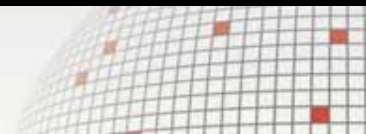


The New Race to the **Moon**

Building Bridges for Lunar Commerce

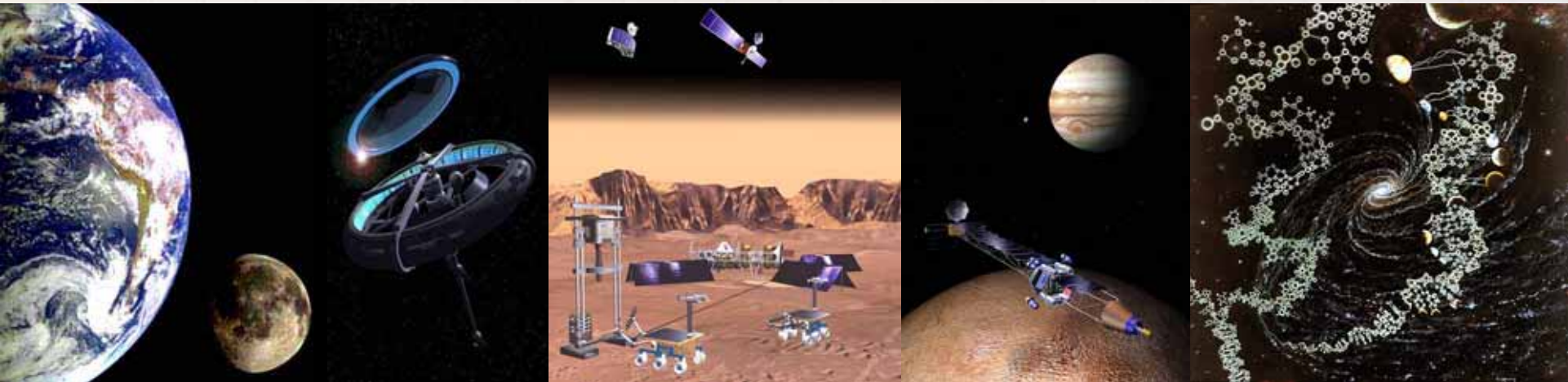


Robert D. Richards
Director, Optech Space Division
Founder, International Space University





- What is our world of 2057?



What are the business cases for private players?

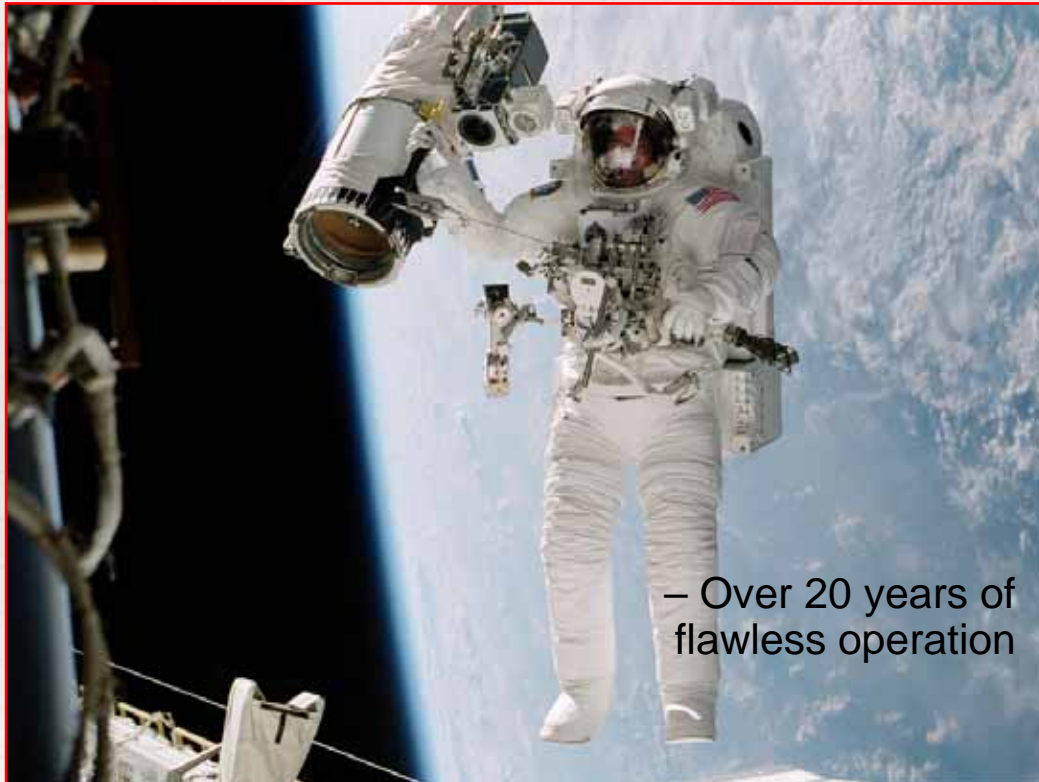
What are the engines of innovation and motivation?

