

Mr. TETSUJI YOSHIDA

CSP-Japan Inc. (est. 1987)

- President & CEO from 2007

- Space business consulting company owned by Shimizu Corp.



Experience on R&D (Shimizu/CSP-Japan)

1. Automation and Robotics in Construction (1977~)

2. Space Robotics (1990~)

1. Space manipulator (SMSM at CMU, PIT)

2. Space structure assemble experiments on the ETS-VII (NASDA)

3. ISRU

1. Water production from lunar ilmenite/ FeTiO_3 (NASA/Carbotek, HOU)

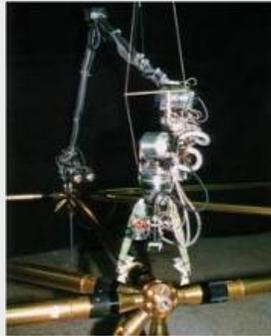
2. Simulated lunar soil, FJS-1 (NASDA)

4. Space Systems

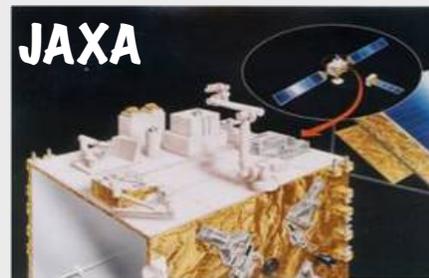
1. Space Solar Power System (SSPS, JAXA)

2. Space Hotel, Lunar Base made of concrete, The LUNA RING (Shimizu)

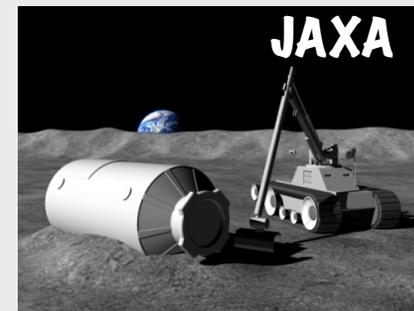
Space Robotics



Self-mobile Space Manipulator (SM²)



Remote operation experiments on the ETS-VII (Engineering Test Satellite 7)



Lunar mining and construction robots initiatives

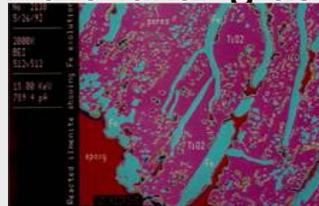
ISRU

Moon-made construction materials (MDSSC,Huntington)



Oxygen/water production (Carbotek,Houston)

- Get water from the moon ilmenite by hydrogen reduction
- Fluidised bed experiment under the lunar gravity

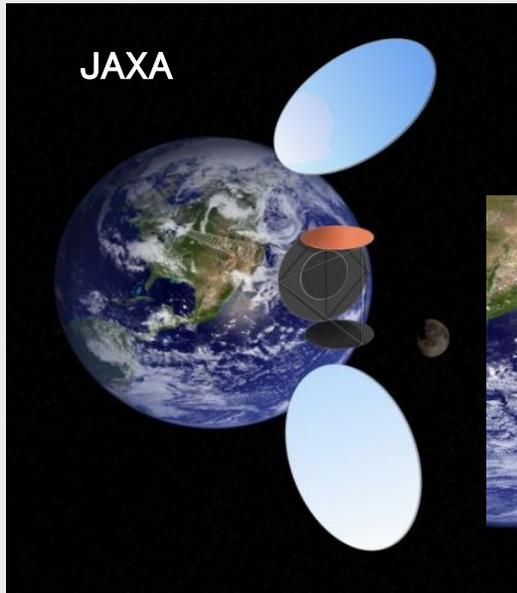


Development simulated lunar soil (NASDA/JAXA)

