

Commercialization

ESRIC Start-up Support Programme

From *Lab* to *Market*

Lari CUJKO

Start-up Support Programme Lead

XXIV Meeting

June 4, 2024

Session 2: Economic, Legal, and Policy Considerations

Colorado School of Mines
Golden, Colorado USA

esric
technoport®
technology business incubator



esric

esa

LSA LUXEMBOURG
SPACE AGENCY

LUXEMBOURG
INSTITUTE OF SCIENCE
AND TECHNOLOGY

LIST

Agenda

1 About ESRIC

People making it possible

2 Our structure

Our core activities as an innovation and center of excellence

3 Commercialization

Our main commercial oriented activities

4 Start-up support

Our space resources unique worldwide programme

5 Portfolio

Our portfolio and strategic commercial support towards ISRU early-stage projects

6 ISRU Cluster

Description of the first operating ISRU cluster

7 Benefits

Advantages and assets to go to market

8 Technoport

Our main partner in the Start-up Support Programme, a Leading Business and technology Incubator

Luxembourg Institute of Science & Technology (LIST)

Research and Technology Organization



► ENVIRONMENT

► INFORMATICS

► MATERIALS

► SPACE (RESOURCES)

European Space Resources Innovation Centre (ESRIC)

Mission



RESEARCH

DEVELOPING EXTENSIVE RESEARCH CAPABILITIES

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



COMMERCIALIZATION

INITIATIVES TO SUPPORT AN EMERGING ISRU SECTOR

ESRIC Start-up Support Programme
Space Resources Accelerator



COMMUNITY

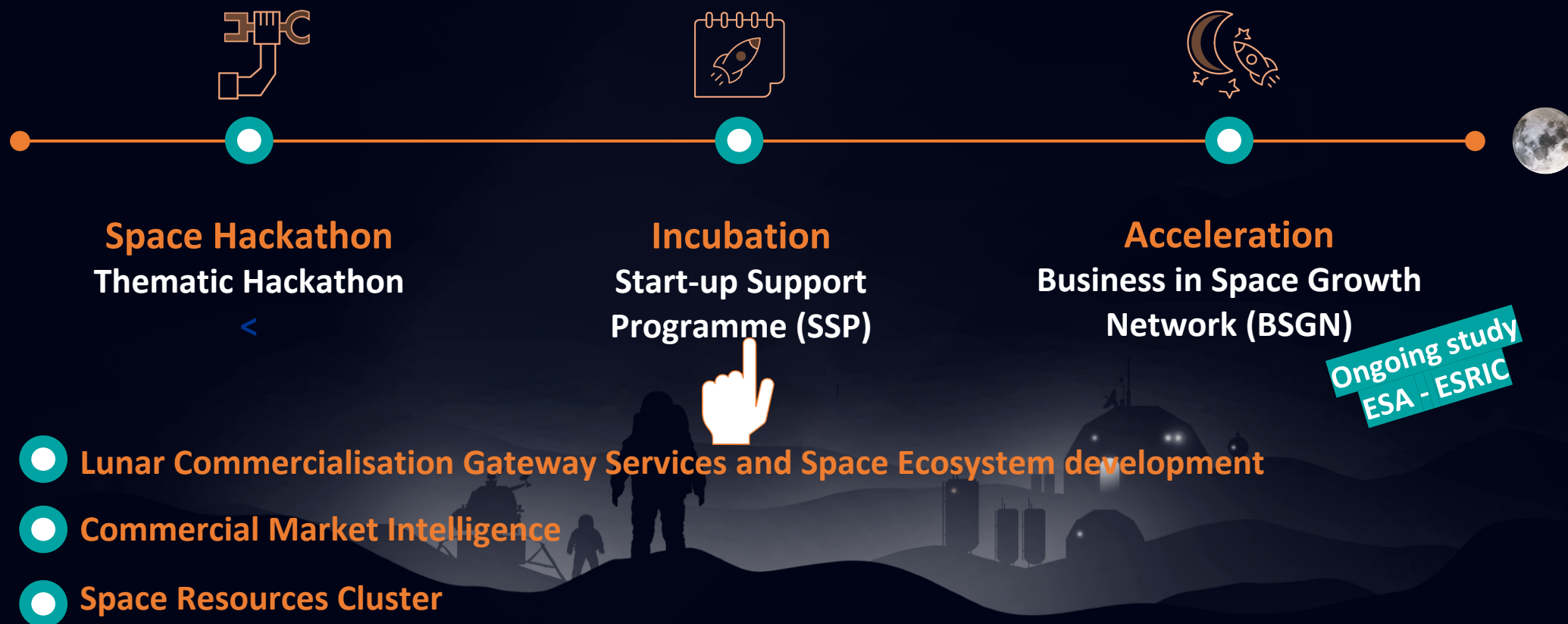
CONNECTING RESEARCHERS, ENTREPRENEURS & INDUSTRY

Space Resources Week
ESA & ESRIC Challenges
Resourceful podcast

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 **innovative** sustainable in-space economy

European Space Resources Innovation Centre (ESRIC)

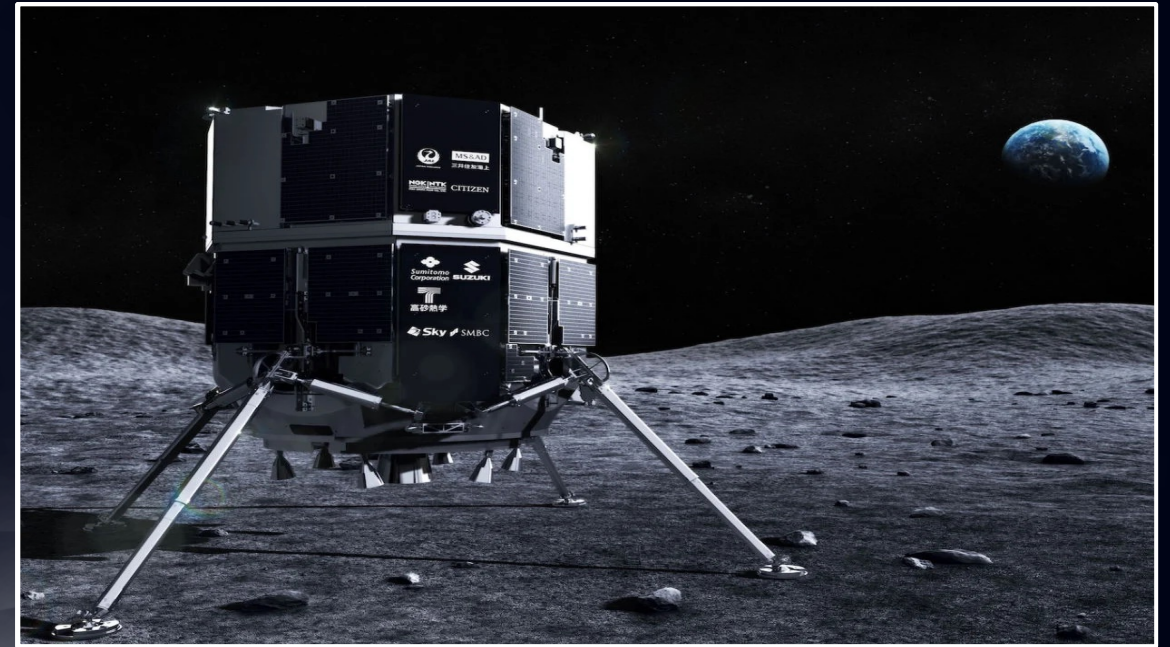
ESRIC Commercialization



ESRIC Commercialization

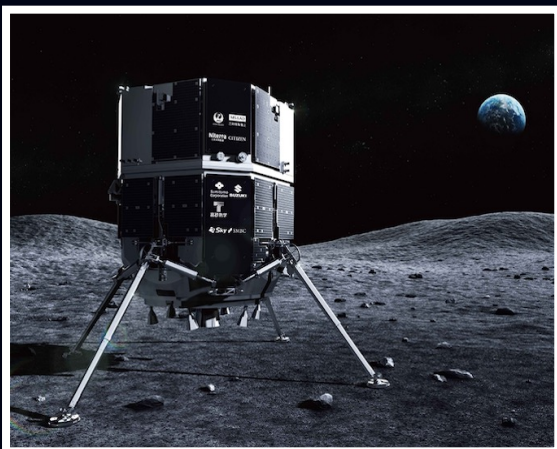
Space (Resources) Commercialization

- **W**hy ?
- **S**ciences
- **E**xploration, Knowledge
- **V**alue (Commercial) ?



