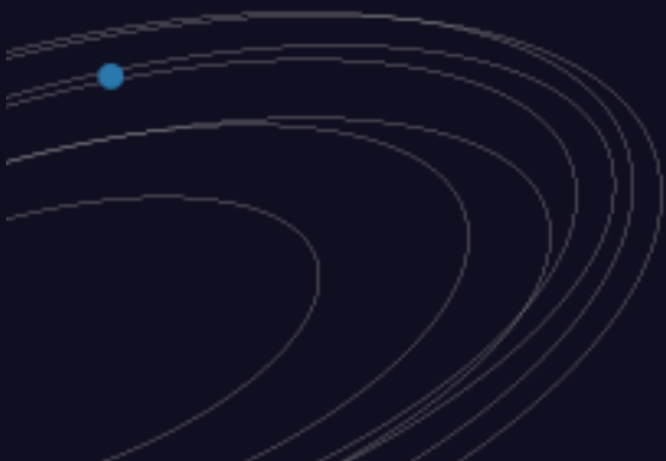


Space Resources Activity in Europe:

The view from ESA and ESRIC

Kathryn Hadler
Director of ESRIC



Explore2040 – Refined European exploration strategy

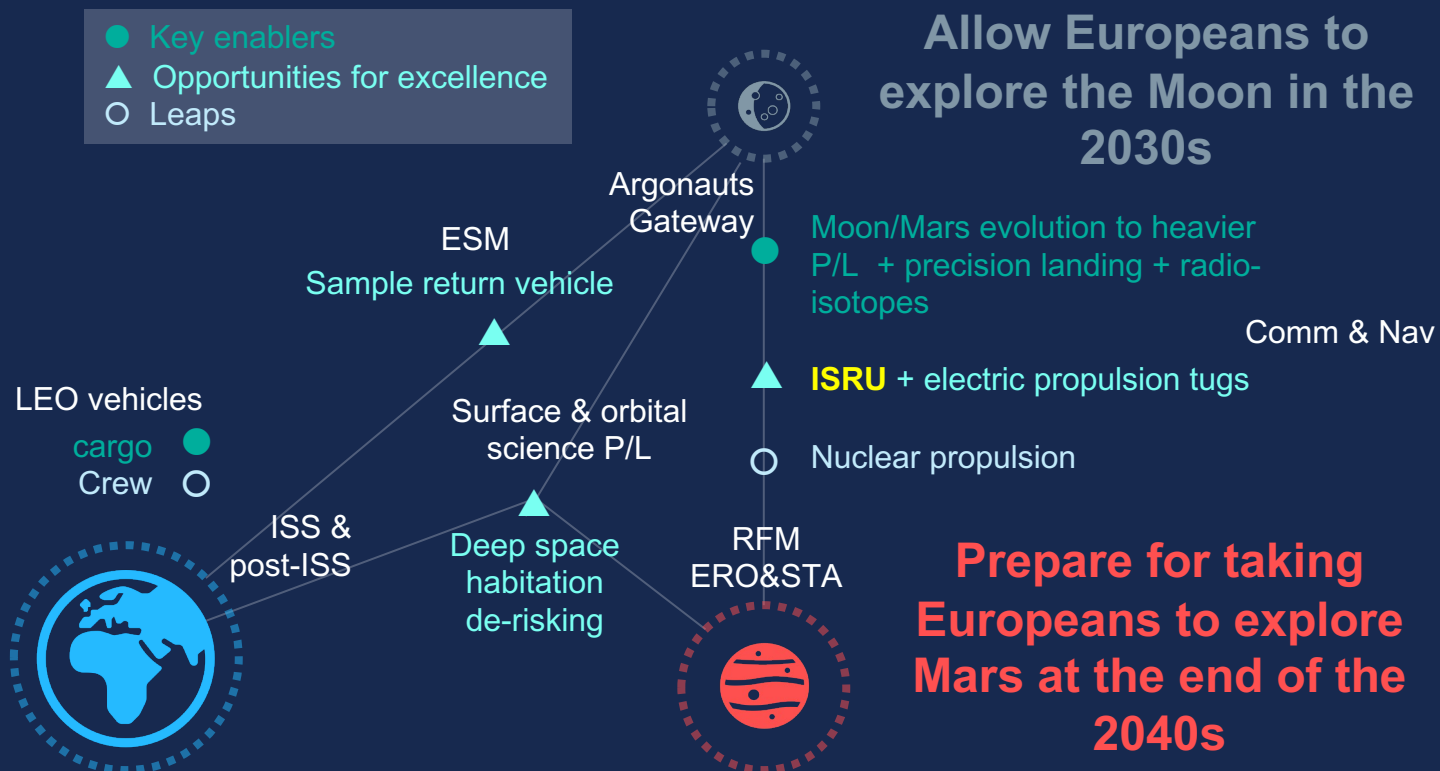


- **Ambition** – Leadership and self-determination
- **Uniqueness** – Leapfrog instead of copycat
- **Achievable** – Options and destination synergies

