

## Moon Village Workshop 2019

# How will Lunar Society in 2040 be Operated?

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# From the ISS to the Moon

*JAMSS has been working for Operation & Utilization of JEM, Japanese Experiment Module, including Health Management and Training of Astronauts for more than 20 years.*

*JAMSS is now heading to the Moon, advancing technology obtained thru the ISS Operation and Utilization.*



# Why Moon?

## Search for answers to humanity's fundamental questions

- ◆ Stepping-stone to go further

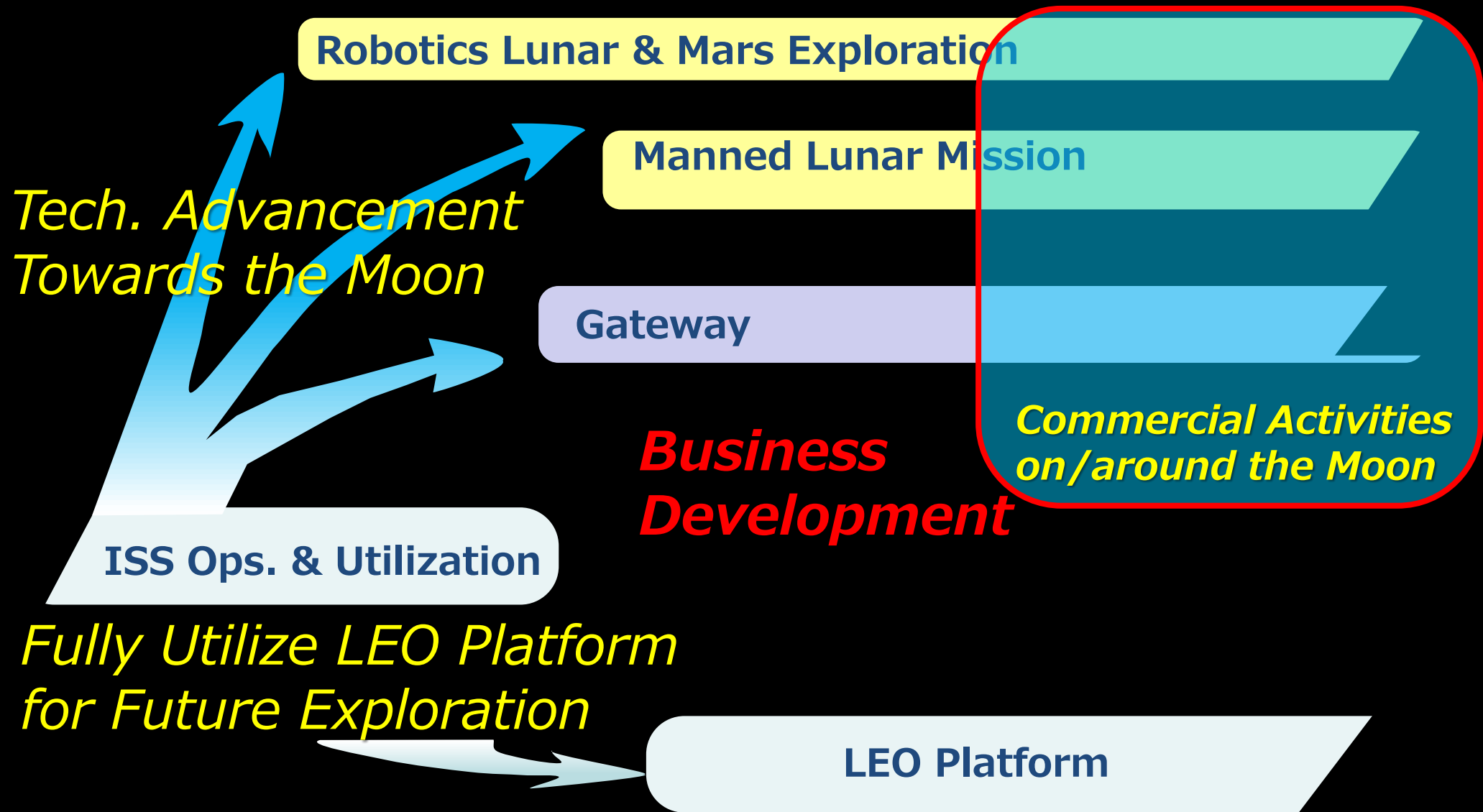
## Extend humanity's place in the universe

