Asteroid Exploration System Command Language

The document provides an example command language for Asteroid Exploration Mission Management.

The document includes commands for:
- defining and updating asteroids
- defining spacecraft
- defining missions
- updating mission control resources
- simulating spacecraft messages

Asteroid Commands

This section defines commands for creating and updating Asteroid information.

Identifier: the given unique identifier for the asteroid (e.g. *1 Ceres*, *4 Vesta*, *433 Eros*, etc),
Notes: description and other notes about the asteroid.   Notes can be added over time. Notes have a date, author and text.
Exploration Status:
> *Minerals found, estimated mass, accessibility* (e.g. platinum, 20 metric tons, surface deposit).
> *Water found, quantity, state* (e.g. yes, 20 million liters, ice)
> *Life* (none, single cell organisms, multi cell, intelligent, friendly)

Asteroid Type (C-Type, M-Type, S-Type, Innerbelt comet)
Size: width, length, height
Mass: approximate mass
Surface Gravity: gravitational field at surface
Aphelion: furthest distance from Sun in AUs
Perihelion: closest distance from Sun in AUs

Commands

> # create_asteroid, <asteroid_identifier>, <asteroid_type>, <width>, <length>, <height>, <mass>, <gravity>, <aphelion>, <perihelion>

> # add_asteroid_note, <asteroid_identifer>, <date>, <author>, <text>

> # add_asteroid_mineral_discovery, <asteroid_identifer>, <mineral>, <estimated_mass>, <deposit_type>

add_asteroid_water_discovery, <asteroid_identifer>, <water_found>, <amount>, <state>

add_asteroid_life_discovery, <asteroid_identifer>, <life_type>, <intelligent>, <friendly>

Examples

create_asteroid, 1 Ceres, G_TYPE, 1000, 1000, 1000, 9.43 ± 0.07×10^{20}, 0.028, 2.9858 , 2.5468

add_asteroid_note, 1 Ceres, 11-27-2013, eric, potential source of water for rocket fuel

add_asteroid_mineral_discovery, 1 Ceres, titanium, 1000000, surface

add_asteroid_water_discovery, 1 Ceres, true, 100000000, ice

add_asteroid_life_discovery, 1 Ceres, multi_cell, true, true

Spacecraft Commands

This section defines commands for creating and updating Spacecraft information.

Each spacecraft has the following set of attributes:
Identifier: unique spacecraft call sign
Launch Date: date of launch
Mission: mission identifier
Type (Explorer, Miner)
Status
> *Fuel* (% remaining)
> *Systems*
>> *Guidance* (OK, Not OK)
>> *Communication Link* (OK, Not OK)
>
> *State* (waiting for launch, in route, lost, crashed, landed, exploring, mining, homeward bound, malfunction)

Location (AUs from Sun)
Destination (target Asteroid identifier)

Command

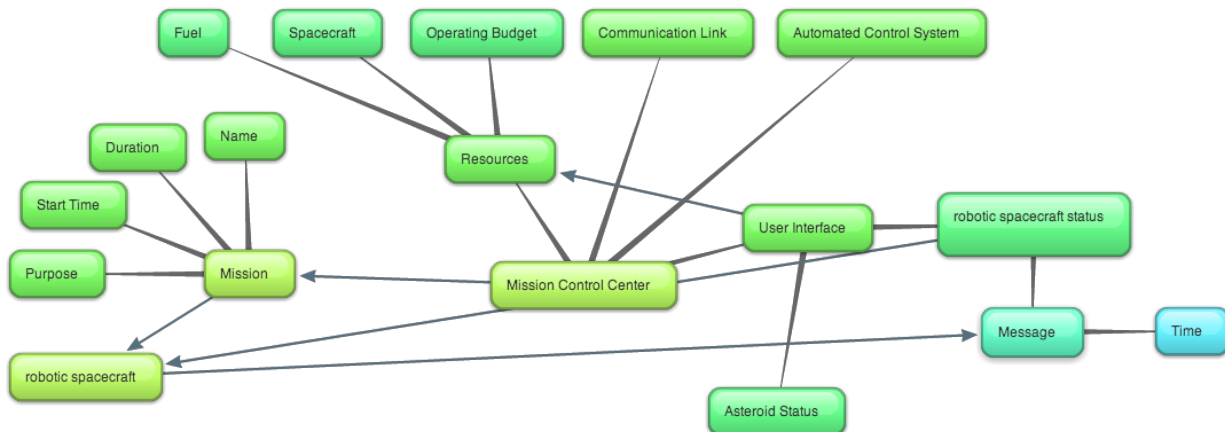> # create_spacecraft, <spacecraft_identifier>, <launch_date>, <mission_identifier>, <spacecraft_type>, <fuel_level>, <guidance_status>, <communication_status>, <state>, <location>, <target_asteroid_identifier>