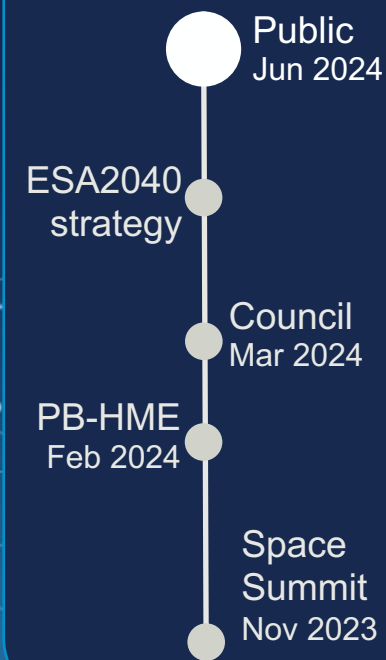
- **Uplift science** and **socio-economic impact** on Earth
- **Sustained + sustainable + responsible** exploration

European architecture open to cooperation

Maintain a human presence in and utilisation of LEO



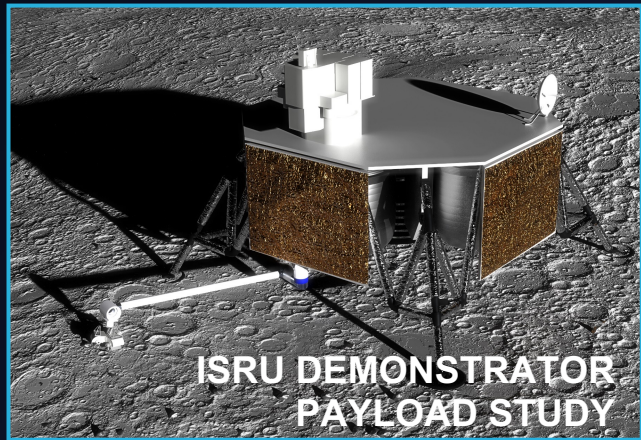
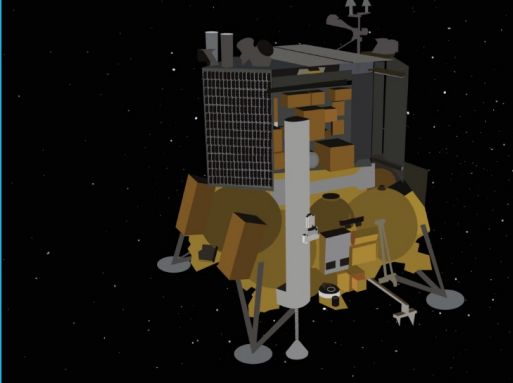
Timeline



