpose

To determine the ability of a postulated vehicle design to conduct a series of interplanetary missions.

Overview

The ROAM analyst defines the vehicles and mission scenarios. The tool schedules the missions, and determines the amounts of propellant and cargo necessary to support the multi-mission plan.

System Description

ROAM is a stand-alone Windows PC application. It consists of a client program, containing the user interface and all application logic, and a data repository containing all input and output data. In normal operation, both elements are loaded on the analyst's PC. The data repository may be placed on a network fileserver, if desired.

Resource And Operations Analysis Model (ROAM)

Inputs

Vehicle Design

Modules
Carriers

Mass, Performance (Isp), Cargo capacity
Tare mass, Capacity (mass/vol)

Cargo Items

Mass/density, Carrier assignment

Mission Design

Events

Event linkage, Required energy (Delta V), Module assignment

Cargo Requirements

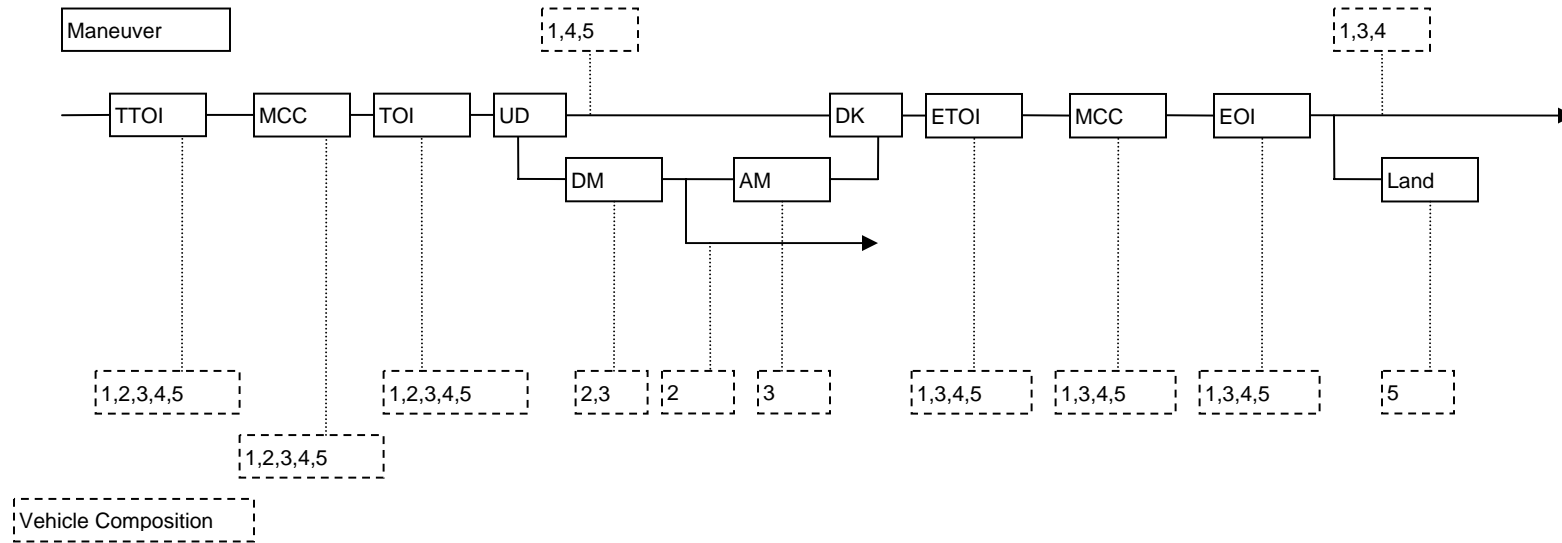
Rates (Annual, Per Crewmember), Vehicle/Delivery

Mission Schedule

First mission, mission interval, number of missions

Resource And Operations Analysis Model (ROAM)

Mission Timeline Schematic



Vehicle Elements:

1: Propulsion and Service 2: Descent Module 3: Ascent Module 4: Crew Module 5: CEV

Maneuvers:

TTOI: Target Transfer Orbit Insertion MCC: Mid Course Correction TOI: Target Orbit Insertion DM: Descent Maneuver
 AM: Ascent Maneuver UD: Undock DK: Dock
 ETOI: Earth Transfer Orbit Insertion EOI: Earth Orbit Insertion Land: Earth Landing