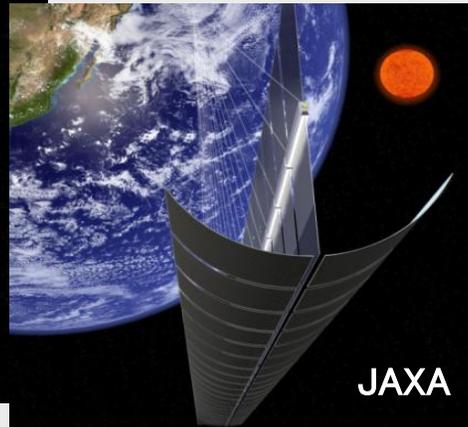
- Find and obtain the resource for soil production
- Smash lava and adjust grain size and properties



SSPS concepts and model



Microwave power transmission satellite



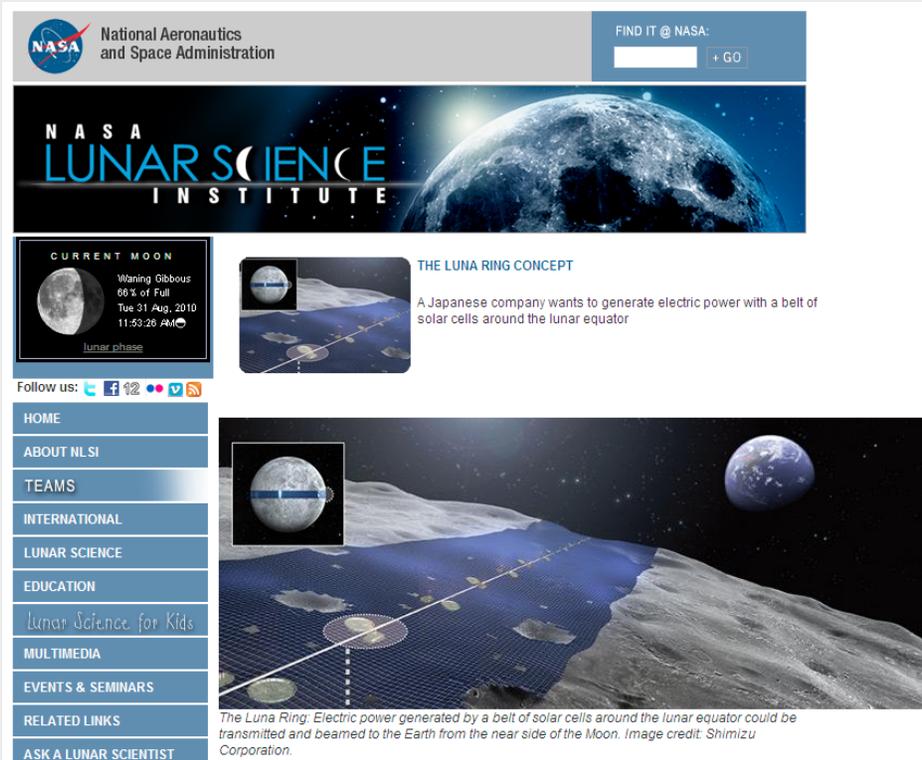
LASER power transmission satellite



SSPS model (**JAXA/Kyoto-Univ. 2001**)

Space initiatives for Shimizu

The LUNA RING (2009)



NASA National Aeronautics and Space Administration

FIND IT @ NASA: + GO

NASA LUNAR SCIENCE INSTITUTE

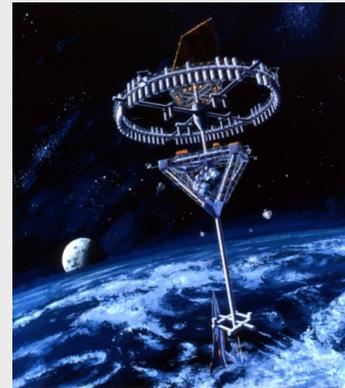
CURRENT MOON
Waning Gibbous
68% of Full
Tue 31 Aug, 2010
11:53:28 AM

THE LUNA RING CONCEPT
A Japanese company wants to generate electric power with a belt of solar cells around the lunar equator