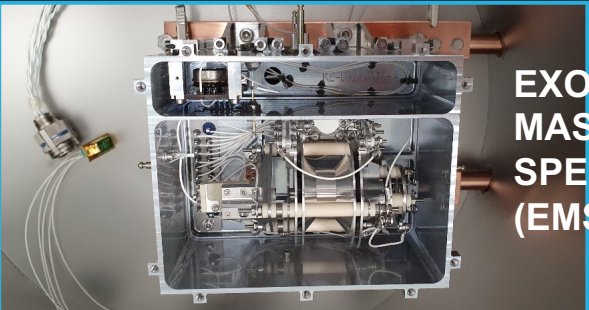
What has ESA done since 2019



PROSPECT DRILL & CHEMICAL LABORATORY



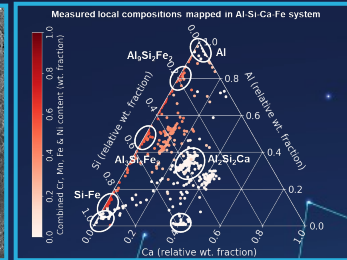
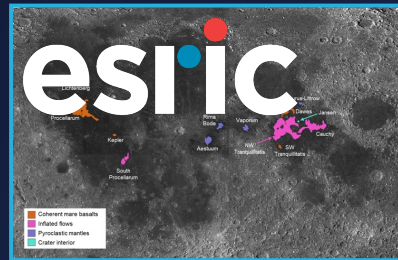
ISRU DEMONSTRATOR
PAYLOAD STUDY



EXOSPHERIC
MASS
SPECTROMETER
(EMS)



ISRU PILOT
PLANT STUDY



CREATION OF ESRIC
RESEARCH, BUSINESS SUPPORT &
COMMUNITY MANAGEMENT

FIRST SPACE RESOURCES CHALLENGE: PROSPECTING



ESTEC INTERNAL
RESEARCH ON THE
FFC PROCESS

... and more!



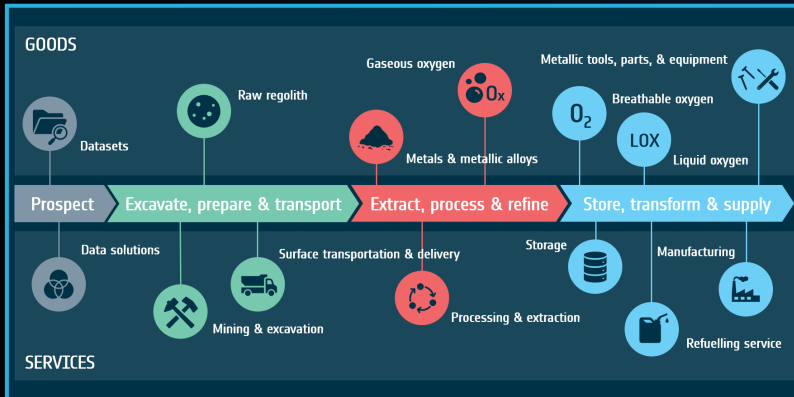
What ESA will do in the future

ESA will support the development of ISRU capabilities in an incremental way:

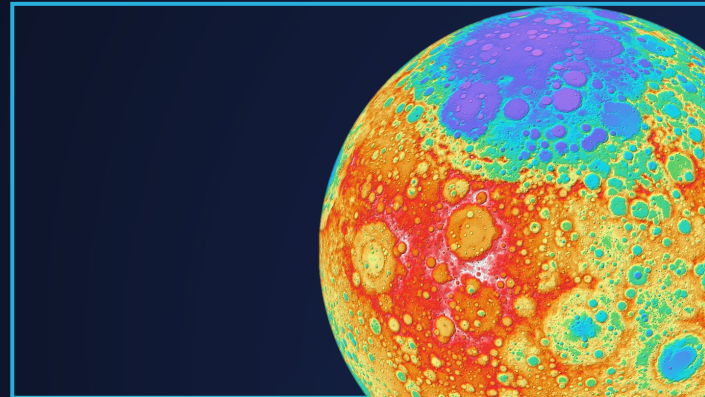
PREPARE FOR THE EMERGENCE
OF FUTURE ECONOMIC
OPERATIONS

