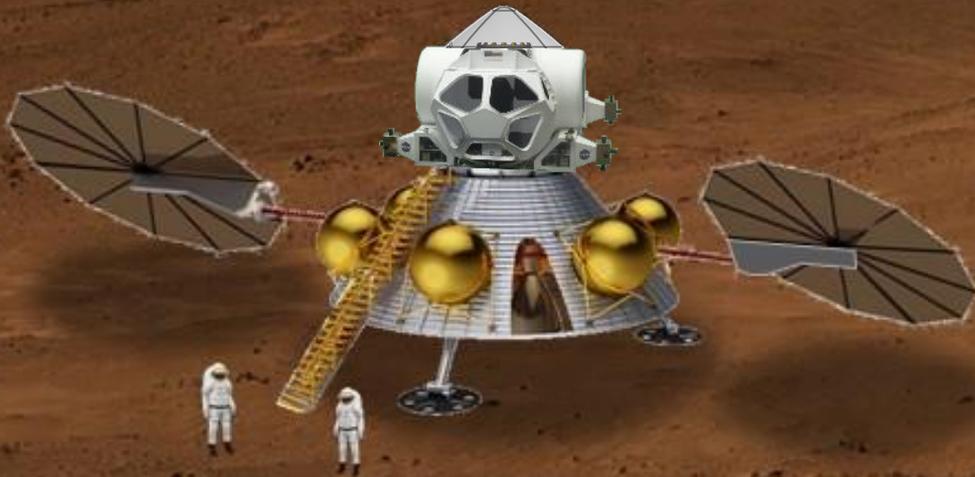


Concepts for Surface Exploration of Mars



July 20, 2017

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Jet Propulsion Laboratory
California Institute of Technology

Why Mars?



- Mars science is compelling
 - Mars was Earth-like over 3 billion years ago
 - Possibility of discovering fossils of extinct microbial life
 - Possibility of discovering extant microbial life underground
 - Humans on-site can be more expedient than robots
- Mars is the most hospitable planet beyond Earth
 - Close to a 24 hour day (compared to Moon's 29 days)
 - Psychologically and physiologically advantageous
 - Potentially better for solar power and thermal control
 - Twice the gravity of the Moon (1/3 g vs. 1/6 g)
 - Accessible water ice glaciers a few meters under the regolith
 - CO₂ atmosphere as a readily accessible resource

BOTH EARTH & MARS HAVE:



MOON(S)
& ECLIPSES



A COMMON
BIRTH

SUN

ATMOSPHERES



TILTS
& SEASONS

YEARS

CLOUDS

DAYS
& NIGHTS

ROBOTS



MAGNETIC
FIELDS

POLAR CAPS

VOLCANOES



WEATHER
& CLIMATE

ROCKS & SOILS



HOT SPRINGS?



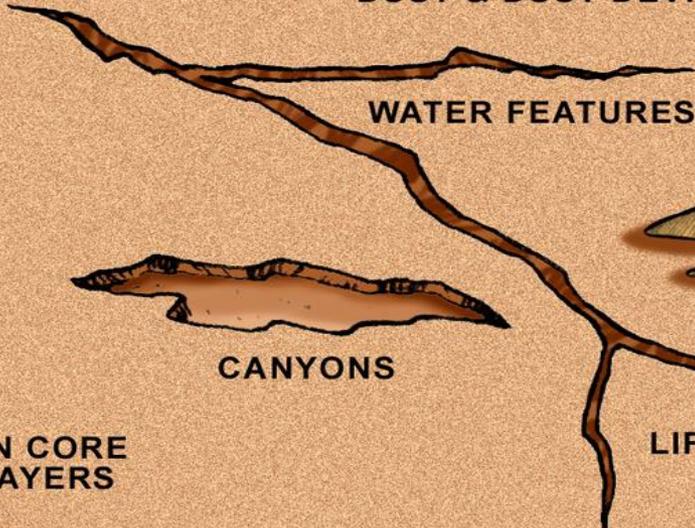
DUST & DUST DEVILS



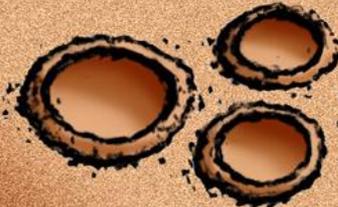
WIND



WATER FEATURES



CRATERS



DUNES



QUAKES?