- ◆ Not to reach, but to STAY

## Commercial Activities

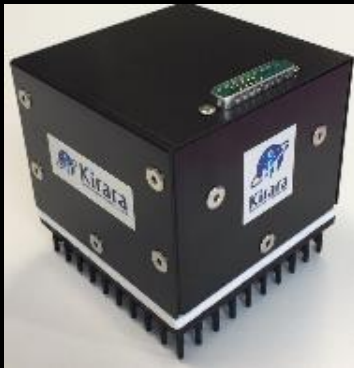
- ◆ Tech. breakthrough
- ◆ Benefits return to earth
- ◆ Establishment of Earth-Lunar Eco-system

# Our Scenario for Lunar Society



# Fully Utilize LEO Platform for Future Exploration

- ◆ Promote commercialization of LEO base
  - ✓ Enhancement of Market Demand, Commercial Service Provider
- ◆ Demonstration field for future exploration
  - ✓ Supported development of “HOURGLASS” which examines relationship between gravity and behavior of several types of regolith under low gravity such as 1/6G and 3/8G which are generated in the ISS.



***JAMSS-developed  
1U facility for  
protein growth  
will be launched  
to ISS very soon.***

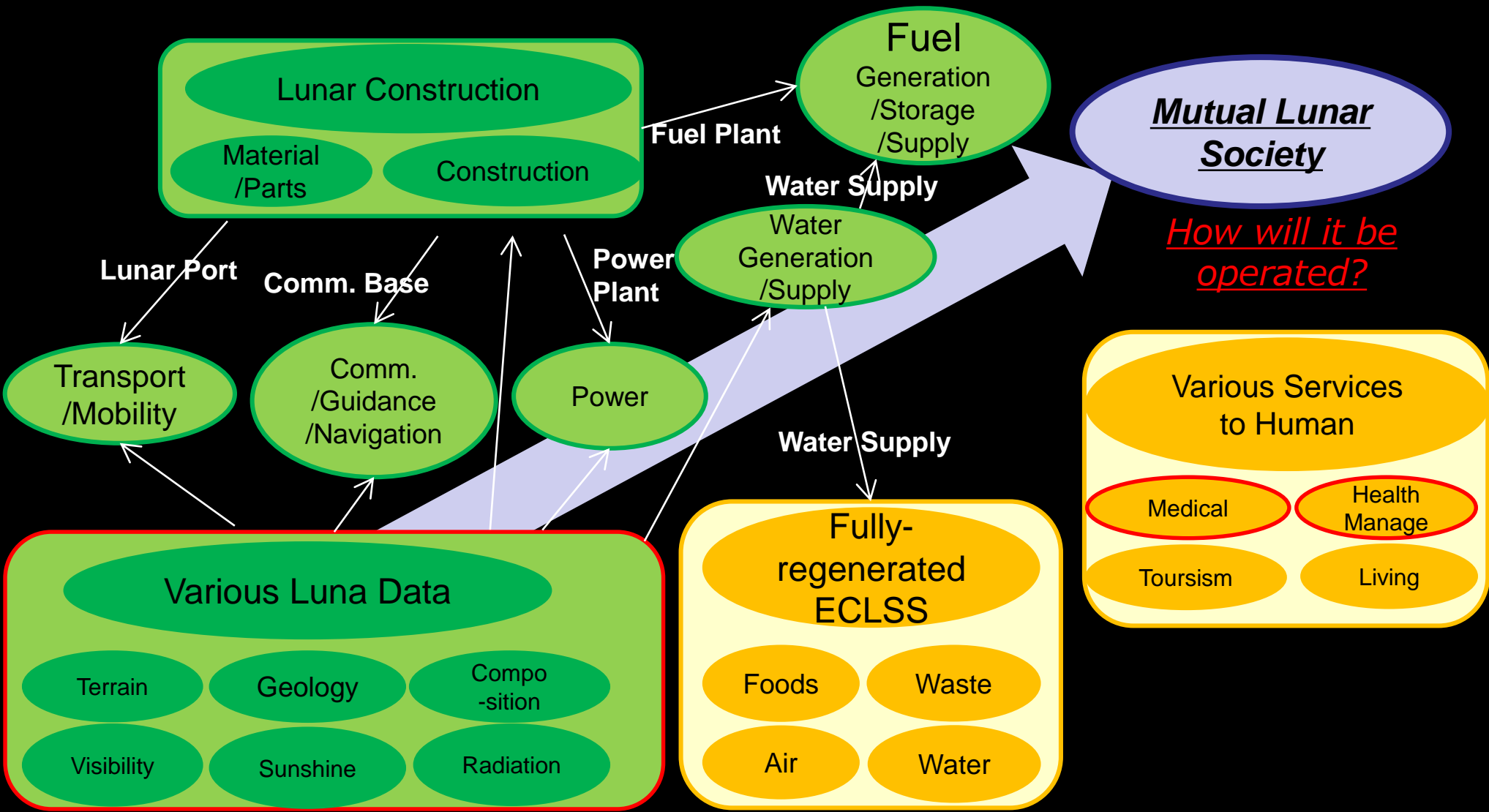


- ◆ What the Lunar Society would be?
