



Canadian Space
Agency

Agence spatiale
canadienne



CSA Exploration Plan

Jean-Claude Piedboeuf
Head, Exploration Planning

Planetary & Terrestrial Mining
Sciences Symposium (PTMSS)
2011/06/20-22, Ottawa, Canada

EXPLORATION SPATIALE
SPACE EXPLORATION



Canada



Canadian Space
Agency

Agence spatiale
canadienne



Outline

- Exploration Plan
 - ◆ Overview of CSA exploration potential activities
- Exploration Core and Stimulus funded projects

EXPLORATION SPATIALE
SPACE EXPLORATION

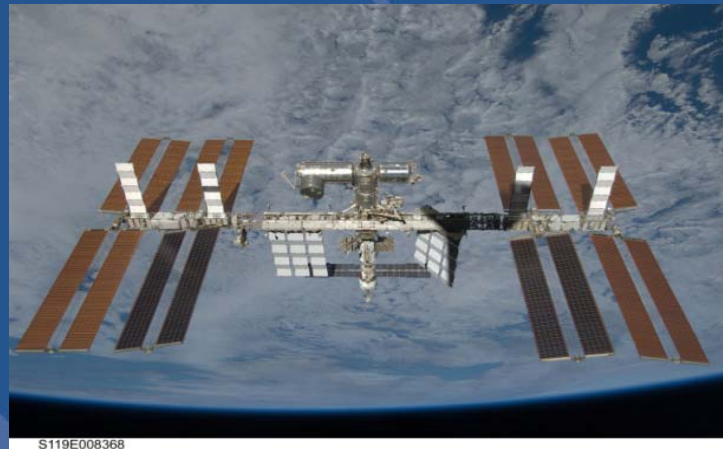


Canada 

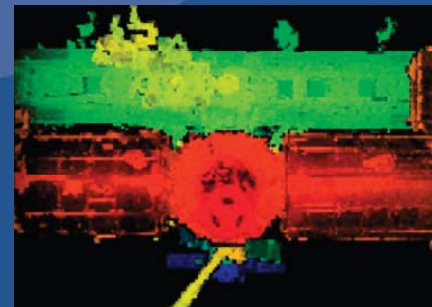


Canadian Space
Agency

Agence spatiale
canadienne



SPACE EXPLORATION PLAN



Canada



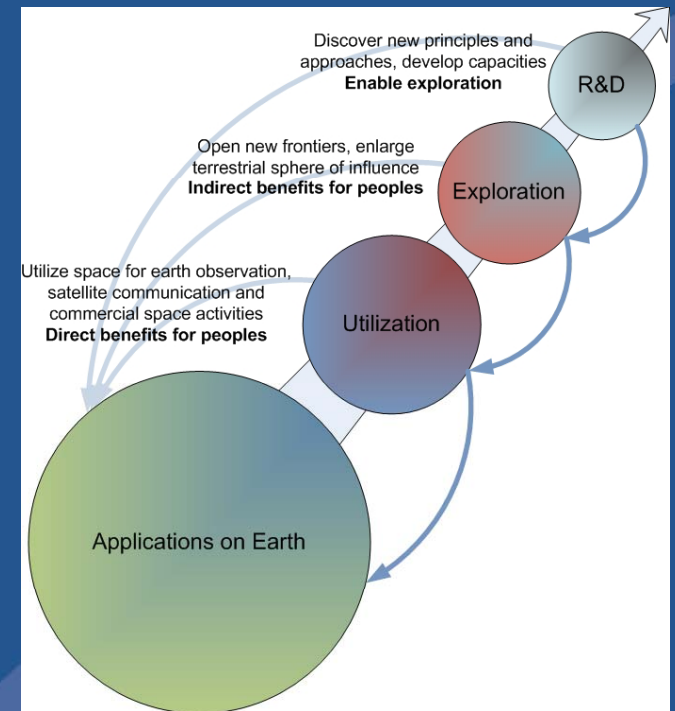
Canadian Space
Agency

Agence spatiale
canadienne



Space Exploration Plan

- Why space exploration?
- Canada's Space Heritage
- Changing Global Context
- CSA Exploration Program
 - ◆ ISS Extension
 - ◆ Importance of robotics
 - ◆ Joint NASA-ESA Mars Exploration
 - ◆ Human spaceflight beyond LEO
 - ◆ Private sector
 - ◆ International collaboration