ESRIC Commercialization

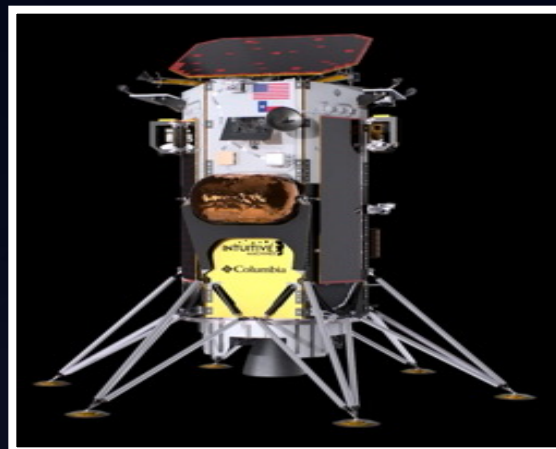
Commercialization in Exploration

ISPACE
"HAKUTO-R"

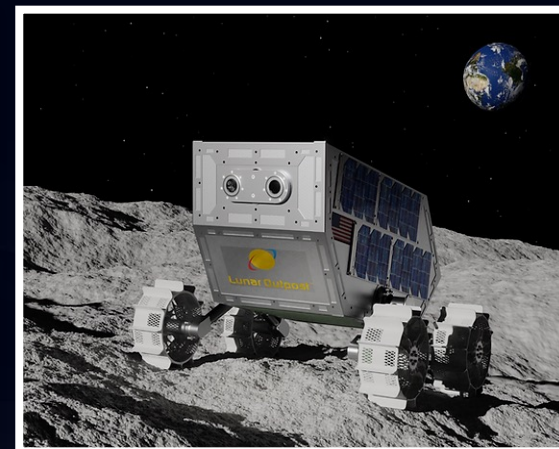
2022

ASTROBOTIC
"PEREGRINE M-1"

2024

INTUITIVE MACHINES
"ODYSSEUS"

2024

LUNAR OUTPOST
"4 MISSIONS"

2024+

Past

Private Lunar Mission

Future/Planned

Private Lunar Mission

ESRIC Commercialization

Space Economics

- **1 Tn\$** Morgan Stanley's Space Team estimates that the roughly \$350 billion global space industry could surge to over **\$1 trillion** by **2040**
- **142 Bn€** PwC's "Lunar Market Assessment" predicts a market trend to surpass a value of **€142 billion** by **2040**
- **464 Bn\$** Euroconsult estimates the "Value of Space Economy" at **\$464 billion** in **2022** despite several unforeseen investment concerns



ESRIC Start-up Support Programme

Three phases Programme



ESRIC Start-up Support Programme

Phase 1: Three sets of Deliverables



Phase 1: Pre-Incubation

Scouting stage to **qualify** and **validate** early-stage venture's potential – Idea generation



2. Business Deliverables

- ii. Specified addressable market strategy
- iii. Competition and existing alternatives are identified
- iv. Formalised business model
- v. Identified business risks
- vi. Advanced Business Plan



1. Technical Deliverables

- i. Valid technical concept:
(formalizing an alpha technology base / technical development plan/feasibility analysis/milestones planning)



3. Strategic Communication Deliverables

- vi. Product & company fact sheets
- vii. Concept teaser video
- viii. Investors/Partners deck

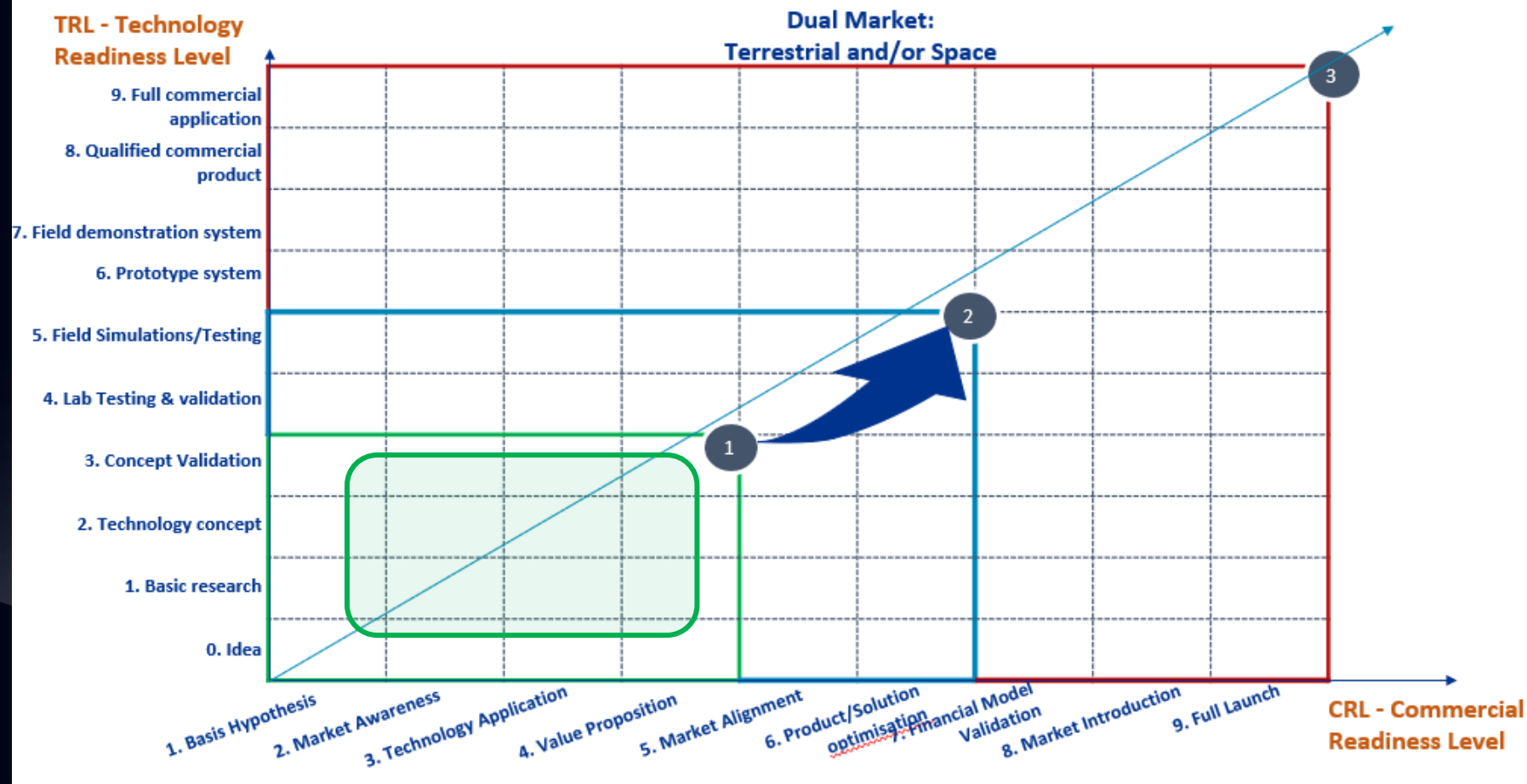
ESRIC Start-up Support Programme

Technology (TRL) & Commercial (CRL) Readiness Level

Consolidate
technological
proposal into a
Technology
Business Solution

What do you need to
proof & start your
Project

Who are the
Targeted
Customers / End
users



Target Audience

Dual Challenge: DeepTech & SpaceTech Players

- **Technology providers:** Having existing market applications being **Terrestrial** or **Space**