- **The strategic partnership of Optech and MDA combines world leading lidar technology with world leading space robotics technology to produce the next generation of space lidar systems.**

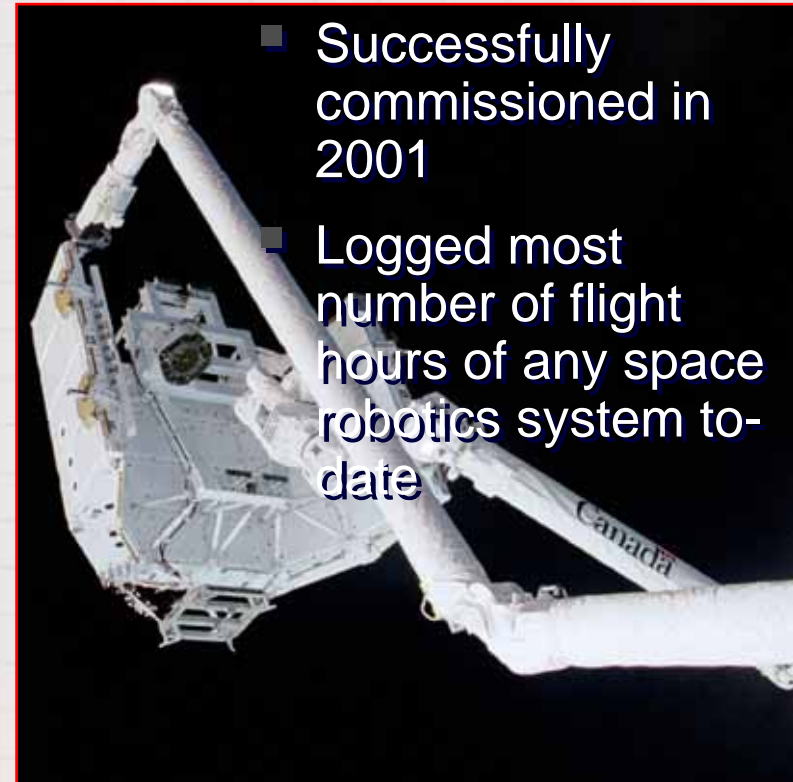


- **MDA safety critical systems have earned the trust of astronauts**

Shuttle Remote Manipulator System



ISS Remote Manipulator System



□ BUSINESS

- ~\$50 million annual revenue
- ~95% International
- ~15% Annual Growth



□ PRODUCTS/PROJECTS

- Cost: under \$5,000 to over \$10,000,000
- Volume: prototype to 500/yr.