  - Expanding humanity's place in universe  
~ Step to go further
  - Benefits return to earth
  - Opportunity for us to think about earth

# What's necessary for Lunar Society?

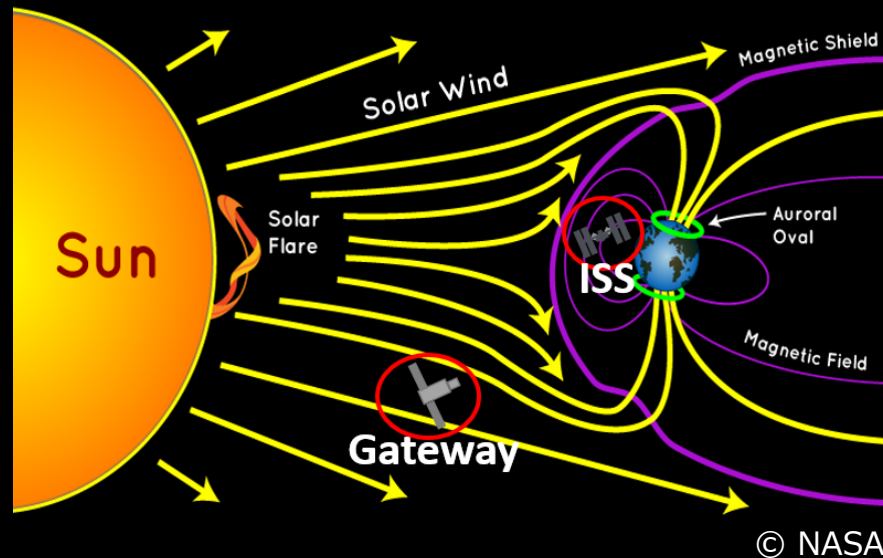
- ◆ Participation of all players such as;
  - Transportation
  - Electric power
  - Communication
  - Positioning / navigation
  - Water mining / fuel generation / supply
  - Construction
  - ECLSS (including food supply), etc.
- ◆ Understanding and deal with the effects (both physical and psychological) of the lunar and lunar environments (radiation, 1 / 6G, etc.) on humans in order for people to stay safely.
- ◆ Various data related to the moon (terrain, geology, composition, radiation, sunshine conditions, etc.) are foundation to support the activities of all these players.