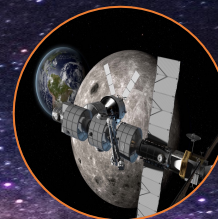
TERRESTRIAL

- Mining
- Agriculture
- 3D Printing
- Marine
- Other



SPACE

- LEO / MEO / GEO
- Satcom services
- Earth Observation
- Space Debris use
- Other



CIS-LUNAR

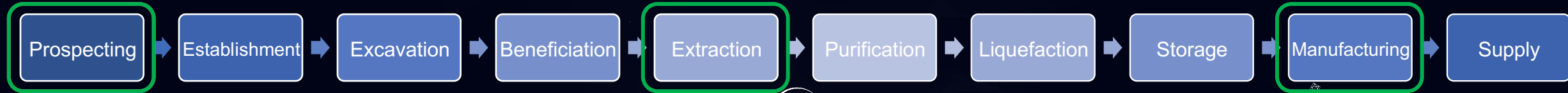
- Communications
- Infrastructure
- ISRU Applications
- Transportation
- Other



LUNAR & OTHER

- Infrastructure
- Exploration & Prospection
- Mining & Extraction
- Refining & Processing
- Manufacturing & Supply
- Power
- Transportation

Primary Activities



Transversal Activities

(Autonomous) Transportation



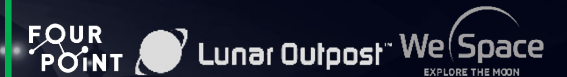
Waste Management/Recycling



Communication & System Navigation

Spacebackend

Robotic Systems

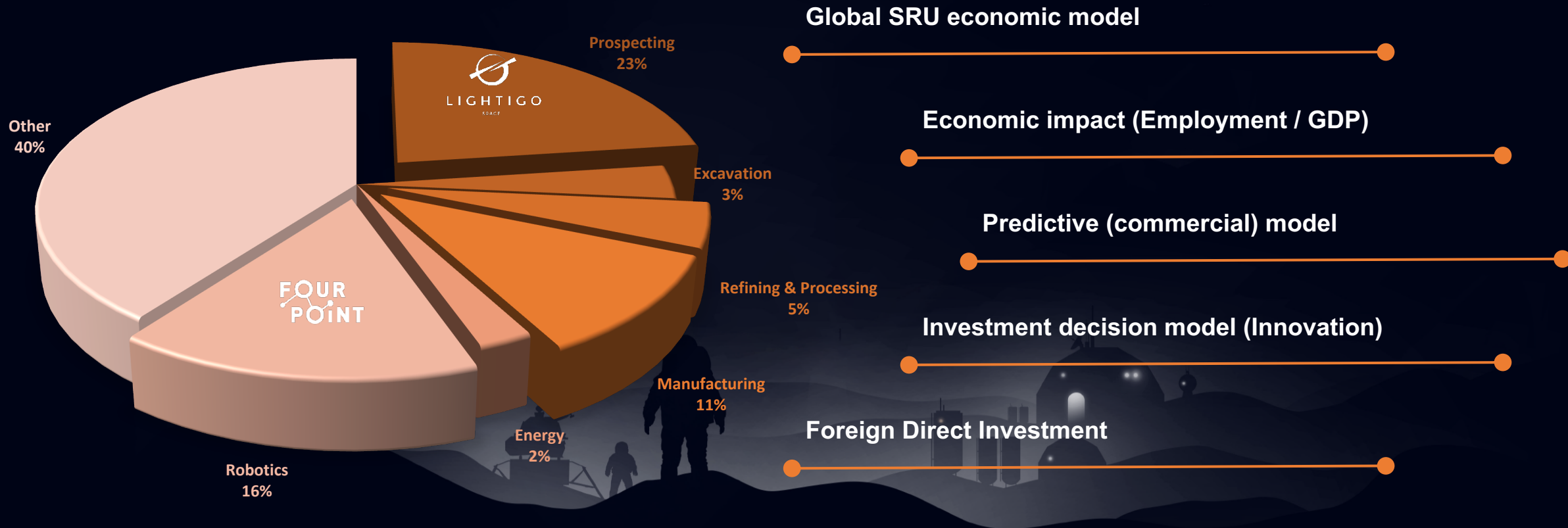


Energy & Power



Commercialization

Space Resources Value Chain Consolidation



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esa

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SPACE AGENCY

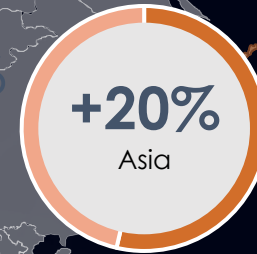
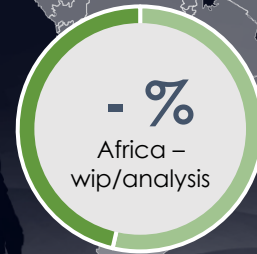
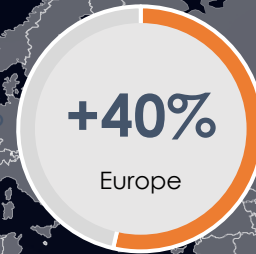
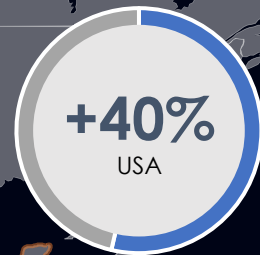
LUXEMBOURG
INSTITUTE OF SCIENCE
AND TECHNOLOGY

LIST

technoport®
technology business incubator

**First Worldwide Incubation Programme
dedicated to Space Resources Utilization**





The **ESRIC Commercialization** goal is to reach and connect your **business value** with the right **customer base (ISRU Cluster)** and creating **Innovation (R&D)**

ESRIC SSP Selected Project (Phase 2)

Three projects

SSP1

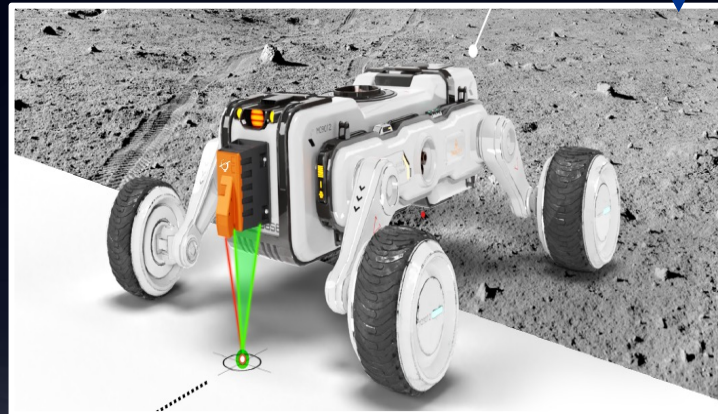
Four Point Space (03 2023)



- Autonomous Transport Platform
- SWARM technologies
- Operations on Earth and Space
- EO – TerraEye solutions

SSP2

Lightigo Space (05 2024)



- Prospecting & Characterization
- ISRA – In-Situ Resource Analyser
- Laser spectroscopy payload for lunar exploration
- Laser-Induced Breakdown Spectroscopy

SSP3

Spacebackend (06 2024)



- Space Communications
- On-Board SW - Assets Connectivity
- Payload Integrity, Accessibility, scalability

