Joint Mars Programme Report
• ESA and NASA have agreed to embark on a joint Mars robotic exploration programme:
  ➢ Initial missions have been defined for the 2016 and 2018 launch opportunities;
  ➢ The joint programme’s ultimate objective is an international Mars Sample Return mission.

2016
ESA-led mission
Launcher: NASA – Atlas V 431
Orbiter: ESA
Payload: NASA-ESA
EDL Demo: ESA

2018
NASA-led mission
Launcher: NASA – Atlas V 541
Cruise & EDL: NASA
Rover: Joint, ESA-NASA
• **Joint Mars Executive Board (JMEB)** is the governing authority for the Joint Program

• JMEB defines mission formulation parameters and partnership arrangements/agreements, forms Joint Engineering or Science Working Groups (JEWG/JSWG) and acts as an adjudication authority for issues not resolvable at Project level

• Project Managers report within their Agency’s traditional chain-of-command as well as to the JMEB for issues affecting both partners

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**Diagram:**

- **NASA**
  - Science Mission Directorate
    - Planetary Science Division

- **ESA**
  - Science and Robotic Exploration Directorate

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**Joint Mars Executive Board**

- Mars Exploration Program Director
- Lead Scientist for Mars Exploration
- Mars Program Manager
- Robotic Exploration Coordination Office Head
- Mars Lead Scientist (TBC)
- Science & Robotic Exploration Projects Department Manager

**Project Managers**
Joint Mars Exploration Program (JMEP)

**Joint Mars Executive Board (JMEB):**
- Steering of the joint programme, guidance for formulating missions, requirements, and programme architecture;
- Oversight on implementation of missions.

**Joint Mars Architecture Review Team (JMART):**
- Independent review team to assess/critique programme level architecture, programmatic risk, national priorities, etc.

**Joint Engineering Working Group (JEWG):**
- Advanced engineering planning group; standing organisation at ESTEC & JPL.
- Develop cooperative architecture options for shared mission responsibilities.
- Complete for 2016 ExoMars TGO, on-going for 2018 Rover mission, starting for Mars Sample Return.

**Joint Instrument and other Study Groups:**
- Established by the JMEB. For example, Joint Instrument Definition Team (JIDT) defined the investigation capabilities for the 2016 orbiter mission. Joint Science Working Group (JSWG) starting for 2018.
- 2R-iSAG two-rover science analysis group explored science cooperation possibilities for the 2018 rovers. E2E-iSAG to carry out an end-to-end MSR science analysis.
• Recent challenges:
  - Funding shortfall in NASA does not allow the implementation of the 2018 two-rover mission;
  - European industry price proposal exceeded financial target.

• March 2011 ESA-NASA Bi-Lateral meeting agreed to pursue 2018 joint single-rover mission concept

• Approved way forward at 26 May 2011 PB-HME preserves 2016 & 2018:
  - Following intense negotiations during April–June 2011, a price agreement was reached with Industry for the implementation of the 2016 ExoMars TGO mission;
  - The 2018 Joint Rover mission will proceed on the basis of a single rover;
    - Ring fence (set aside) ESA budget for covering industrial rover development;
    - NASA budget process underway in Congress for FY2012 and in NASA for FY2013 and beyond
    - The Joint Rover will pursue the search-for-life goals of ESA, and the first step Mars Sample Return goals of NASA and the US National Academy's Decadal Survey;
  - The 2018 mission is very cost constrained.
    - NASA has cost-capped its share of the 2018 mission
• 2016 ExoMars Trace Gas Orbiter mission:
  - Industrial Policy Committee (IPC) 29–30 June 2011
    Seek funding for Phase C/D. Requires signed ESA-NASA commitment for both missions;
  - Phase C/D kick-off 1 July 2011

• 2018 Joint Rover mission:
  - Design study completion and proposal preparation Sep–Oct 2011
  - Final agreement on contributions Nov 2011
  - IPC Feb 2012
  - Phase B/C/D kick-off (3-month Phase B) Apr 2012
  - Phase C/D activities Jul 2012
EDM

- A European technology demonstrator for landing medium-large payloads on Mars;
- Provides a limited, but useful means to conduct scientific measurements during the dust storm season.

EDM SURFACE PAYLOAD

- Lifetime: 2–4 sols;
- Integrated payload mass: 3 kg;
- Data: single pass of 50 Mbits.
Second solicitation for proposals jointly organised by ESA and NASA.

ESA released AO in Nov 2010; 8 proposals received on 1 Mar 2011.

Both agencies took part in the review process.

NASA is only supporting US Co-I’s in selected proposals.
Selected Investigations

**EDM Surface Payload: DREAMS, including**

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<td>Francesca Esposito</td>
<td>INAF – Osservatorio Astronomico di Capodimonte (I)</td>
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<td>Franck Montmessin</td>
<td>LATMOS (F)</td>
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**EDM Entry and Descent Science: Merged proposals EDL Science + Ideas**

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<td>Università di Padova (I)</td>
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<td>François Forget</td>
<td>Laboratoire de Météorologie Dynamique (F)</td>
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**Surface camera:**

_Could not be selected from the submitted proposals._

_Various ESA advisory bodies have recommended that a colour surface camera be included in the payload._

_The project is investigating options for realising this, possibly in combination with a descent camera._
• After March 2011 Bi-Lat and agreement to study a single, joint rover
  – Joint Engineering and Science Working Groups established

• JSWG defined initial requirements to address joint sample return and exobiology objectives
  – In situ investigations: Be able to conduct a set of geological and exobiological studies on the surface and subsurface (down to 2-m depth)
  – Returned sample study: Be able to characterize and cache samples of rock, regolith, and atmospheric gas for intended return to Earth

• JEWG working with JSWG to establish candidate “Threshold” Mission-level requirements
  – Landing site accessibility, mission life, etc., not to exceed MSL-class performance
  – Trade studies and design concept options are the focus of work forward

• Working Groups have been meeting by telecon and face-to-face since May to refine concepts and iterate concepts with the Executive Board.
The Executive Board approved 2 JEWG design concepts in May for further study:
- Caching and drill on front of rover (Solar and MMRTG variants)
- Caching and drill on opposite ends of rover (solar powered only)

Rover work-share is current focus of the Executive Board over the coming months:
- Hardware/software provisions and roles and responsibilities
- Cost-based decision making for Agency roles

Key upcoming milestones:

**Key Upcoming Milestones**
- Jun 20: Executive Board face-to-face
- Sep ‘11: PB-HME
- Oct ‘11: Joint Mars Architecture Review Team (JMART)
- Dec ‘11: Pre-SRB technical review of concept(s) for MCR
- Dec ‘11: ESA Council
- 2Q CY12: Mission Concept Review