# Various Players of Lunar Society





- ◆ We are going to provide medical and health management services for all people on the Moon being safe from environments such as radiation, regolith, 1/6G etc.
  - Management of exposure to radiation
  - Re-conditioning for gravity changes (1 <-> 0G, 0 <-> 1/6G)
  - Psychological support;  
Several aspects to be considered such as privacy, loneliness, nationalities, etc.



- ◆ Various lunar data such as terrain, geology, composition, etc. have been acquired by remote sensing probes such as Kaguya and LRO.
- ◆ For carrying out the lunar surface mission, accumulating and sharing the lunar data obtained thru previous and future missions are important;
  - In a manner everyone can easily use;
    - ✓ Utilization of various lunar data in accordance with mission specific needs
  - Update in real-time;
    - ✓ Dynamic Mapping etc.
  - Prediction (ex. Space Radiation by Solar Flare)

# Operation of Lunar Society

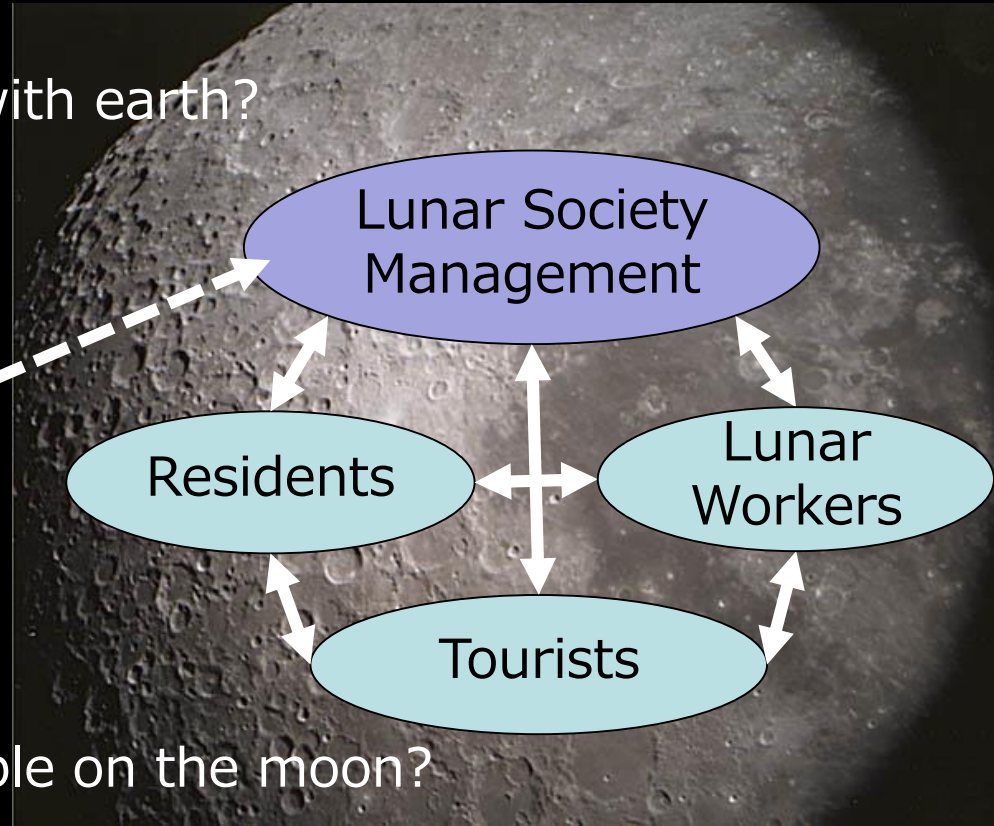
## Several Considerations

- ◆ Collaboration between Lunar Workers & Robots
- ◆ Psychological Consideration  
Diversity <-> Closed/Limited Habitation Area
- ◆ Sharing infrastructures and resources. How?
- ◆ Management of lunar society  
How much interacted / managed with earth?
- ◆ International Lunar Law