SSP 1 | Four Point Space

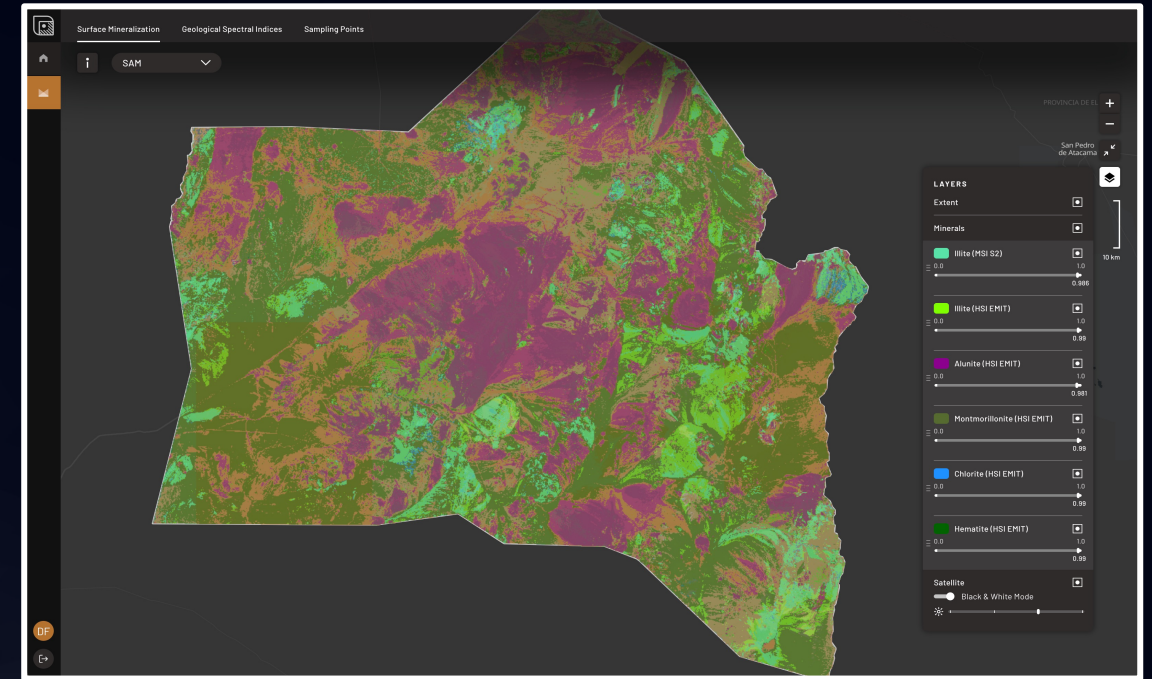
Space DATA and AI for the discovery of metals critical to human development

We Deliver:

- Exploration & Mining Prospecting,
- Low entry point to access remote sensing processing
- Unparalleled precision and insights

We can:

- Speed up the process – insights in Minutes instead of weeks!
- Reduce exploration cost by 20%
- Reduce environmental impact of exploration by 50%



15	Paying Users
2 K\$	MRR
800 K\$	Closed Deals
4.7 M\$	Sales Pipeline

SSP 1 | Four Point Space

Management team



Marek Wilgucki



Miłosz Małachowski



Oskar Fryckowski

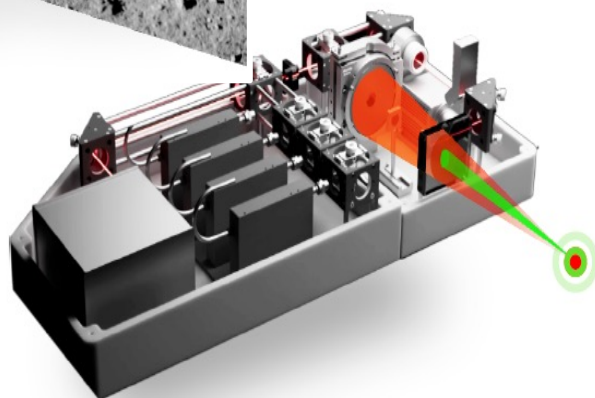
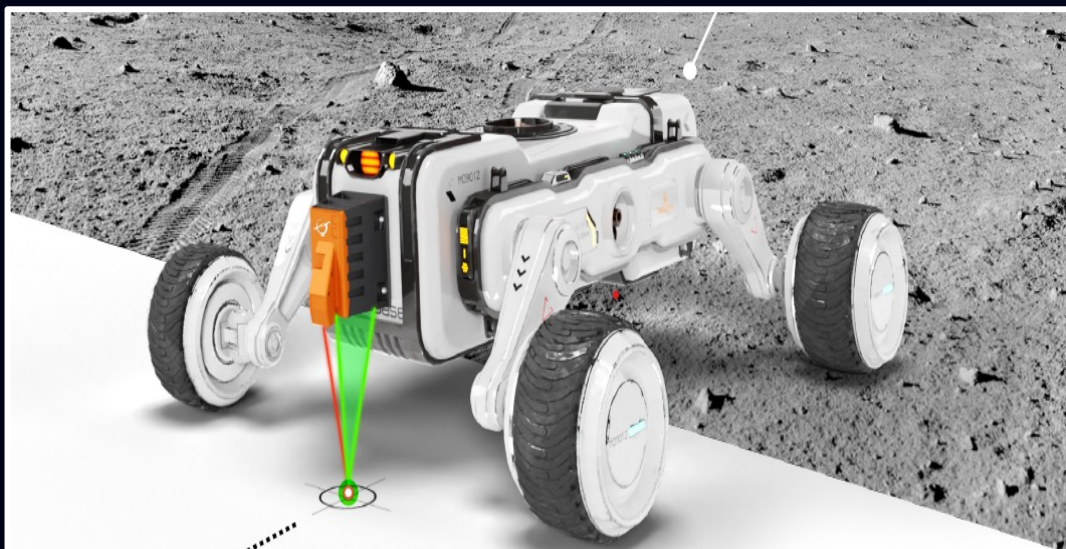
- Four Point Space activities in Luxembourg (03 2023)
- Local SME supports
- Commercial Partnerships with Terrestrial industrials

Marek Wilgucki, CEO
marek.wilgucki@fourpoint.space

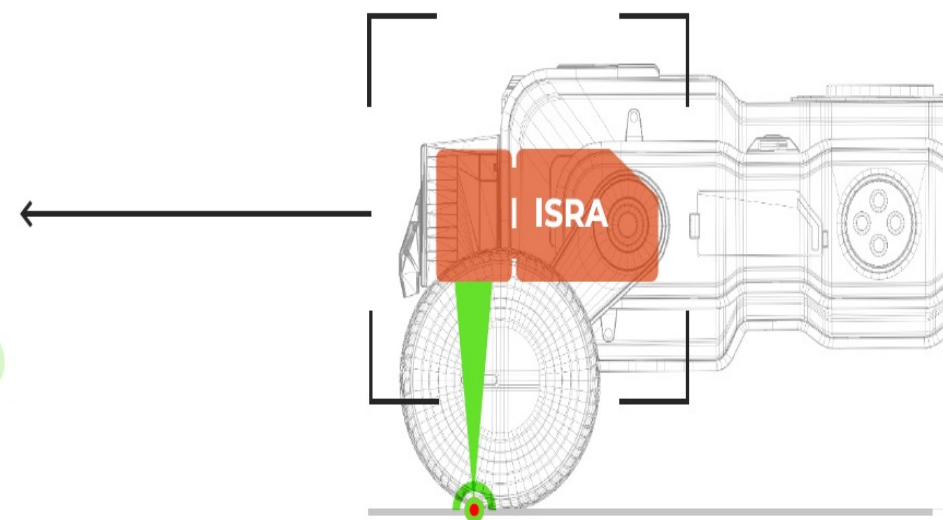


SSP 2| Lightigo Space

Laser spectroscopy payload for lunar exploration



- Resources Prospecting & Materials Characterization
- ISRA – In-Situ Resource Analyser
- Laser spectroscopy payload for lunar exploration
- LIBS – Laser-Induced Breakdown Spectroscopy



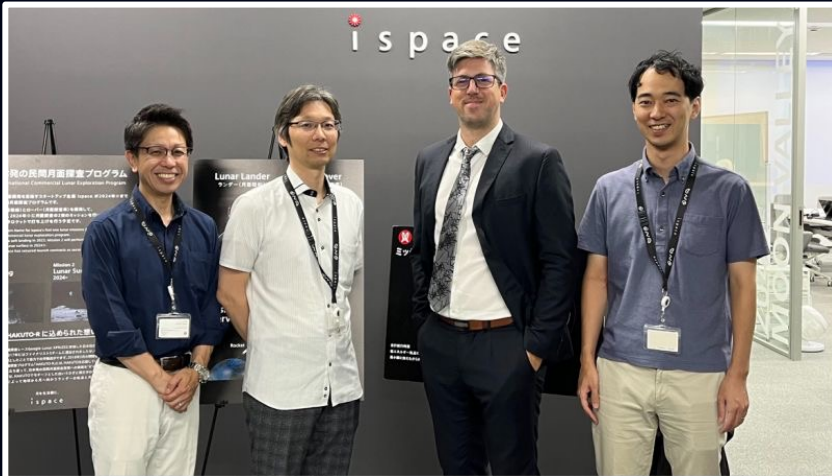
SSP 2 | Lightigo Space

Terrestrial and Space Applications / Research Capabilities

Japan: Ispace
Mr. Masashi Sato
Industry Creation Director, CEO Office
(June 2023)

Japan: Conference/Research
Pr. Deguchi
University of Tokushima

Japan: Industrial
Smart Laser and Plasma Systems
https://slps.co.jp/index_en.html



- Potential cooperation for LIBS implementation or spectroscopic payload on Lunar landers/rovers for regolith prospecting.
- Lightigo (Space) long-term goal is to deliver commercially available LIBS payload.