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Outputs

Multi-mission Schedule

Propellant requirements for each event

Cargo requirements

Vehicle and Crew support

Delivery to supported station

Analysis results exported to MS Excel[®] workbook

Data Organization

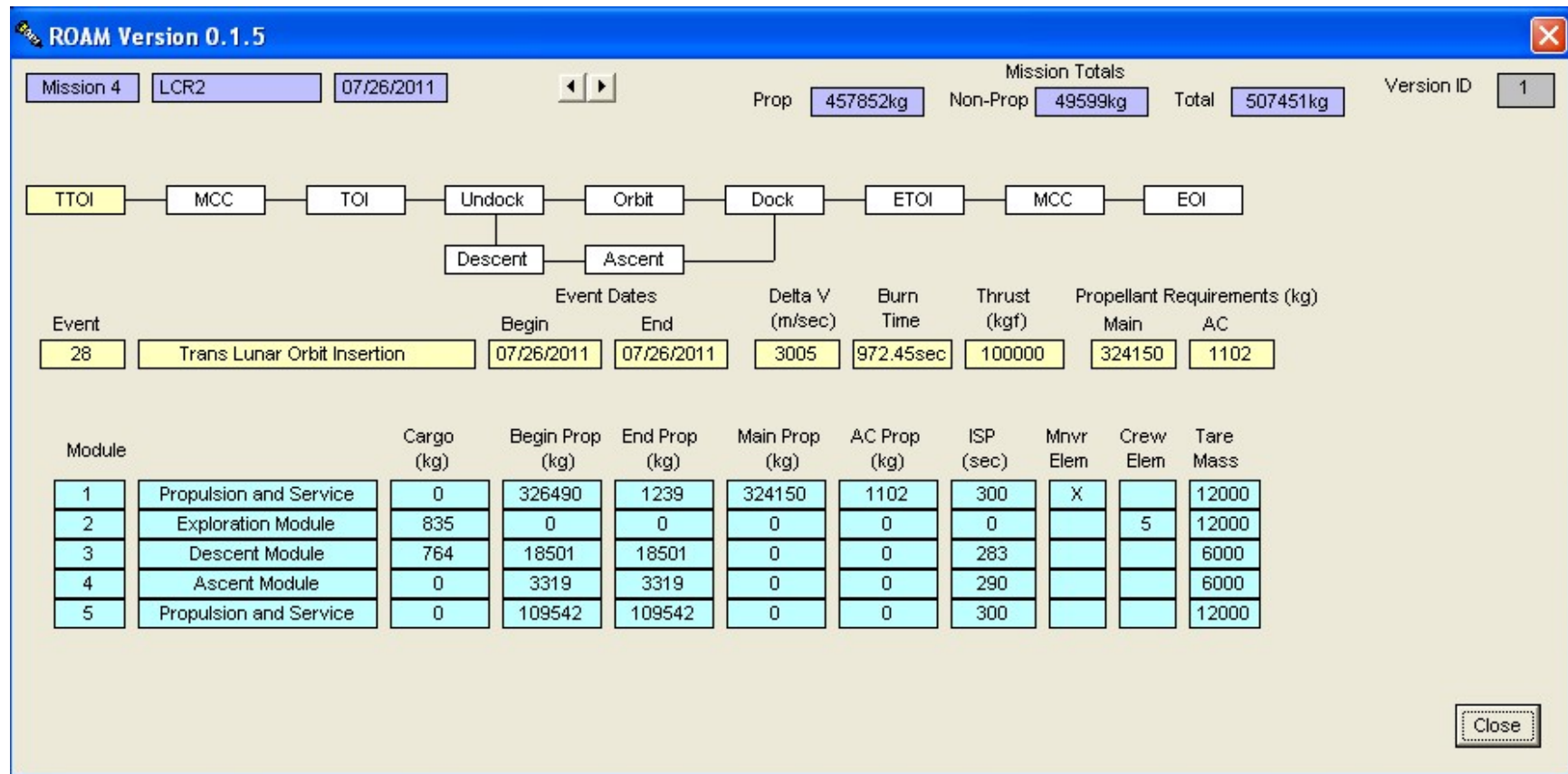
Data resides in an external database

Data is 'Versioned': multiple, separate scenarios

Scenarios (versions) may be created, deleted, copied, exported, imported

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Mission Output Display



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Enhancements (Future Capabilities)

Variable Thrust/Isp	Modify the propellant requirements calculation to allow modeling of a variable performance profile (e.g.: VASIMIR)
Turnaround Processing	Model the orbital/ground turnaround processing of modules for reuse on subsequent missions
Cargo Conversion	Model the conversion of cargo items from one state to another, generating material which may be reprocessed or discarded
Consumable Reprocessing	Model closed or semi-closed cycle reprocessing of consumable cargo (e.g.: water)
Trash Ejection	Model the periodic reduction of vehicle mass due to discard of unusable material
Orbital Delivery Requirements	Generate requirements for delivery of vehicle elements, cargo and crew
Delivery/Assembly Flight Schedule	Generate an Earth orbital flight schedule for vehicle assembly, provisioning, fueling and support based on known or postulated orbit capable vehicles