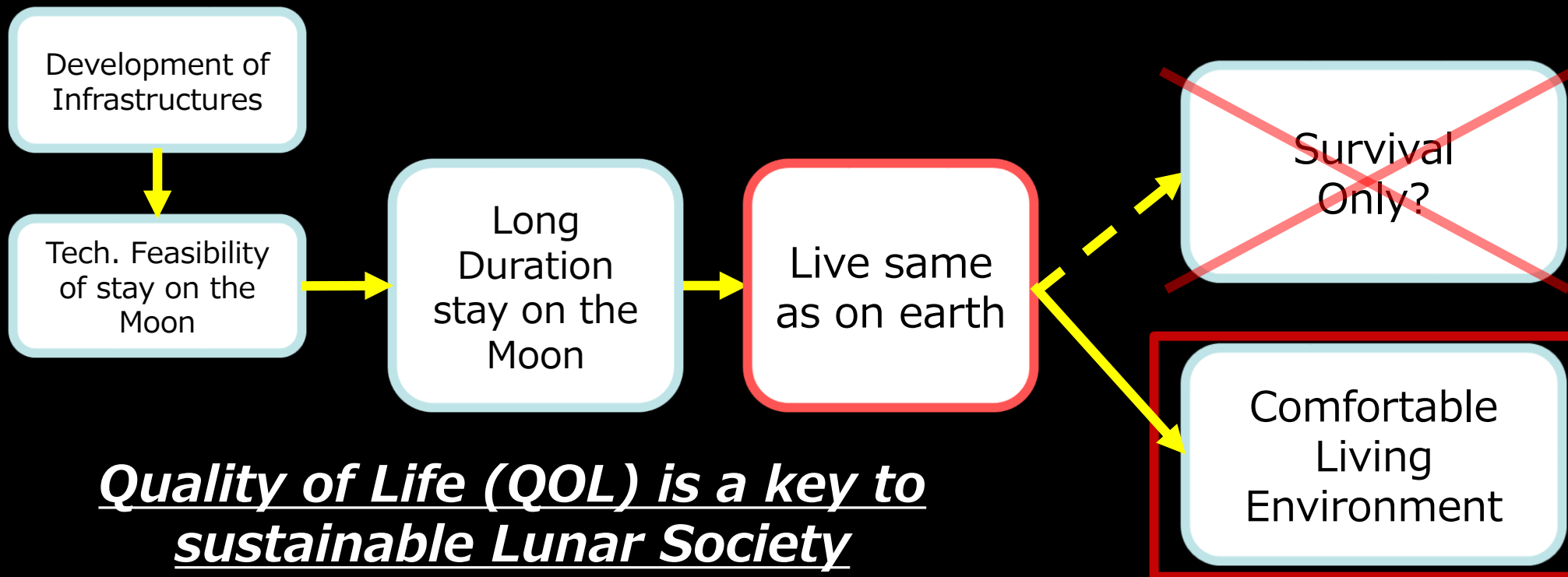
Management from earth

1,000~10,000 people on the moon?



# Vision for Sustainable Lunar Society

- ◆ Building a society where everyone can easily go to the moon;
  - Not only safety and security, but also comfortable living environment and clothing / food / living
  - Experience unique to the moon that makes travelers feel satisfied



- ◆ Returning the value obtained in the process of building a lunar society to the earth and space activities;
  - Utilization of water resources as fuel (enabling challenge to Mars and beyond)
  - Application of complete regeneration circulation system to global issues
  - Opportunities for scientific exploration brought about by the sustainable lunar society (Moon Observatory, Geological Survey, etc.)

*Thank you for your attention!*

*JAMSS is exploring from LEO towards  
the Moon, Mars & beyond*



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