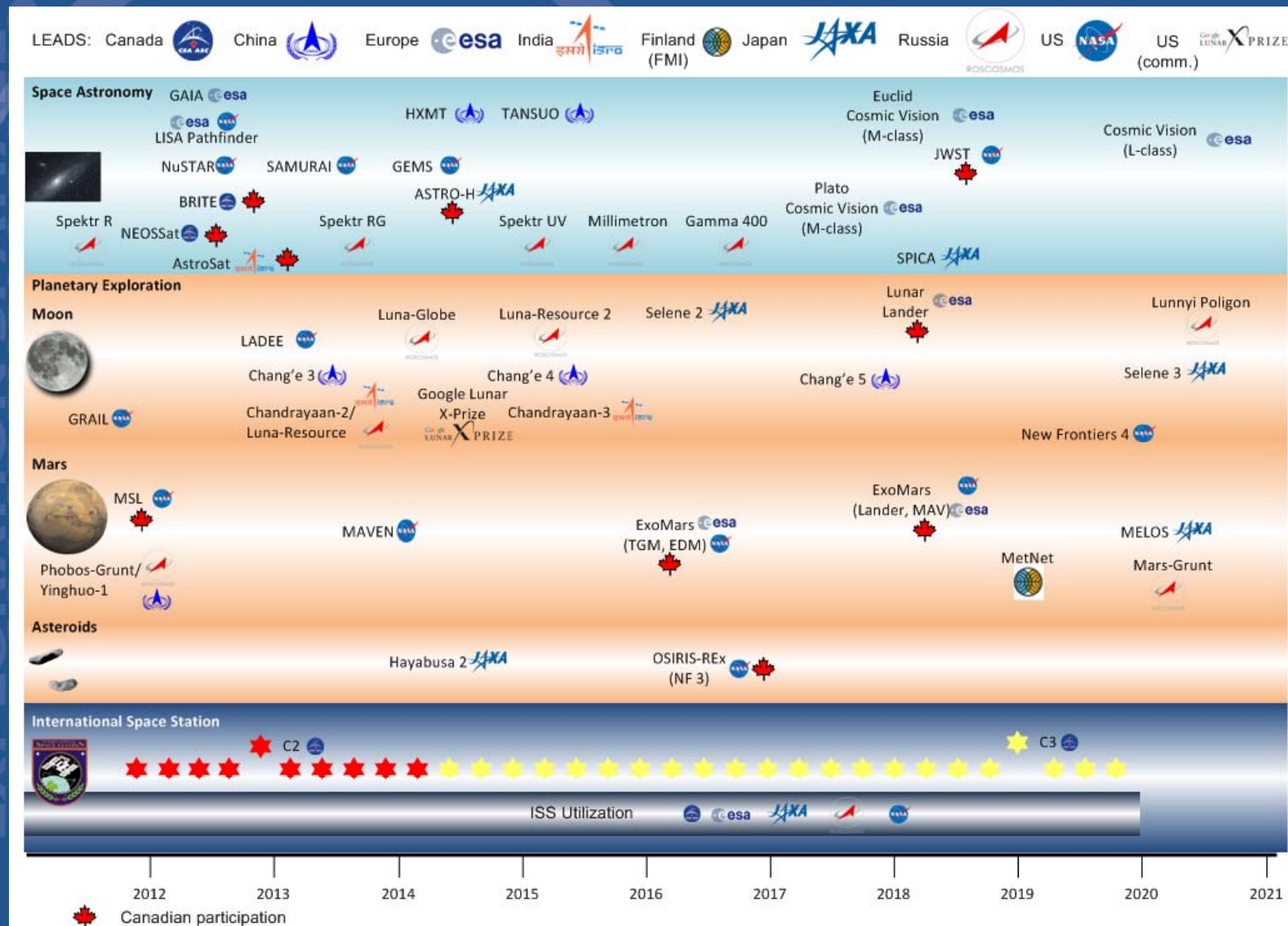




Canadian Space Agency
Agence spatiale
canadienne



International Missions Planned



Canada



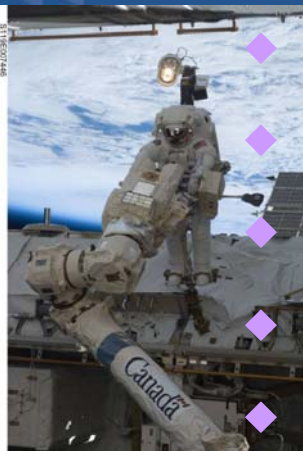
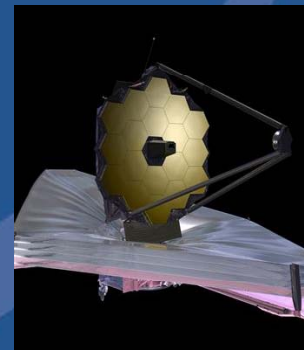
Canadian Space
Agency

