Lunar
Commerce &
Economics
Working Group

The Lunar Commerce Portfolio

Technical Session Presentation for the 60th Session of the Scientific and Technical Subcommittee of UN COPUOS

Gidon Gautel, Co-Chair, Lunar Commerce Economics Group - 9 Feb 2023

AGENDA

- Lunar Commerce & Economics Working Group
- Lunar Commerce Portfolio
- Results & Next Steps
- Following the Working Group

Lunar Commerce & Economics Working Group

A Forum for International, Interdisciplinary Discussion

- Founded in early 2021 to promote discussion around potential lunar markets
- Original scoping activities involved over 200 people comprising 53 nationalities
- First package of work, the Lunar Commerce Portfolio, delivered by a team of 3 co-chairs, 9 market leads, and more than 30 international researchers, spanning more than 15 nationalities

AGENDA

- Lunar Commerce & Economics Working Group
- **Lunar Commerce Portfolio**
- Results & Next Steps
- Following the Working Group

The Lunar Commerce Portfolio

Introduction

What is it?

- Comprehensive report comprising 2 years work by international team of volunteer analysts
- Uses public domain sources, and is fully referenced
- A descriptor of lunar economic markets, their suppliers, customers, and value chains
- A model of lunar, commercial markets and interactions

Who are its intended users?

- Businesses, investors, insurers
- National space agencies
- International bodies and regulators