DELIVER PROSPECTING
MISSIONS AND PROCEDURE
DATA SERVICES

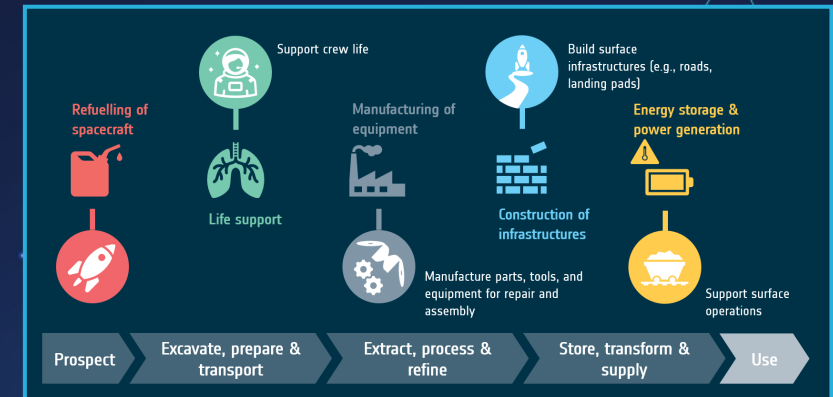
DEFINE MISSIONS ENABLED BY
SPACE RESOURCES
UTILISATION



Develop services and applications enabled by the use of lunar regolith.



Prospect and explore the Moon via ESA missions and data procurement.



Define a future lunar architecture and missions making effective use of ISRU services & applications.

Near-term focus on lunar regolith utilisation

Phase 1: ESA as an **Enabler**

ESA supports and prepares for the emergence of Economic Operators by de-risking technologies, stimulating market creation, and mitigating externalities.

Phase 2: ESA as a **Partner & Customer**

ESA becomes a Partner & Customer, forging partnerships with European Economic Operators and acting as an anchor customer for mature products and services.



Phased Development of Refuelling, Metal Production, & Other Derived Services Based on Lunar Regolith Utilisation.

→ Support activities to de-risk investments in ISRU and foster the creation of an ecosystem of future European Economic Operators.

The 5 Pillars for Delivering Phase 1

Supporting the development and de-risking of ISRU technologies

Stimulating the creation of Space Resources-enabled markets

Nurturing the growth of the Space Resources community to facilitate

**Pillar 1: Ground-based Research Facilities
and technology de-risking**

TECHNOLOGY DE-RISKING

Pillar 5: In-Situ Demonstrators

EXTERNAL FACTORS MITIGATION

**Pillar 2: Business Support,
Incubation & Acceleration**

Pillar 3: Space Resources Challenge

Pillar 4: Community Engagement

MARKET DE-RISKING

ESRIC's MISSION

To be a world-leading centre of excellence in the science, technology and business of space resources, support human and robotic space exploration and a future in-space economy

RESEARCH

DEVELOPING EXTENSIVE RESEARCH CAPABILITIES

Industry-relevant R&D
State-of-the-art facilities
Training the next generation



COMMERCIALIZATION

INITIATIVES TO SUPPORT AN EMERGING SECTOR

ESRIC Start-up Support
Programme
Space Resources Accelerator



COMMUNITY

CONNECTING RESEARCHERS, ENTREPRENEURS & INDUSTRY

Space Resources Week
ESA & ESRIC Challenges
Resourceful podcast



ABOUT US

Team and expertise

13
researchers
3 engineers

2 commercialisation
specialists



RESEARCH

Lunar geoscience Microwave processing
Beneficiation Dust mitigation
Reduction and electrolysis In-space recycling
Gas purification Vacuum distillation