Example

> create_spacecraft, Ceres Explorer Spacecraft, 12/1/2015, Ceres Explorer Mission, explorer, 100, OK, OK, waiting_for_launch, 1, 1 Ceres

Mission Management Commands

This section defines commands for mission management.

unique id for mission
name of mission (e.g. "sling shot"),
purpose of mission (e.g search for water)
spacecraft id of fully provisioned spacecraft that will perform the mission
launch date (start time)
eta, estimated time of arrival
destination: the destination asteroid for the the Mission
status: (waiting for launch, in progress, complete, aborted)

Commands

create_mission, <mission_identifier>, <mission_name>, <mission_purpose>,
<spacecraft_identifier>, <launch_date>, <eta>,   <target_asteroid_identifier>,
<mission_state>

increment_fuel_resource <amount>
increment_spacecraft_resource <amount>
increment_operating_budge <amount>
set_communicaiton_link_status <status>
set_automated_control_system_status <status>

Examples

create_mission, Ceres Explorer Mission 1, Ceres Explorer Mission 1, Explore Ceres and locate best location to retrieve water, Ceres Explorer Spacecraft, 12/1/2013, 12/1/2015, 1 Ceres, waiting for launch

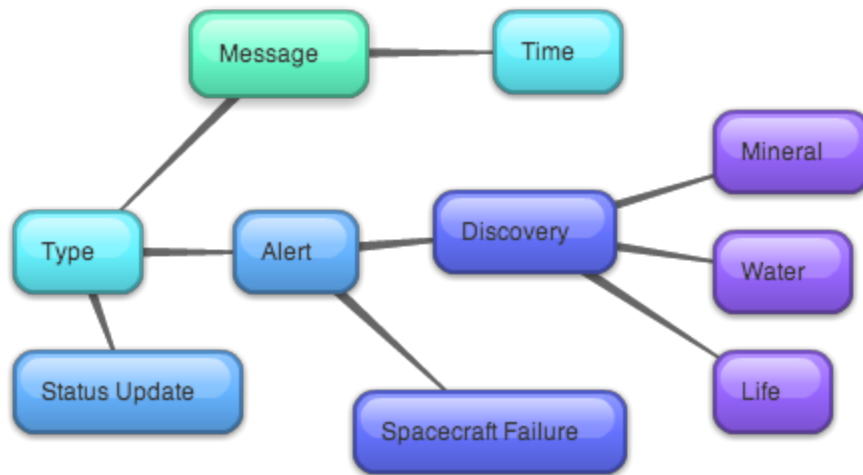increment_fuel_resource -1000
increment_spacecraft_resource -1
increment_operating_budge -1000000
set_communicaiton_link_status OK
set_automated_control_system_status NOT_OK

Simulating Spacecraft Messages

This section defines commands for simulating spacecraft messages.

Commands

create_spacecraft_status_message, <spacecraft_identifier>, <timestamp>, <mission_identifier>, <spacecraft_type>, <fuel_level>, <guidance_status>, <communication_status>, <state>, <location>, <target_asteroid_identifier>

create_spacecraft_fault_alert_message, <spacecraft_identifier>, <timestamp>, <failure_type>

create_spacecraft_mineral_discovery_message, <spacecraft_identifier>, <timestamp>, <asteroid_identifer>, <mineral>, <estimated_mass>, <deposit_type>

create_spacecraft_water_discovery_message, <spacecraft_identifier>, <timestamp>, <asteroid_identifer>, <water_found>, <amount>, <state>

create_spacecraft_life_discovery_message, <spacecraft_identifier>, <timestamp>, <asteroid_identifer>, <life_type>, <intelligent>, <friendly>

Examples

create_spacecraft_status_message, Ceres Explorer Spacecraft, 2014:7:1::15:01, Ceres Explorer Mission 1, explorer, 80%, OK, OK, in_route, 1.4, 1 Ceres

create_spacecraft_fault_alert_message, Ceres Explorer Spacecraft, 2014:7:1::15:01,
solar_panel_damaged

create_spacecraft_mineral_discovery_message, Ceres Explorer Spacecraft,
2014:7:1::15:01, 1 Ceres, titanium, 1000000, surface_deposite

create_spacecraft_water_discovery_message, Ceres Explorer Spacecraft,
2014:7:1::15:01,   1 Ceres, true, 1000000, ice

create_spacecraft_life_discovery_message, Ceres Explorer Spacecraft,
2014:7:1::15:01, 1 Ceres, multi_cell, true, true