SSP 2| Lightigo Space

SSP2 – S1 2023

- Lightigo Space activities in Luxembourg (07 2024)
- Local SME supports and Partnerships
- Commercial/Private Partnerships with Terrestrial industrials



Pavel
Scientific director



Marek
Business director



Jan
Optical engineer



Patrik
HW and SW engineer



Jozef
Scientific supervision

SSP 3| Spacebackend

Transforming Lunar Exploration

By providing smart Software infrastructure for connecting, automating and remotely maintaining lunar assets to reduce mission time, minimize human exposure and mitigate associated risks.

~ EUR 1.5M

Cost reduction per
Lunar Lander
Payload Integrations

1-2 Years

Reduced in
Payload Integration SW
Development

> 1 Year

Reduced on Custom
SW development for
Payload Controller
and GS Dashboards

>20%

Software
qualification effort
reduced for Payload
integrations

5

Signed Letters of
Intention with Lunar
and LEO companies

By Q2 2025

First technology
demonstration in
LEO

TRL-8 by Q2`2026

Fully qualified and
certified product
version

One AI Engine

Automating and
Maintaining any
connected payloads



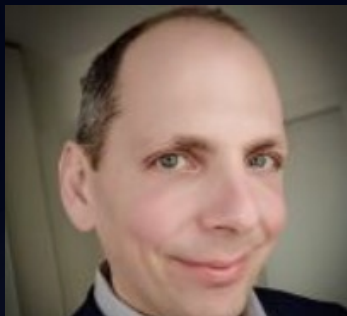
SSP 3 | Spacebackend

Management team



Dmitry Goldenberg
Founder, CEO

Serial technology entrepreneur,
inventor with 15 years'
experience.
Space Enthusiast



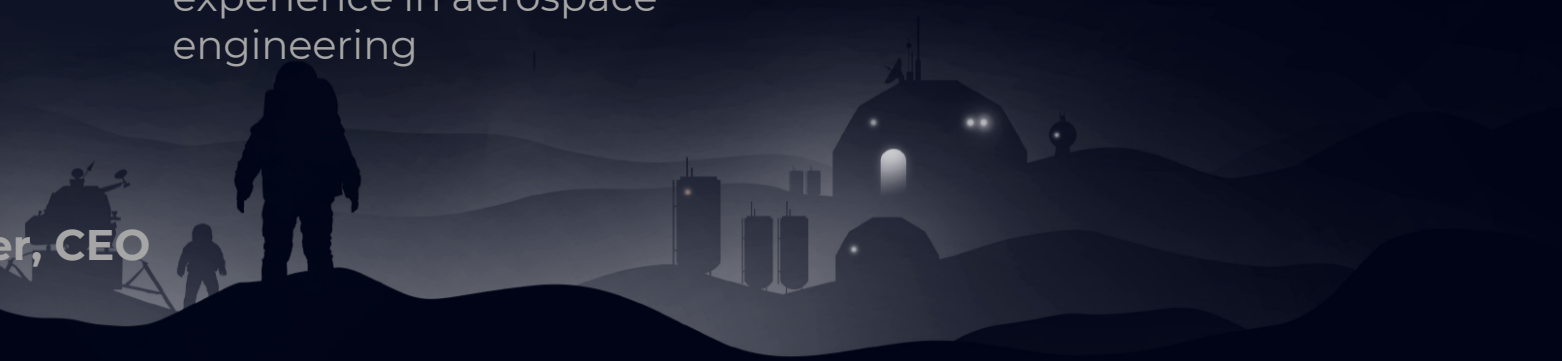
Yoav Landsman
Co-founder & Managing Director
Ex-SpaceIL, more than 20 years of
experience in aerospace
engineering



Daniel Bolan
Co-founder & CTO
Technology and AI expertise

Dmitry Goldenberg, Founder, CEO

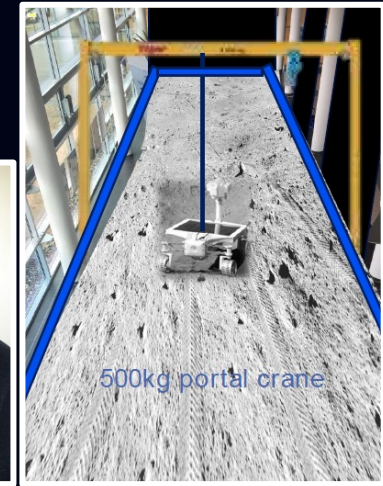
dmitry@spacebackend.com
www.spacebackend.com





Anisoprint, SSP1 | Providing 3D manufacturing for terrestrial applications is expanding its activities in China and creating partnerships with Indian research centres.

Orbit Recycling, SSP1 | Continuation of research on waste recycling and development of several activities (customer based) like testbed located at Airport Rostock (Germany) with 90m² of “moon dust” simulant.



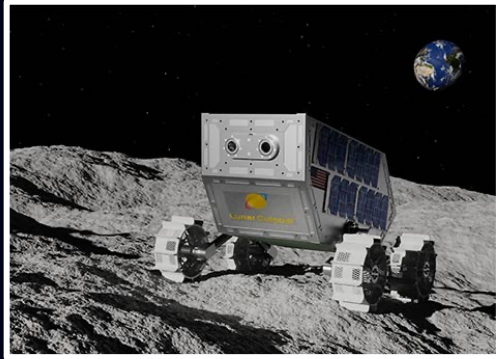
Astroport Space Technologies forms European Subsidiary in Luxembourg



XArc / Astroport Announce \$1.3 Million in Multiple NASA SBIR/STTR Awards for 2023

Astroport, SSP1 | Following their implementation in Luxembourg, they received a combined \$1.3M in NASA SBIR/STTR (Phase 1 and Phase 2) awards for development of extreme environment landing pad technologies.





Lunar Outpost EU, SSP2 | Strong Growth trajectory. Continuing their growth in Luxembourg (Foetz) having a TVAC, a new prototype and are currently collaborating with ESRIC.

Aurora Connect, SSP2 | Dustproof solution for electrical and data connectors (GDPPC) capabilities is under development. Part of the **Orbital Space Lunar Mission (UAE)** via **Lunaris** payload project.



Above Space, SSP2 | Above was Launching Tests to ISS in **March, 2024**. Testing the performance and durability of its proprietary materials in low orbit, aboard the ISS as part of the **MISSE-19 mission** flown by **SpaceX**.