In partnership with ESA

GROUND-BASED SUPPORT

Dusty Thermal Vacuum Chamber
Ground-Based Pilot Plant

TECH DEMONSTRATORS

Oxygen production from
lunar regolith

BUSINESS

Start-up Support Programme
Space Resources Accelerator

COMMUNITY

Space Resources Week
ESA & ESRIC Challenge
Resourceful podcast

RESEARCH

Facilities and Labs at ES RIC



Beneficiation Zone



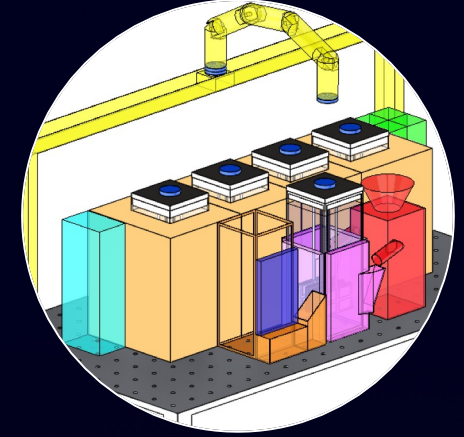
O₂ Extraction Zone



Purification Zone



DTVC
Manufacturing completion
expected in 2025



Ground-Based Pilot Plant
Scoping and design study
ongoing

EXISTING FACILITIES

FUTURE INFRASTRUCTURE

COMMUNITY ACTIVITIES

Space Resources Week 2024



550 participants on-site

650 participants online

Parallel sessions

12 partners

105 speakers

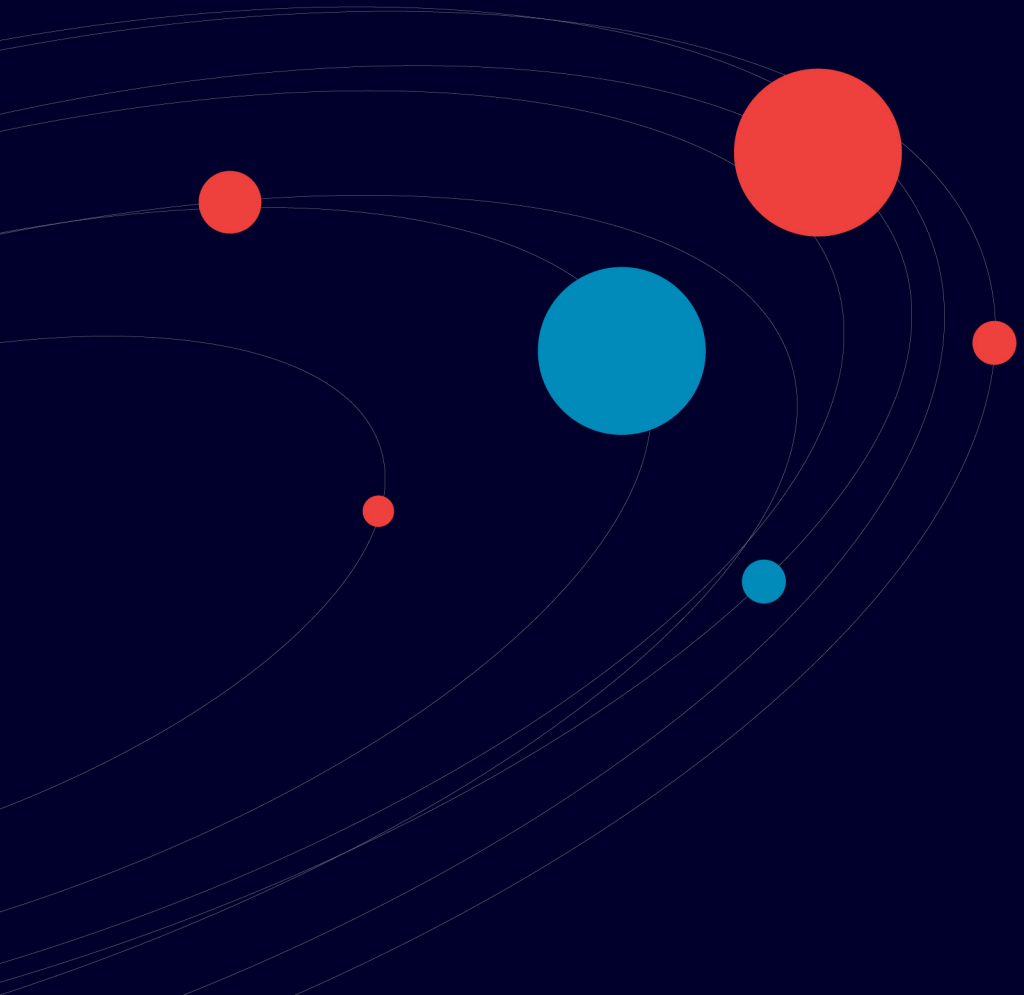
88 organisations represented on stage

50 posters presented

We were also honored to have the
UNOOSA Expert meeting taking place at
the same time and in the same venue



UNITED NATIONS
Office for Outer Space Affairs



Thank you!

Get in touch!
contact@esric.lu

www.esric.lu



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ZSN LUXEMBOURG
SPACE AGENCY

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LUXEMBOURG
INSTITUTE OF SCIENCE
AND TECHNOLOGY **LIST** 