Agence spatiale
canadienne



Investments in Space Exploration

- 25 years of investment
- Short-term priorities
- Our Focus – Various Destinations
 - ◆ ISS Operation & Utilization
 - ◆ On-Orbit Robotics
 - ◆ Planetary Exploration:
 - ◆ Moon – Mars
 - ◆ Space Astronomy
 - ◆ Human Exploration
 - ◆ Public Participation
 - ◆ Signature Technologies
 - ◆ Commercial activities



Canada



Canadian Space
Agency

Agence spatiale
canadienne



EXPLORATION SPATIALE
SPACE EXPLORATION

EXPLORATION CORE AND STIMULUS PROJECTS



Canada 

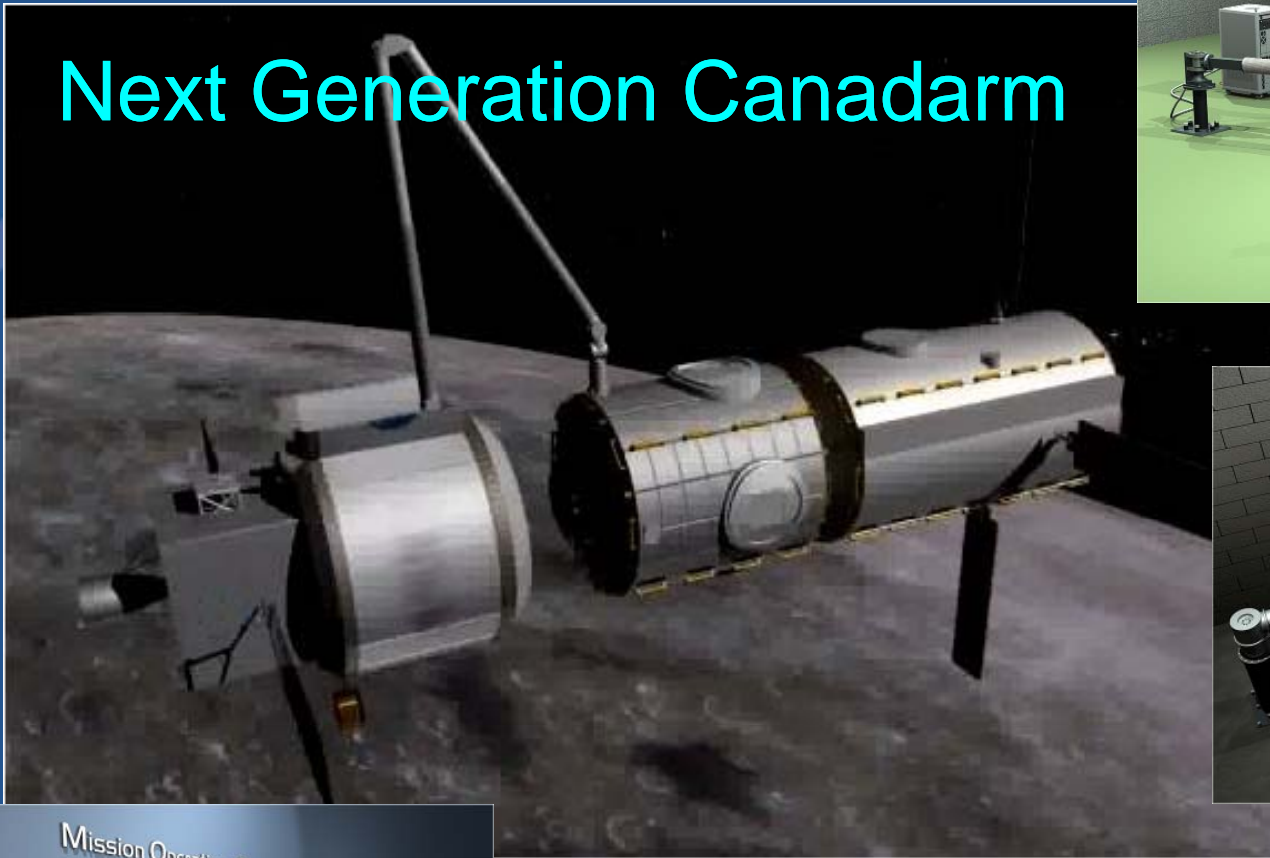


Canadian Space
Agency

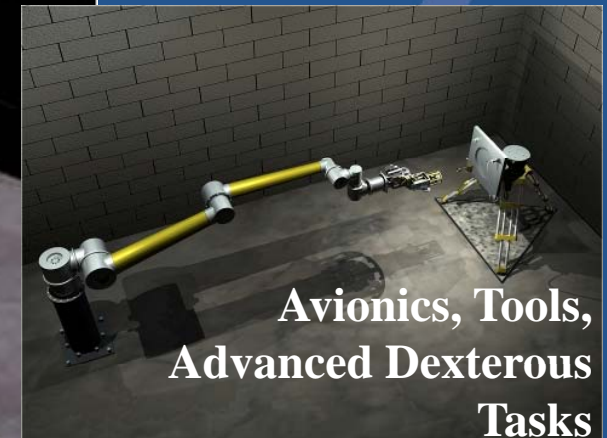
Agence spatiale
canadienne



Next Generation Canadarm



Telescoping booms



Avionics, Tools,
Advanced Dexterous
Tasks



Operations,
Integration



Proximity



Docking

Canada



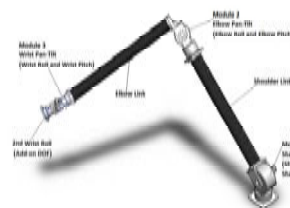