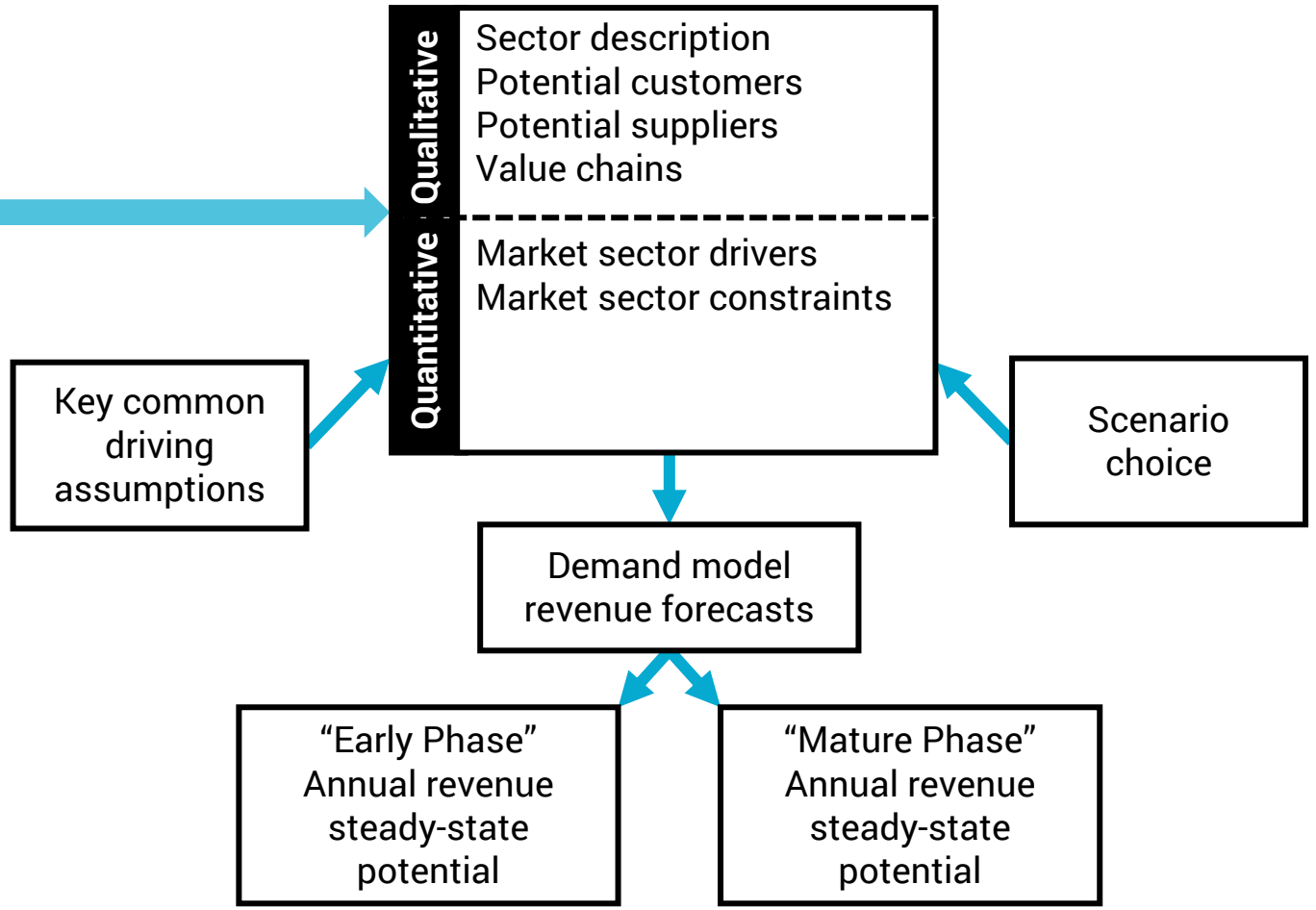
The Lunar Commerce Portfolio

Approach

9 Lunar Market Sectors (Surface & Orbit)

1. Transport to/from Moon
2. Transport on the Moon
3. Communications & Navigation
4. Energy & Power
5. Supplies & Services
6. Construction & Manufacturing
7. Mining & Resource Extraction
8. Habitation & Storage
9. Agriculture & Food

6 Information Formats (for each sector)



The Lunar Commerce Portfolio

Approach

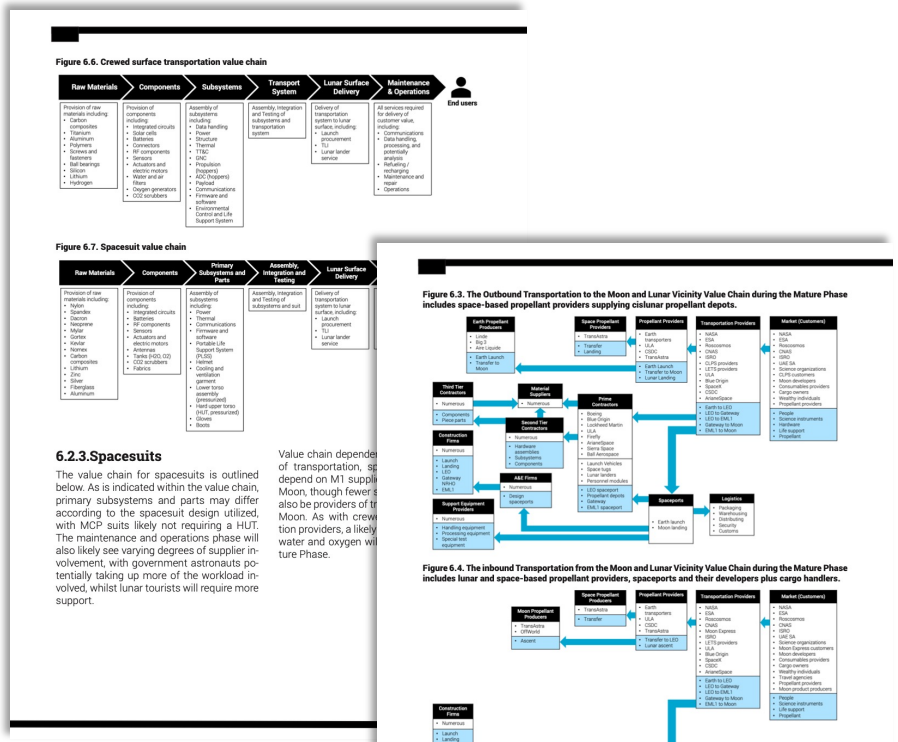


Figure 6.6. Crewed surface transportation value chain

Raw Materials | Components | Subsystems | Transport System | Lunar Surface Delivery | Maintenance & Operations | End users

Figure 6.7. Spacesuit value chain

Raw Materials | Components | Primary Subsystems and Parts | Assembly, Integration and Testing | Lunar Surface Delivery

6.2.3.Spacesuits

The value chain for spacesuits is outlined below. As is indicated within the value chain, primary subsystems and parts may differ according to the spacesuit design utilized, with MCP suits likely not requiring a HUT. The maintenance and operations phase will also likely see varying degrees of supplier involvement, with government astronauts potentially taking up more of the workload involved, whilst lunar tourists will require more support.

Value chain dependen
of transportation, sp
depend on M1 suppli
Moon, though fewer s
also be providers of tr
Moon. As with crew
tion providers, a likely
water and oxygen wi
ture Phase.

Figure 6.3. The Outbound Transportation to the Moon and Lunar Vicinity Value Chain during the Mature Phase includes space-based propellant providers supplying cislunar propellant depots.

Figure 6.4. The inbound Transportation from the Moon and Lunar Vicinity Value Chain during the Mature Phase includes lunar and space-based propellant providers, spaceports and their developers plus cargo handlers.

omy. Additional market pull will come from high-net-worth individuals and adventure travelers for excursions to the lunar vicinity and lunar surface.

