Aurora Mission Roadmap

Entry Vehicle Demonstrator (2007)

Primary Objectives:

- Validate the robust design of a re-entry capsule,
- Demonstrate high-speed re-entry technology,
- Demonstrate that planetary protection aspects can be fulfilled,
- Validate operational aspects of sample retrieval.

Mars Sample Return – first launch (2011)

Scientific objectives

- Search for signs of life,
- Perform geological/mineralogical analyses on samples of Martian soil,
- Perform analyses of samples of Martian atmosphere,
- Identify and characterise potential hazards for humans.

Technological objectives

- Entry, descent and landing system validation,
- Mars ascent vehicle validation,
- Sampling of atmosphere, top and deep soil,
- Forward and backward planetary protection,
- Operational aspects of a round trip to Mars.

Human Mission Technologies Demonstrator(s) (2014)

Primary Objectives

- Demonstrate assembly in orbit for planetary missions,
- Demonstration of Life Support Aspects of Moon Mission in LEO,
- Demonstration of Habitation Aspects of Moon Mission in LEO,
- Demonstration of EVA Aspects of Rehearsal Mission 1 in LEO,
- Demonstration of micro-gravity countermeasures in LEO,
- Demonstrate Mars Docking System in LEO,
- Demonstrate Re-entry Vehicle from LEO.

Secondary Objectives

- Perform operational procedures,
- Perform Life Sciences experiments.

Human Moon Mission (2024)

Primary Objectives

- Demonstration of Life Support System,
- Demonstration of Habitation Module for interplanetary trajectory,
- Demonstration of In-space and Surface EVA,
- Demonstration of Re-entry to Earth,
- Crew aspects following long term isolation,
- Crew performance aspects in reduced gravity after prolonged micro-gravity
- Demonstration of operational capability.

Secondary Objectives

- Perform exploration tasks on the Moon,
- Perform science tasks on the Moon.

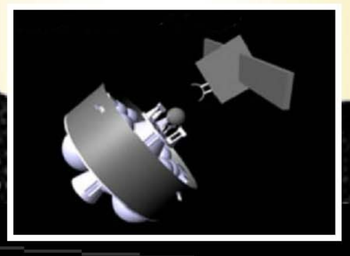
Cargo element of First Human Mission (2030)

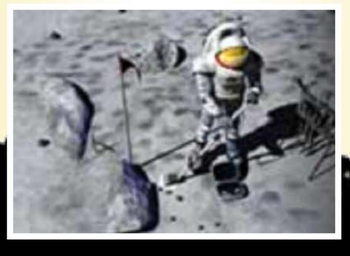
Primary Objectives

- Land a crew of humans on Mars by 2030 and return them safely, ensuring planetary protection for both Earth and Mars,
- Demonstrate human capabilities needed to support human presence on Mars,
- Perform exploration and expand scientific knowledge taking maximum advantage of human presence including sample selection.

Secondary Objectives

- Assess suitability of planet for long term human presence (habitability, resources availability, engineering constraints),





Entry Vehicle Demonstrator (EVD)

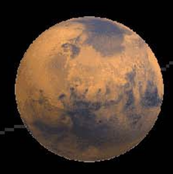
Mars Sample Return (MSR) – first launch

Human Mission Technologies Demonstrator(s)

Human Moon Mission

Cargo element of First Human Mission

2007 2009 2011 2014 2018 2024 2026 2030 2033



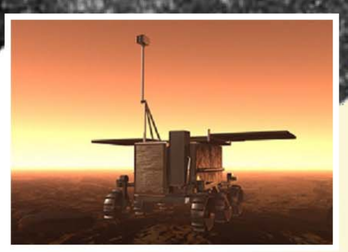
ExoMars

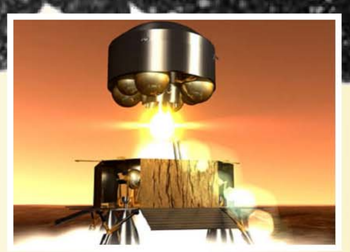
Mars Sample Return (MSR) – second launch

Technological Pre-cursor Mission

Automatic Mars Mission

First Human Mission to Mars





ExoMars (2009)

Scientific objectives

- Search for signs of past and present life,
- Identification and characterisation of potential hazards to humans,
- Enhancement of the knowledge of the Martian environment.

Technological objectives

- Landing of large payloads on the surface of Mars,
- Solar electric power application on the surface of Mars,
- Mars surface mobility,
- Rendezvous in Mars orbit,
- Forward planetary protection.

Mars Sample Return – second launch (2014)

Scientific objectives

- Search for signs of life,
- Perform geological/mineralogical analyses on samples of Martian soil,
- Perform analyses of samples of Martian atmosphere,
- Identify and characterise potential hazards for humans.

Technological objectives

- Entry, descent and landing system validation,
- Mars ascent vehicle validation,
- Sampling of atmosphere, top and deep soil,
- Forward and backward planetary protection,
- Operational aspects of a round trip to Mars.

Technological Pre-cursor Mission (2018)

Primary Objectives

- Demonstrate intermediate size Aerocapture/Aerobraking,
- Demonstrate intermediate size Solar Electric Propulsion,
- Demonstrate intermediate size Soft/Controlled Landing,
- Demonstration of operational procedures for missions,
- Verification of aerocapture aspects for human size missions,
- Setting up of a In situ propellant production experiment.

Secondary objectives

- Search for signs of life,
- Perform geological/mineralogical analyses on Martian soil,
- Perform analyses of samples of Martian atmosphere,
- Identify and characterise potential hazards for humans.
- Place telecommunication and remote sensing infrastructure.

Automatic Mars Mission (2026)

Primary Objectives

- Demonstration of Interplanetary Propulsion for a man-rated full size vehicle,
- Demonstration of Capture for a man-rated full size vehicle,
- Demonstration of Entry, Descent and Landing for a man-rated full size vehicle,
- Demonstration of Ascent and Docking for a man-rated full size vehicle.

Secondary Objectives

- Delivery of Surface Infrastructure (rover, tools, beacon etc.),
- Delivery of meteorological station to future landing site,
- Delivery of science packages to the Surface of Mars.

First Human Mission to Mars

Primary Objectives

- Land a crew of humans on Mars by 2030 and return them safely, ensuring planetary protection for both Earth and Mars,
- Demonstrate human capabilities needed to support human presence on Mars,
- Perform exploration and expand scientific knowledge taking maximum advantage of human presence including sample selection.

Secondary Objectives

- Assess suitability of planet for long term human presence (habitability, resources availability, engineering constraints),

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