- Optech's ILRIS-3D is a complete, fully portable, laser-based imaging and digitizing system for the commercial survey and industrial market

ILRIS-3D



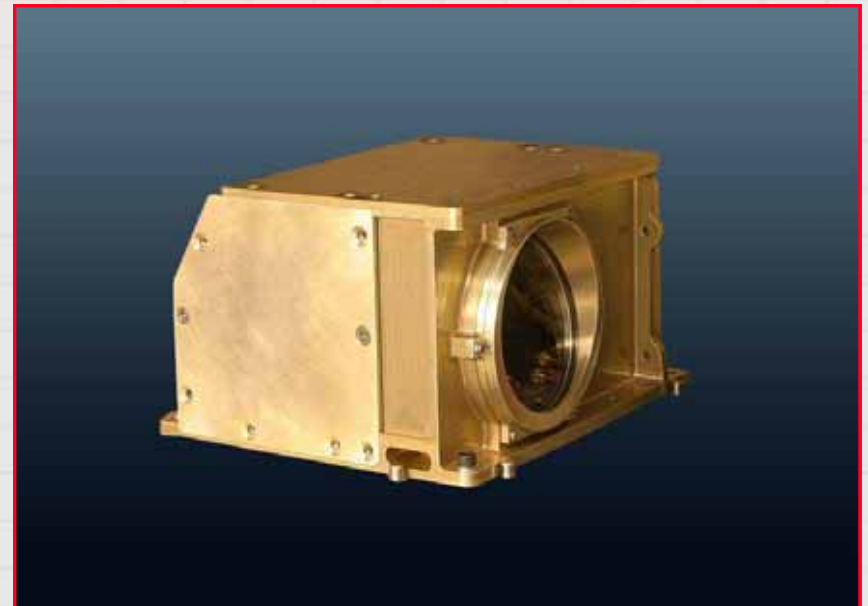
- 2500 Laser Points per Second
- FOV 40° x 40°, extends to 360°
- Measurement Ranges > 1,000m
- Embedded Digital Camera
- Completely Eyesafe
- Modular Design



- From terrestrial “COTS” to space “COTS” in 15 months

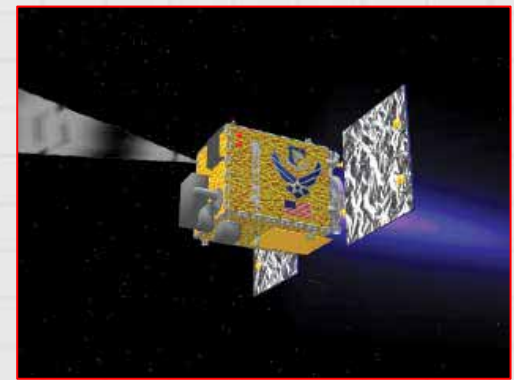


ILRIS-3D Lidar Scanner



RLS Optical Head

- MDA-Optech lidar flight sensor delivered FFP in 15 months
- Launched aboard XSS-11 spacecraft in April 2005 by AFRL
- Successful operations for full mission 18 month duration



Lidar point cloud data of Hubble full scale model at Goddard



The Optech-MDA RLS sensor was selected by NASA to support the robotic Hubble rescue and de-orbit missions.





XSS-11



COTS



CEV

'SMART' LIDAR



LUNAR LANDER



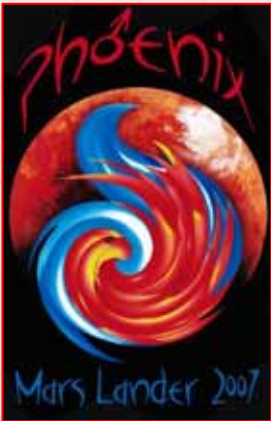
MARS LANDER



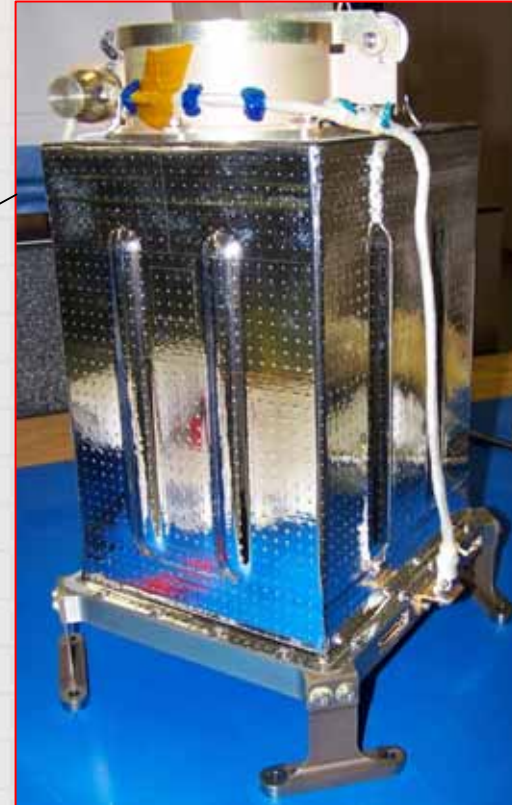
"NASA/John Frassanito and Associates"