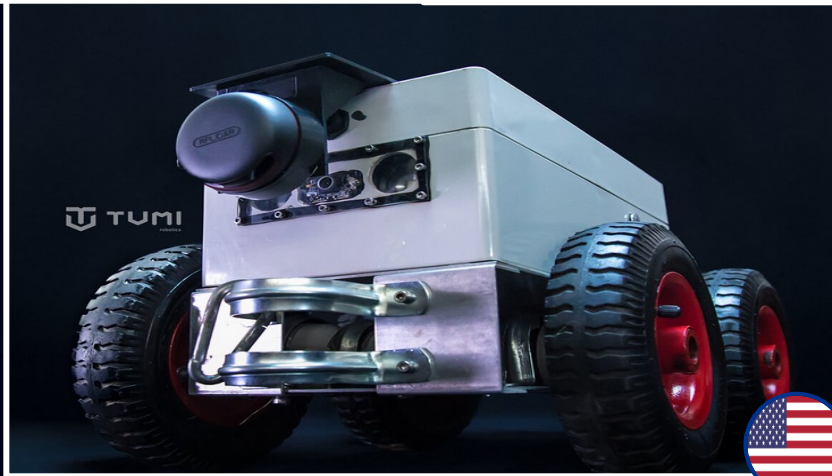
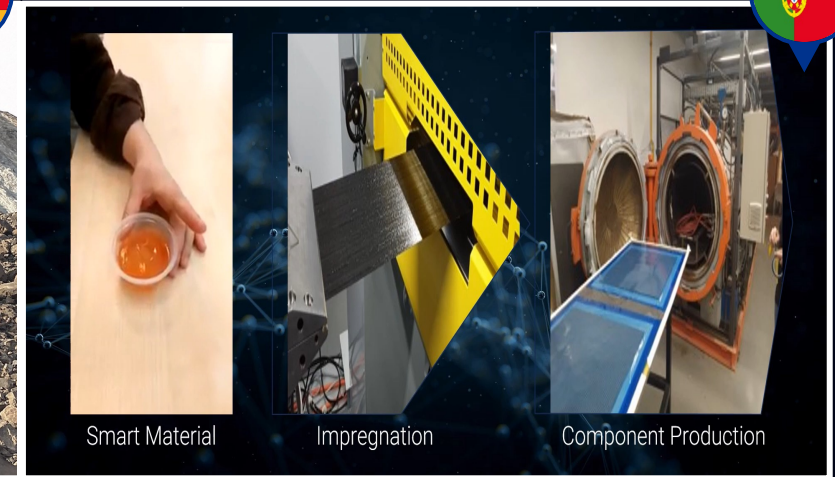
1. Neamine: France
Oxygen extracted from regolith



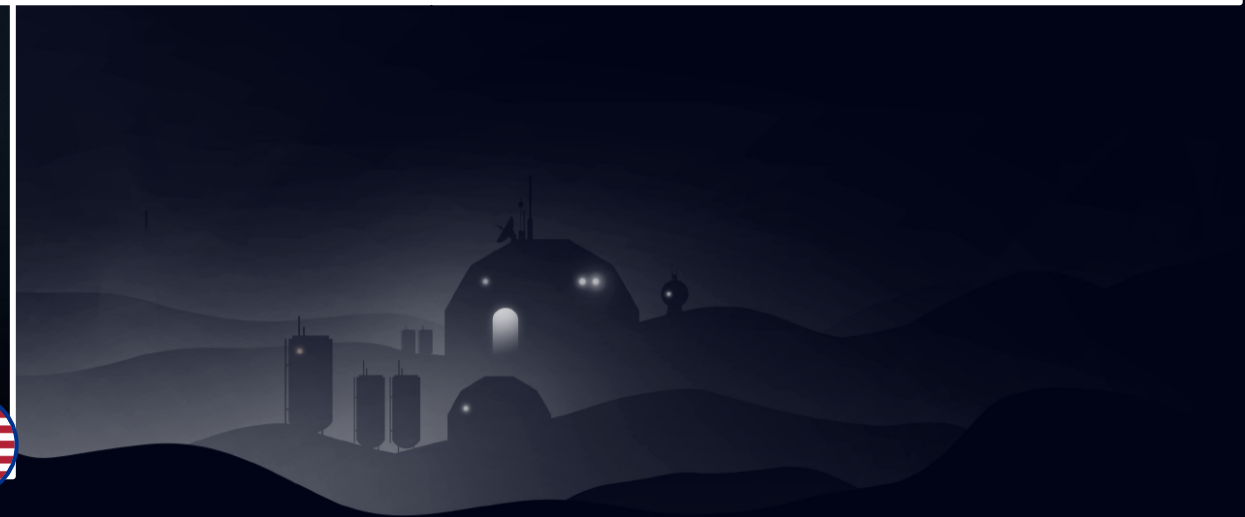
2. Neurospace: Germany
Communication and Navigation