GRAVITY

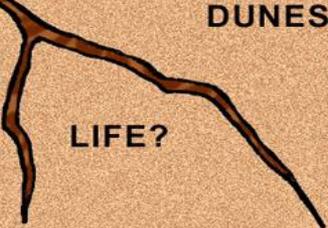
IRON CORE
& LAYERS



CANYONS



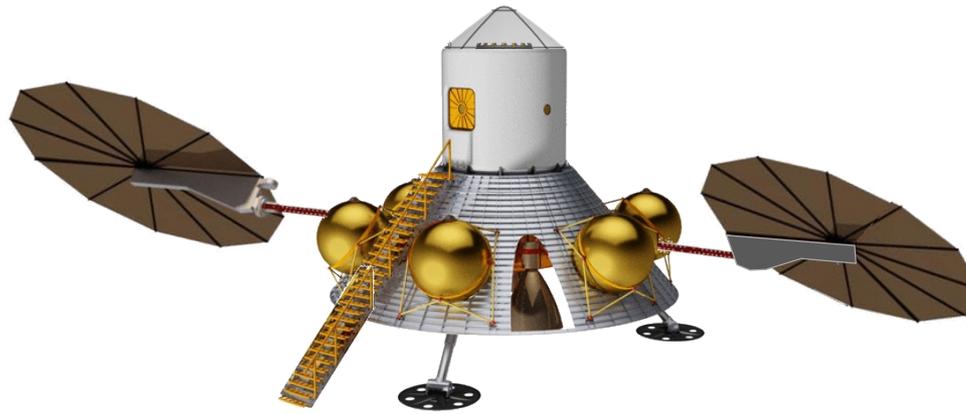
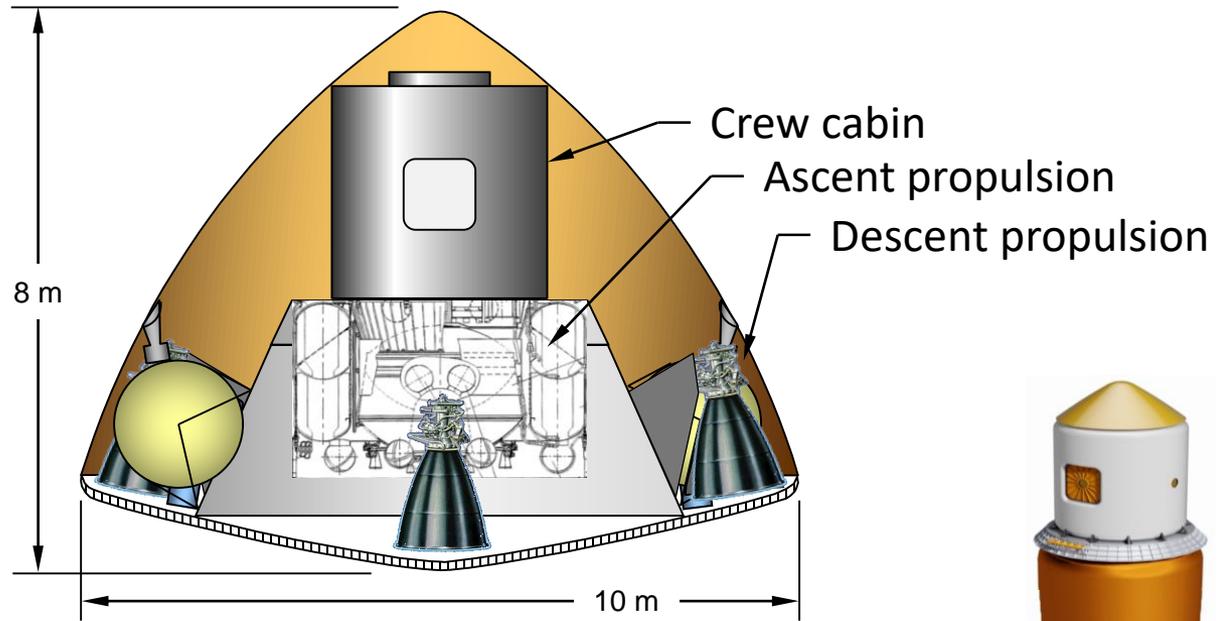
LIFE?