- Flight Hardware: Meteorological Station Lidar Sensor
 - Launched in August 2007.
 - Land on Mars in May 2008.



Credits: University of Arizona, NASA / JPL



Inspiring innovators...



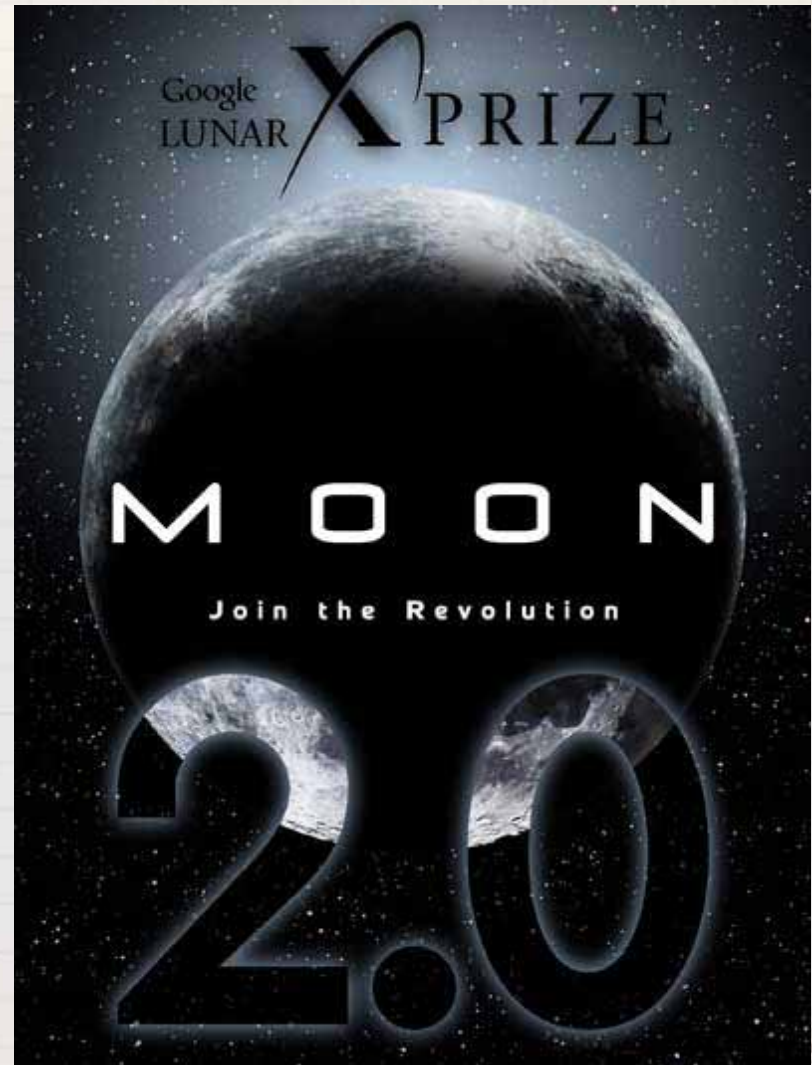
Many times the prize money was invested into winning it.



Making the future happen...