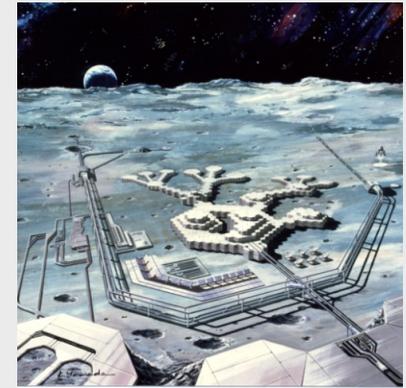
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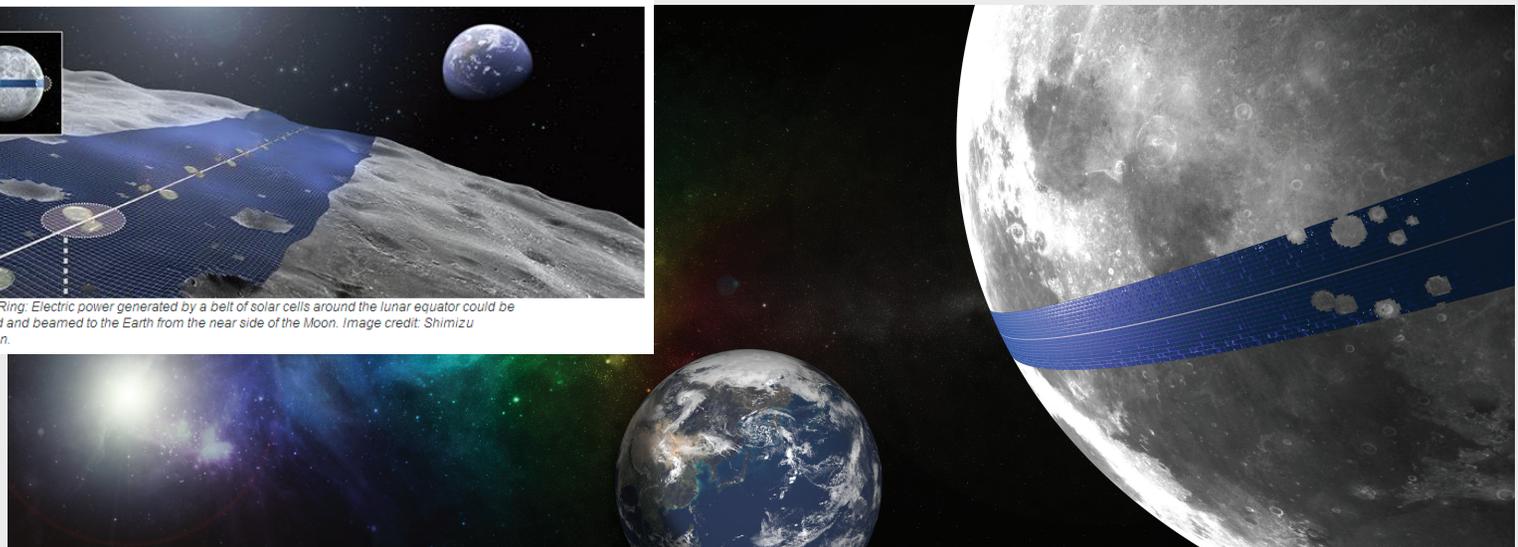
The Luna Ring: Electric power generated by a belt of solar cells around the lunar equator could be transmitted and beamed to the Earth from the near side of the Moon. Image credit: Shimizu Corporation.



Space Hotel (1989)



Lunar Base (1988)