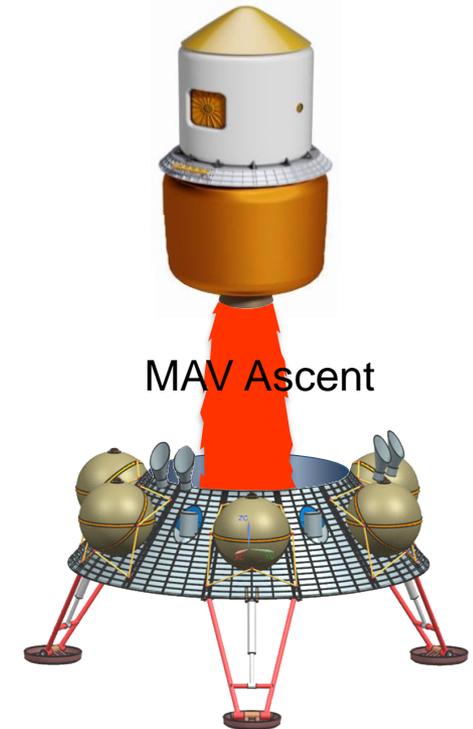
Crew Lander Concept



Launch



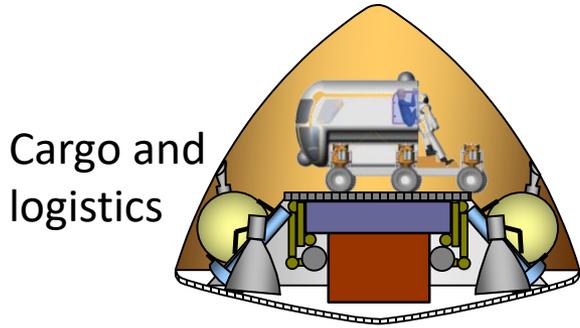
Landed Configuration



MAV Ascent

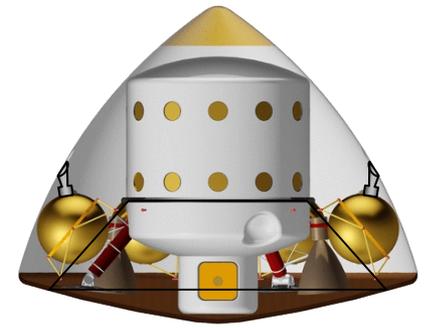
Other Surface Element Concepts

- Cargo and logistics landers would use the same lander design as the crewed lander
 - Could deliver living habitats, power systems, science exploration equipment, food production equipment, etc.

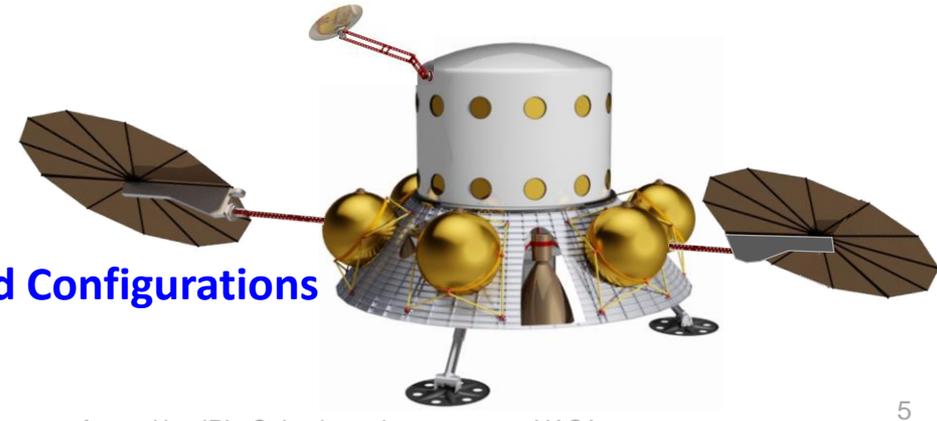
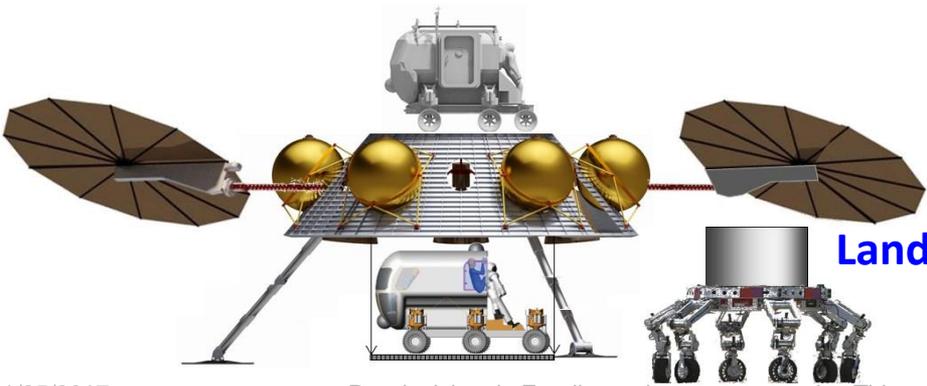


Cargo and logistics

Entry Configurations



Surface habitat



Landed Configurations