3. Space Engineer: Portugal
Composite for space applications

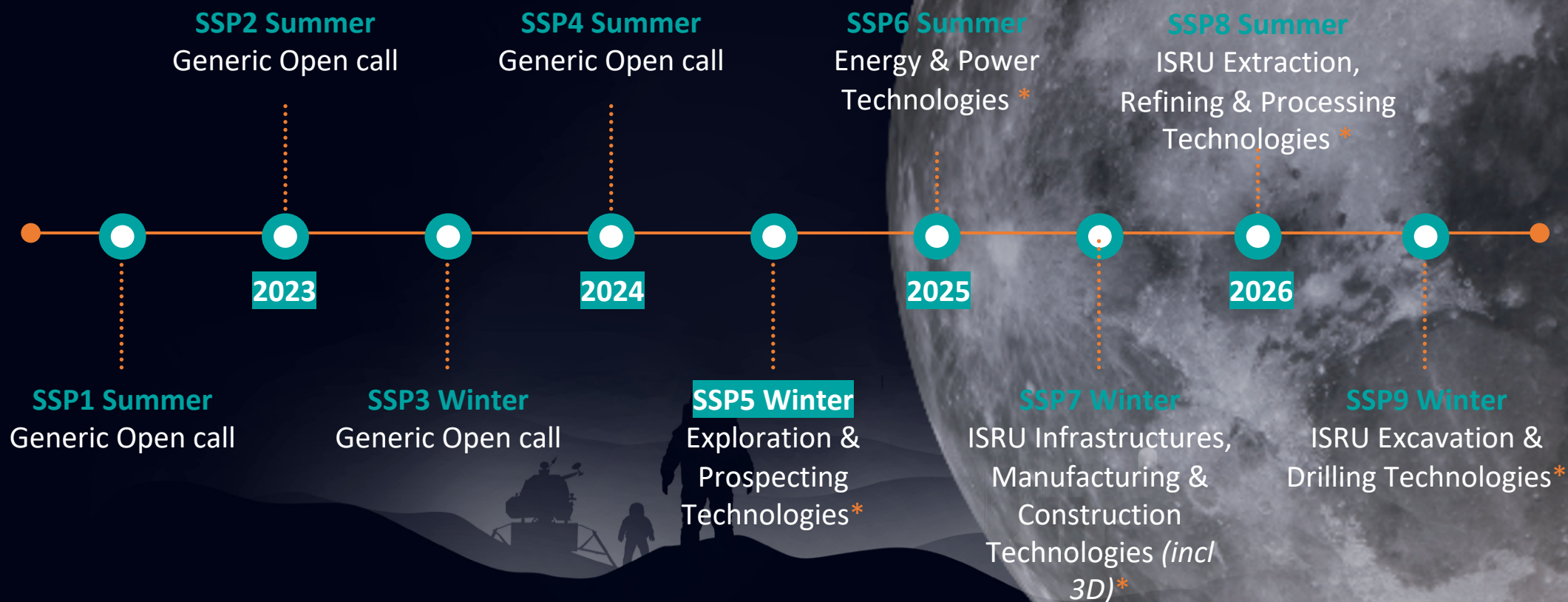


4. Tumi Robotics: USA
Autonomous mobile and aerial robots for exploration



ISRU Thematic Calls

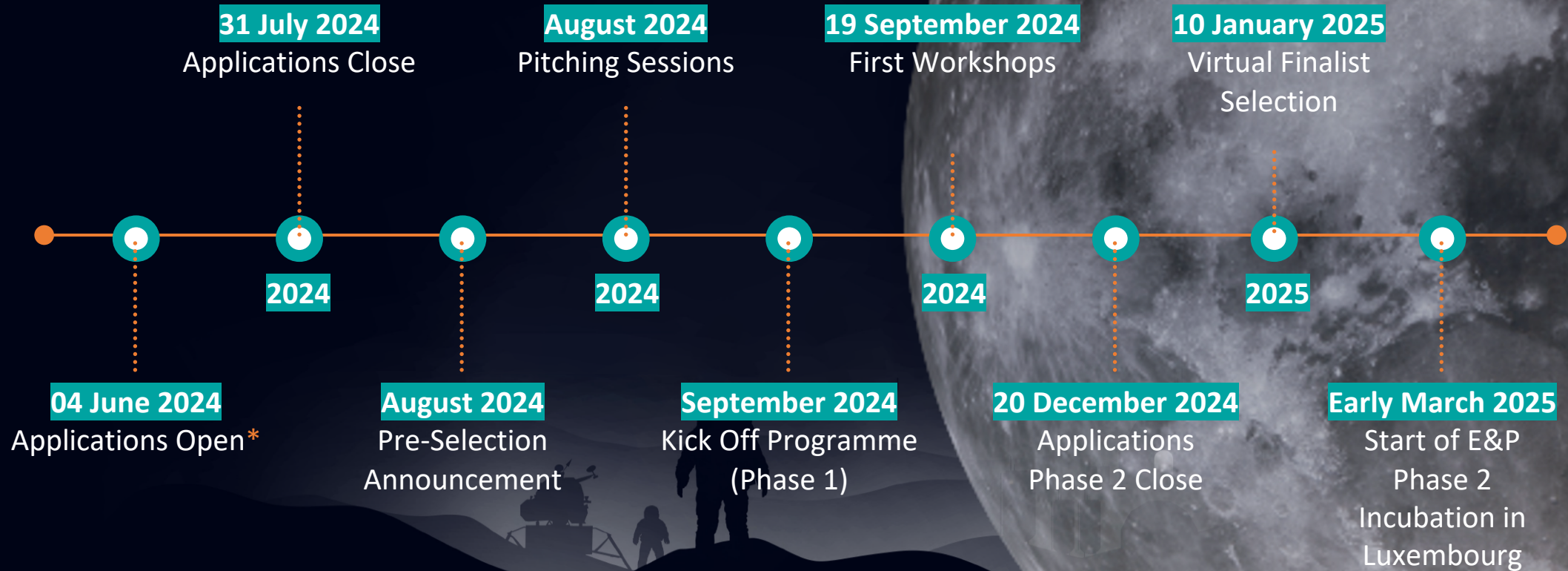
Start-up Support Programme Roadmap



*Generic application in other space resources segments are authorized.

ISRU Thematic Calls

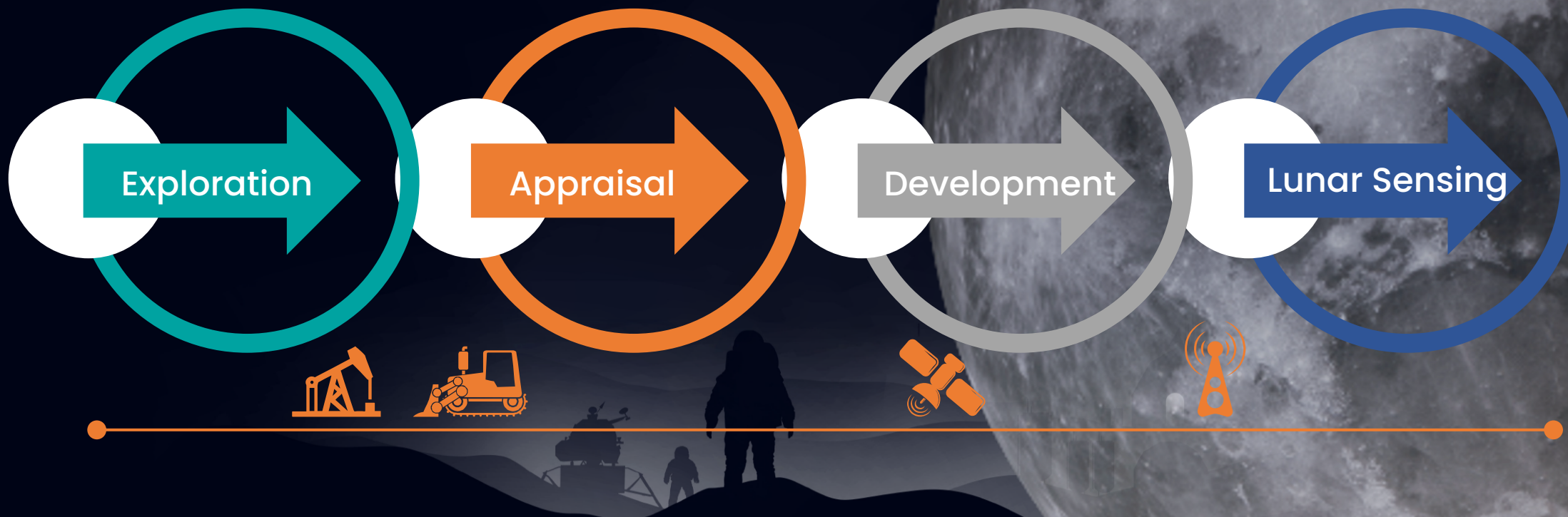
Space Exploration & Prospecting Technologies (SEPT) - Applications



*Exact dates subject to change.

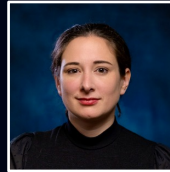
ISRU Thematic Calls

Space Exploration & Prospecting Technologies (SEPT) - Topics





ESRIC Experts (Research & Innovation Lab)



And more

Partners



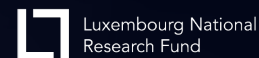
THEMIS

LEX

And more to come



AIRBUS



Stakeholders



Cluster/ Start-ups

FOUR
POINT



Adventus
Interstellar

anisoprint



TERRA
LUNA



Lunar Outpost

Spacebackend

Moliri
Space Energy

ORBITAL
MINING CORPORATION

SOLSYS MINING

We Space
EXPLORE THE MOON



Commercial Gateway toward the Moon



Up to **two** years of business **incubation** at ESRIC



Legal and **IPR** Advice



Workshops and **Trainings**



Technical support from leading experts from ESA and ESRIC



Access to business partners
capabilities, **Labs** and **networks**



€200 000 funding for product and IP development*



Business support from leading experts from ESA and ESRIC



Fundraising **guidance** and opportunities

LUXEMBOURG START-UP ECOSYSTEM

Dynamic, fast growing and data driven



FUNDING

Financing start-ups during their growth

▶ YOUNG INNOVATIVE ENTREPRISE

Support for high growth start-ups matching equity investments from private investors up to €800K

▶ R&D AND INNOVATION

Financial aid in the form of subsidies for R&D and Innovation projects

▶ SNCI

Focus on the mid and long-term financing of Luxembourgish companies by providing loans to foster investment and innovation

▶ ORBITAL VENTURES €120 M

Investing in space-related companies



▶ DIGITAL TECH FUND

Public-Private seed fund financing start-ups
€20M (2016) + €14M (2023)

▶ EUROPEAN SPACE AGENCY (ESA)

3 modes of funding in open calls including co-sponsored research, systems studies and technology development

- ESA Open Space Innovation Platform (OSIP)
- ESA Open Invitation To Tender (ITT)

▶ LUXEMBOURG FUTURE FUND



Investing in international technology focused SMEs and VC Funds developing activities in Luxembourg

- Luxembourg Future Fund 1 €150M
- Luxembourg Future Fund 2 €200M (launched in March 2023)

LUXEMBOURG START-UP ECOSYSTEM

ISRU Cluster

The ISRU Cluster associated to the R&D and Innovation Excellence Center in Luxembourg focus on advancing In-Situ Resource Utilization technologies and commercial oriented activities to support a sustainable space economy

Corporates/start-ups (B2B)

Companies and technology entities that develop, manufacture, and operate space technologies and/or services

Institutionals (B2G)

Governments, space agencies and international organizations that set policies, provide funding, and oversee regulatory compliance



Research Centers & Academics

Entities conducting fundamental or applied research developing new R&D and technologies with commercial outcomes.

Funding/Financial

Providing funding and capital to support space ventures and research initiatives.