Exploration Surface Mobility (1/2)



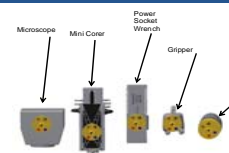
Microscope –
MDA
- Del. 20110516



Small Manipulator:
- ESI
- Del. 20110715



Planetary Medium Manipulator & tools
- ESI
- Del. 20120803

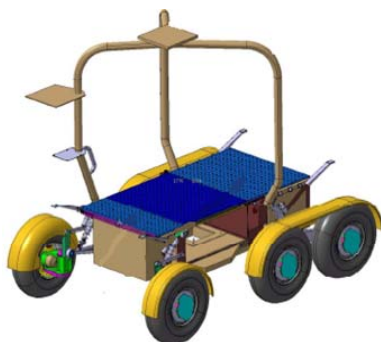


PMM Tools

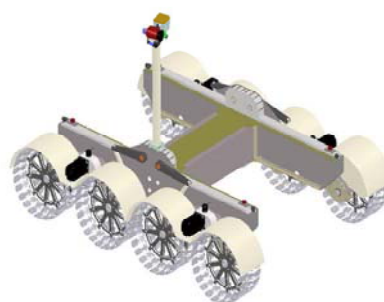
Future Sciences Instruments



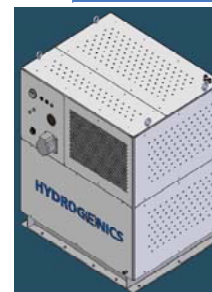
Drill:
- Norcat
- Del. 20120331



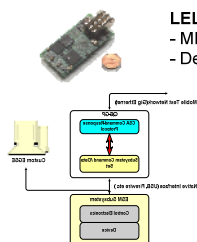
LELR 2 (1.5 prototype):
- MDA
- Del. 20121115 (with int.) 20120920 (without int.)



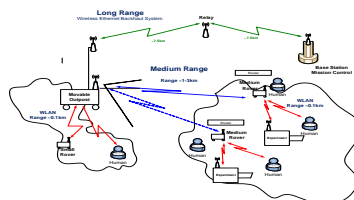
LELR 1 (2 prototypes):
- Neptec
- Del. 20120706 (with int.) 20120620 (without int.)



Fuel Cell:
- Hydrogenics
- Del. 20110531



Generic Pld I/F
- Xiphos
- Del. 20110425



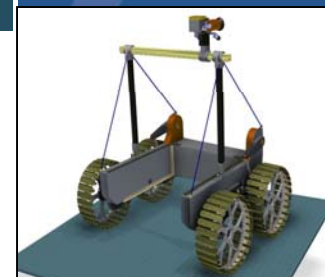
Next Generation Communication System
- MDA
- Del. 20110815