Inbound: Mature Phase inbound customers will include rotating surface personnel, returning adventure travelers, and high-value lunar products from Market Team 4 and possibly Market Team 6. There may also be limited scientific equipment returned to Earth to assess lunar environment impact and continued lunar sample returns for scientific studies.

120

6 Information Formats (for each sector)

Qualitative
- Sector description
- Potential customers
- Potential suppliers
- Value chains

Quantitative
- Market sector drivers
- Market sector constraints

Key common driving assumptions

Scenario choice

Demand model revenue forecasts

"Early Phase" Annual revenue steady-state potential

"Mature Phase" Annual revenue steady-state potential

The Lunar Commerce Portfolio

Common Driving Assumptions

Assumption	Early	Mature
Annual personnel missions	1 – 9	1 – 40
Annual cargo missions	0	40 – 1
CLPS-like missions per year	2.5	2.5
Resident people on surface	2 – 4	40 – 120
Resident people in orbit	2 – 0	0
Number of bases	0	2 – 4
Tourists in lunar orbit	4	100 – 3,200
Tourists on lunar surface	0	10 – 125

The Lunar Commerce Portfolio

Phases and Scenarios Define Activity Level on the Moon

Phases

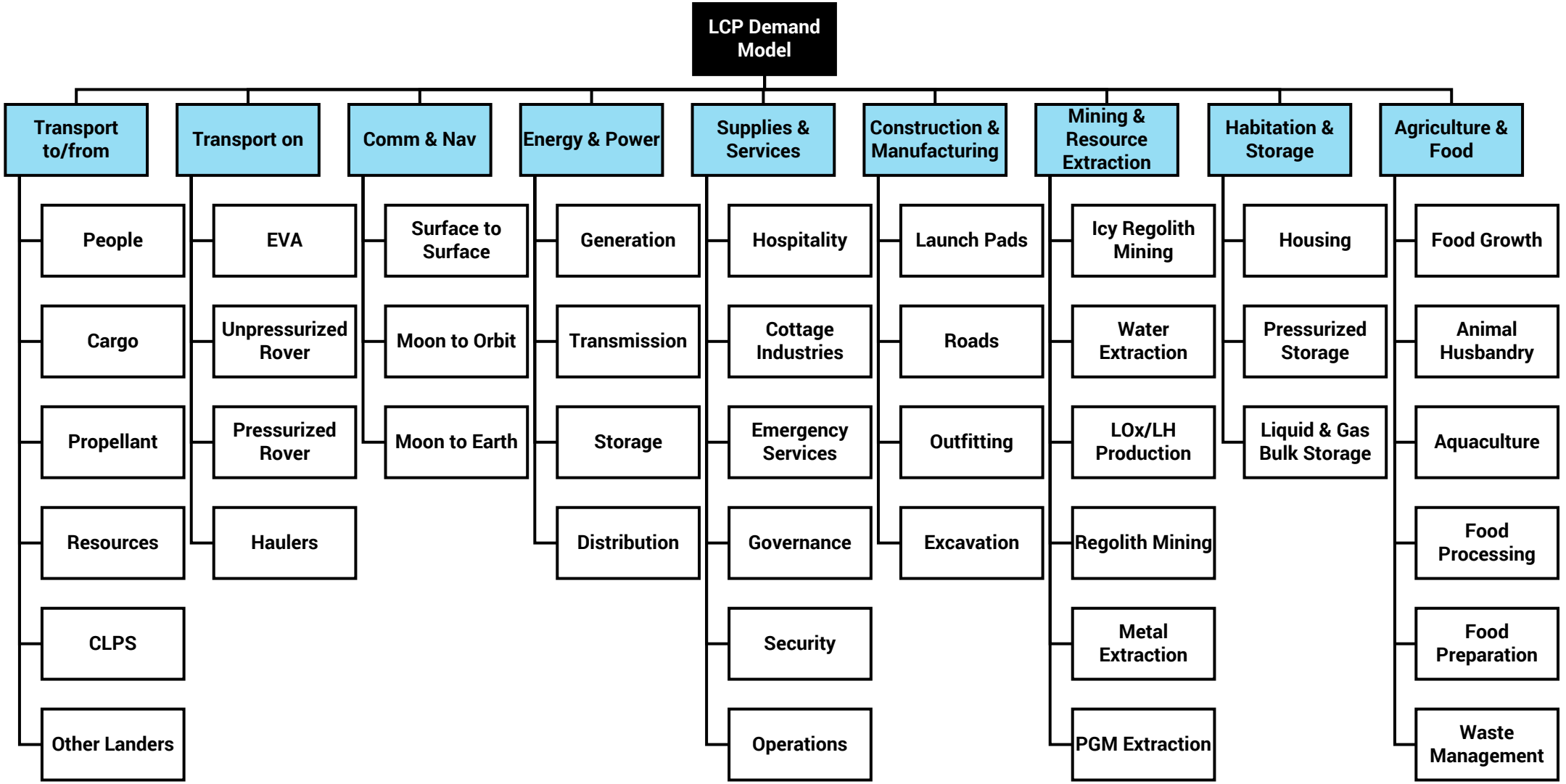
- **Early Phase:** From now to 2030
- **Mature Phase:** That period when there is a permanent human presence on the Moon, self-sustainable with the necessities of life, and not dependent for them on a logistical supply chain of deliveries from the Earth