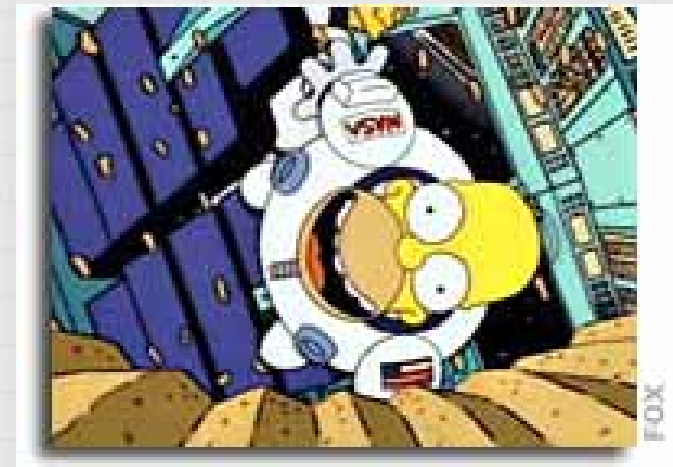
- A \$30M challenge to successfully land a privately funded craft on the lunar surface, roam about the lunar surface for at least 500 meters, and sending a defined image and video data package back to Earth.



- Investors gain comfort from strong associations with major brands and other investors



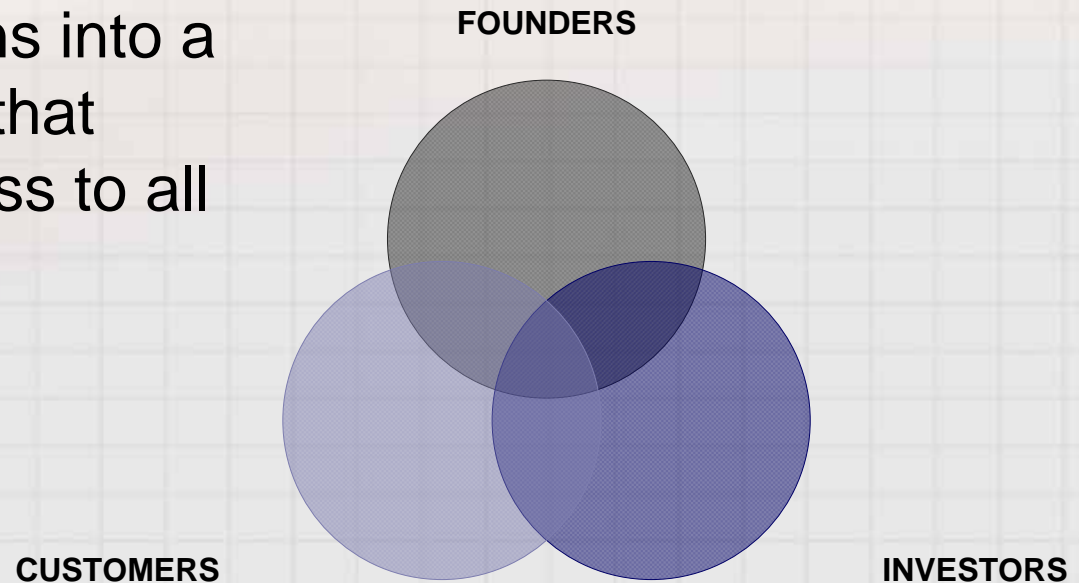
Google™



- The Isle of Man is a self-governing British Crown dependency, located in the Irish Sea at the geographical centre of the British Isles.
- It is a low tax economy with no capital gains tax, wealth tax, stamp duty, death duty or inheritance tax. Income tax rates are 10% and 18%, and corporation tax is 0%
- As a jurisdiction and an International Finance Centre dedicated to Space, the Island has become home to active subsidiaries of the world's leading space and satellite communications companies.



- Integrate the interests of many players with varying value propositions into a business model that delivers happiness to all stakeholders.



- Customers help
 - NASA and other space agencies can help by making clear statements of intent to buy commercial products and services
- Long term market risk can be mitigated by delivering near term value to angels
- Institutional investment requires much more rigor definition and confidence in long term markets
- Venture capitalists still remember the dot com implosion



- Missions of Opportunity (MOO) are key
 - Valid science and technology demonstration enabled by commercial players
- Public & media excitement is a value that can be sold to ego-angels and brand marketers
- The entry of Google into the game provides credibility and co-branding incentives
- The existence of a goal that transcends any short term ROI potential helps close the business case for lunar astropreneurs



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