Next Vision Syst. 1:
- Neptec
- Del. 20120315



Next Vision Syst. 2:
- Optech
- Del. 20120306



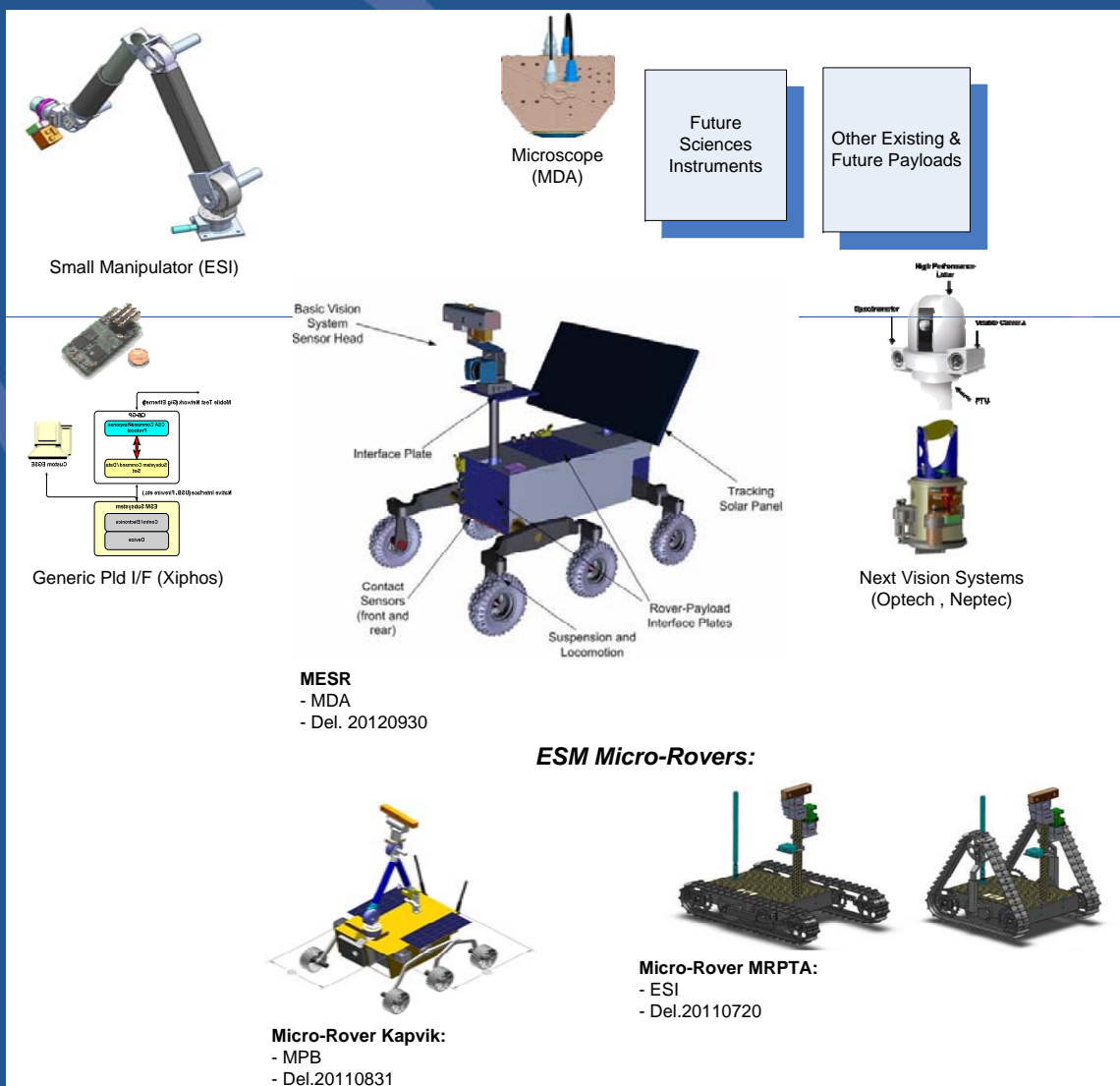


Canadian Space
Agency

Agence spatiale
canadienne



Exploration Surface Mobility (2/2)





Canadian Space
Agency

Agence spatiale
canadienne



Analogue Deployments



EXPLORATION SPATIALE
SPACE EXPLORATION



Canada



Canadian Space
Agency

Agence spatiale
canadienne



Conclusion

- Space exploration needs global coordination
- Scientific exploration int'l plans well defined
- ISS main focus for human exploration
- Human exploration beyond LEO yet to be defined
 - ◆ Preparatory work critical
- Canada focuses on niche areas

EXPLORATION SPATIALE
SPACE EXPLORATION