Scenarios

- **Sorties:** Continuous campaign of single missions to various locations
- **Research Stations:** One or more stations similar to McMurdo Station in Antarctica
- **Sustainable Community:** At least one permanent human presence on the Moon self-sustainable with the necessities of life independent from Earth
- **Exports to Earth:** Moon is fully open for business. Financial returns provided by export of PGM's, KREEP, He3, etc., to Earth.

The Lunar Commerce Portfolio

Demand Model Sums Across Market Teams



AGENDA

- Lunar Commerce & Economics Working Group
- Lunar Commerce Portfolio
- Results & Next Steps
- Following the Working Group

Results & Next Steps

Version 1.0 Results

- For the Mature Phase, aggregated total revenue numbers range from an average annual $4B (“Sorties” scenario) to approx. $31B per annum (“Resources for Earth” scenario), depending on the external factor changes
- Considerable uncertainty remains
- Results particularly sensitive to assumptions around number of people in orbit and on the surface, and to the assumed export demand for resources
- There is a need for statistically valid market research – e.g., for lunar space tourism
- There is a need for putting experimental test results in the public domain – e.g., related to mining yields

Results & Next Steps

Next Steps

- Working partnership with NDA Bocconi's Space Economy Evolution Lab: An independent research center which offers a multidisciplinary perspective within the space sector
  - Improve data and assumptions
  - Explore policy implications
  - Provide tailored analysis for industry
- Feedback requested from user community (Lunar Commerce User Group)
- Focused efforts at improving data and assumptions – e.g., through focused market research efforts
- Subsequent updates of the Lunar Commerce Portfolio will be issued, as data sources are improved

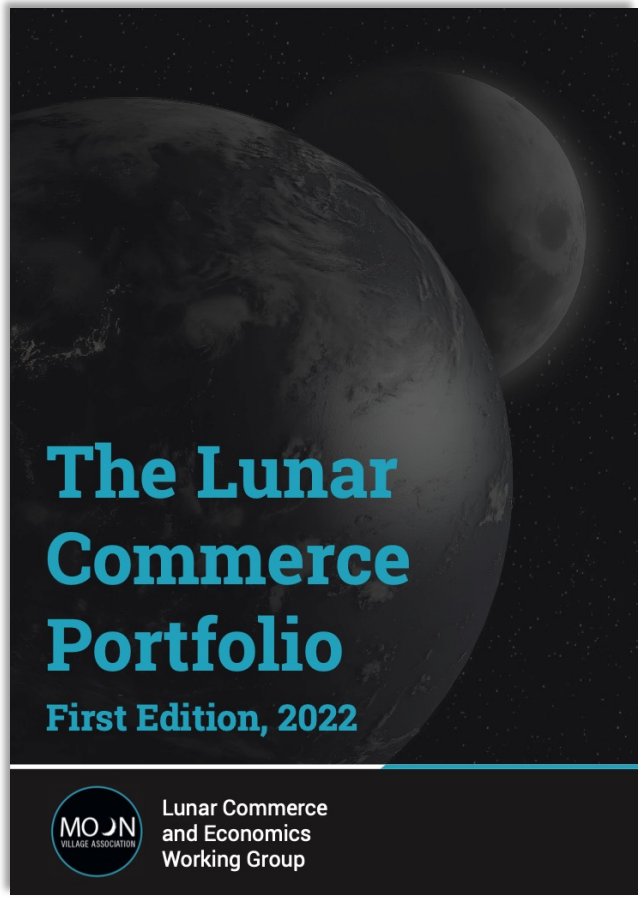
AGENDA

- Lunar Commerce & Economics Working Group
- Lunar Commerce Portfolio
- Results & Next Steps
- Following the Working Group’s Efforts

Following the Working Group's Efforts

How to use and feed into our work

Download V1.0 of the Lunar Commerce Portfolio



Join the Lunar Commerce User Group

LUNAR COMMERCE USER GROUP

Reach out directly!

www.moonvillageassociation.org

@MoonVillageAssn

For Enquiries Contact: Gidon Gautel
Co-Chair, Lunar Commerce &
Economics Working Group
gidon.gautel@moonvillageassociation.org

Thank You!