Bringing Space Settlements Down to Earth

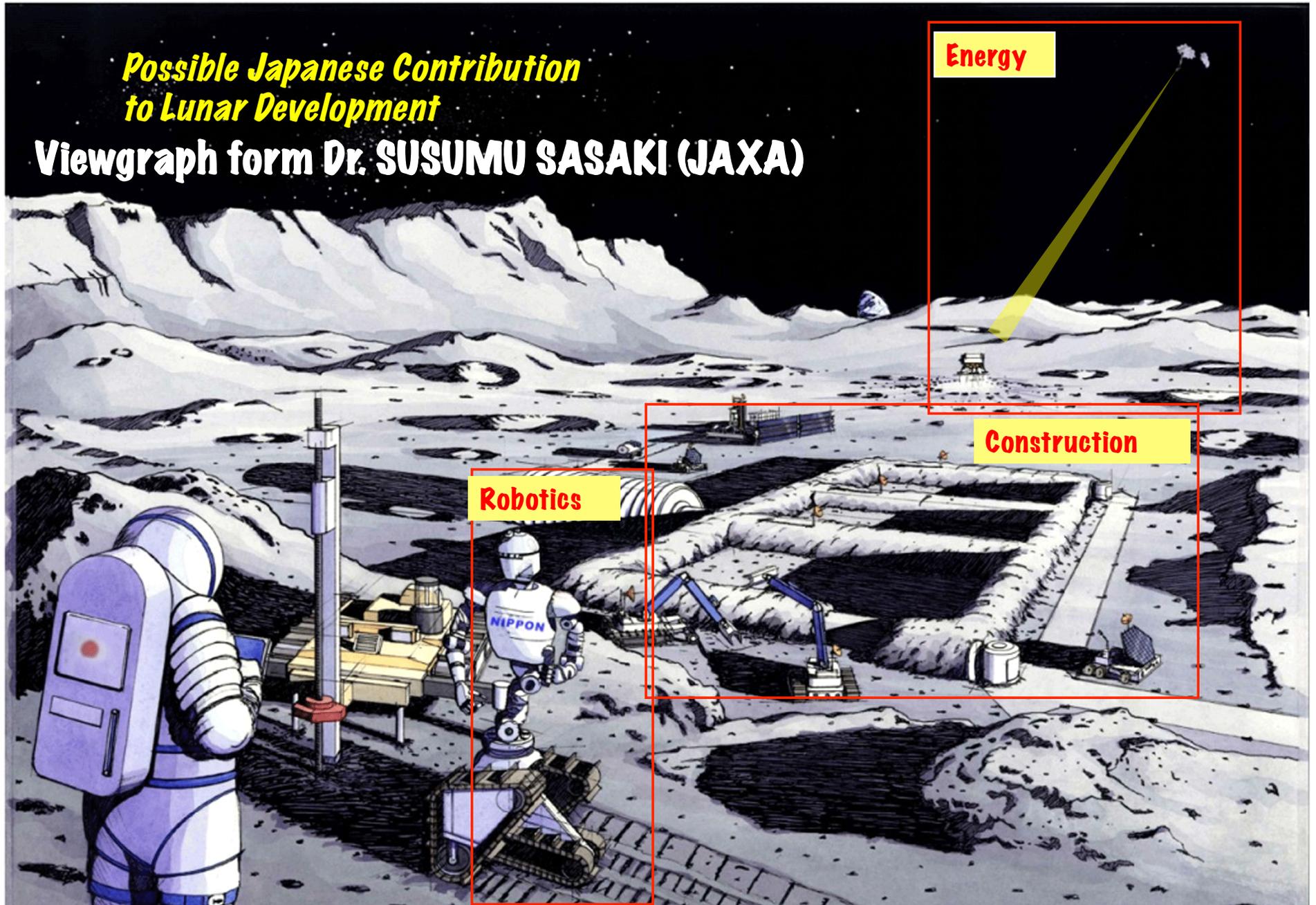
*What **near** and **long-term** issues/
challenges need to be addressed,
and by
whom, to establish a multinational
LRDP/U?*

Challenges

- Near term:
 - Lunar polar area development
 - Energy supply from Lunar SPS
 - Robotics
 - Construction
- Long term:
 - Utilize moon for the Earth, as “LUNAR RING”
 - Energy for the Earth
 - (More) Advanced robotics
 - ISRU and Resource Export to the Earth

*Possible Japanese Contribution
to Lunar Development*

Viewgraph form Dr. SUSUMU SASAKI (JAXA)



Energy

Construction

Robotics

Technological/Scientific Challenges near-term

- Robotics, to decrease human on the moon
 - Less-manned work system, remotely supported from the Earth
 - Moon robotics (mobility, power, radiation durability,,,))
 - International standards for designing and manufacturing robots
 - Parts and components logistics to make lunar systems sustainable
- ISRU
 - Construction materials (brick, water, metal, gases,,,))
 - Processed materials (cement, wire, panels, formed parts,,,))
 - Resource exploration and mining, refining, manufacturing, transportation, etc.

By whom?