Prospecting

Genetic models of ilmenite
Water ice prospecting

Dust Mitigation

Dust in enclosed spaces



Purification

Processed H_2O and O_2
Indigenous H_2O



Construction

Microwave sintering
and melting

Beneficiation

Size classification



Recycling

Recycling of lunar debris



O_2 and metals from regolith

Demonstrator: H reduction

Demonstrator: Molten salt electrolysis

Plasma-enhanced H reduction

Metals produced by molten salt electrolysis



Large **infrastructure** will be made available for use by **Researchers, Start-ups** and **Industrial Partners**

Advanced ISRU capabilities: Lab as a Service (LaaSS)



Beneficiation Zone



O₂ Extraction Zone

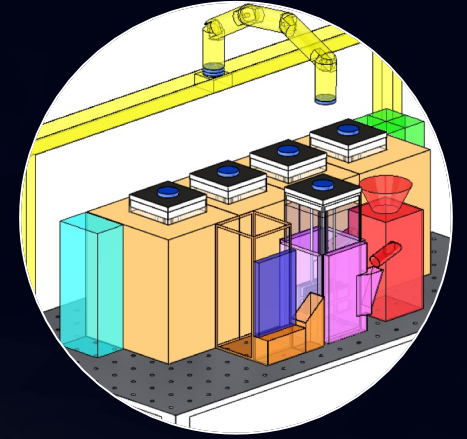


Purification Zone



Dusty Thermal Vacuum Chamber

Manufacturing completion
expected in 2025




Ground-Based Pilot Plant

Scoping and design study
ongoing

EXISTING FACILITIES

FUTURE INFRASTRUCTURE


ESA's Commercialisation Network

 **Φ LAB NETWORK**
(coming soon)

ESA-wide coverage in multiple Member States

Ground-breaking research, driving commercial technologies

For PhDs and researches



BUSINES INCUBATION

25 Centres
>80 locations

200 new startups p/y


1250 startups selected



TECHNOLOGY BROKERS

7 Technology Brokers

404 Technology Transfers



PARTNERSHIPS

For Entrepreneurs, Corporates, Institutes, and Business Schools

Supports startups, alumni and newcomers

Connecting to current & future decisionmakers





Cornelis J.J. Eldering
Head of ESA BIC & Φ-LabNet Office (CIP-CB)
ESA Commercialisation Department



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THE EUROPEAN SPACE AGENCY



technoport[®]

technology business incubator

Supporting creativity, innovation & entrepreneurship
for over 25 years

Olivier ZEPHIR

Head of Business Development & Innovation
olivier.zephir@technoport.lu





OUR INCUBATOR

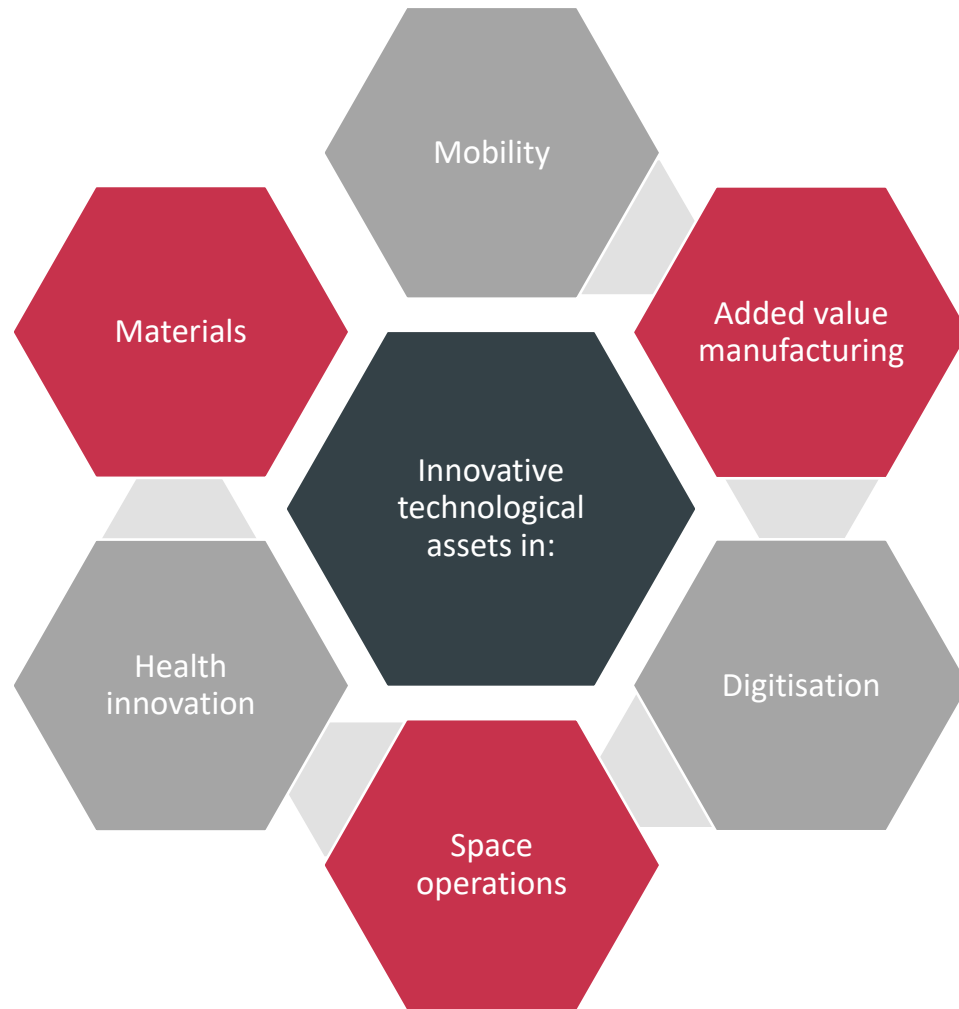
supports the launch and development of
innovative and **technology-oriented** companies in Luxembourg
with the right network, expertise and infrastructure

STARTUPS

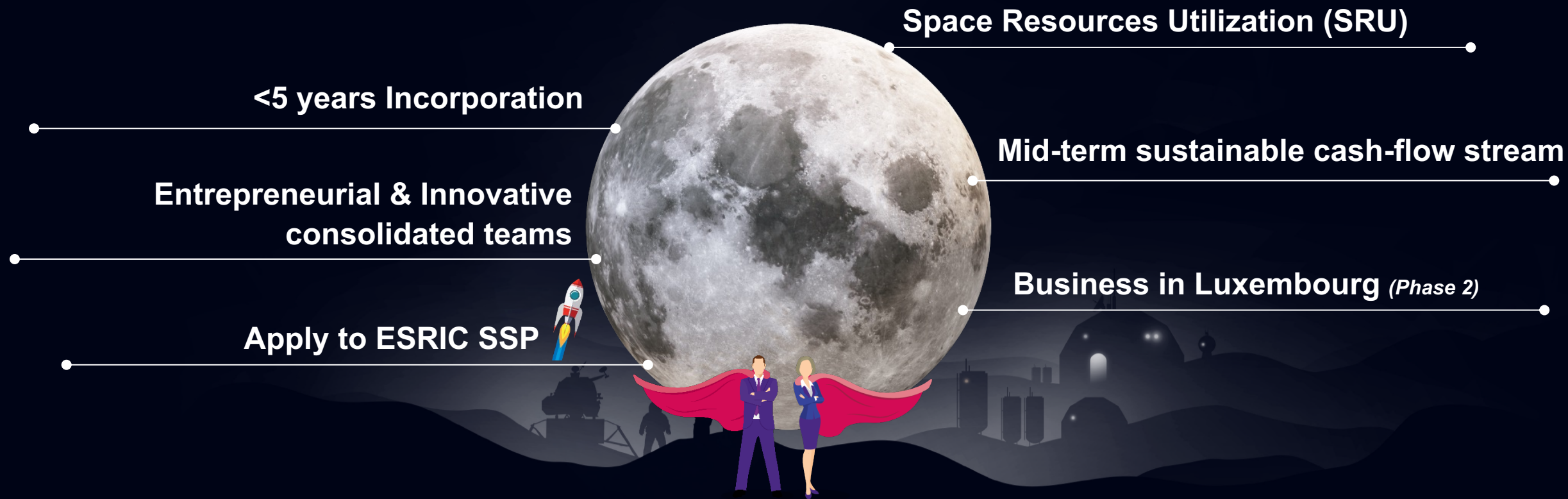
SPIN-OFFS

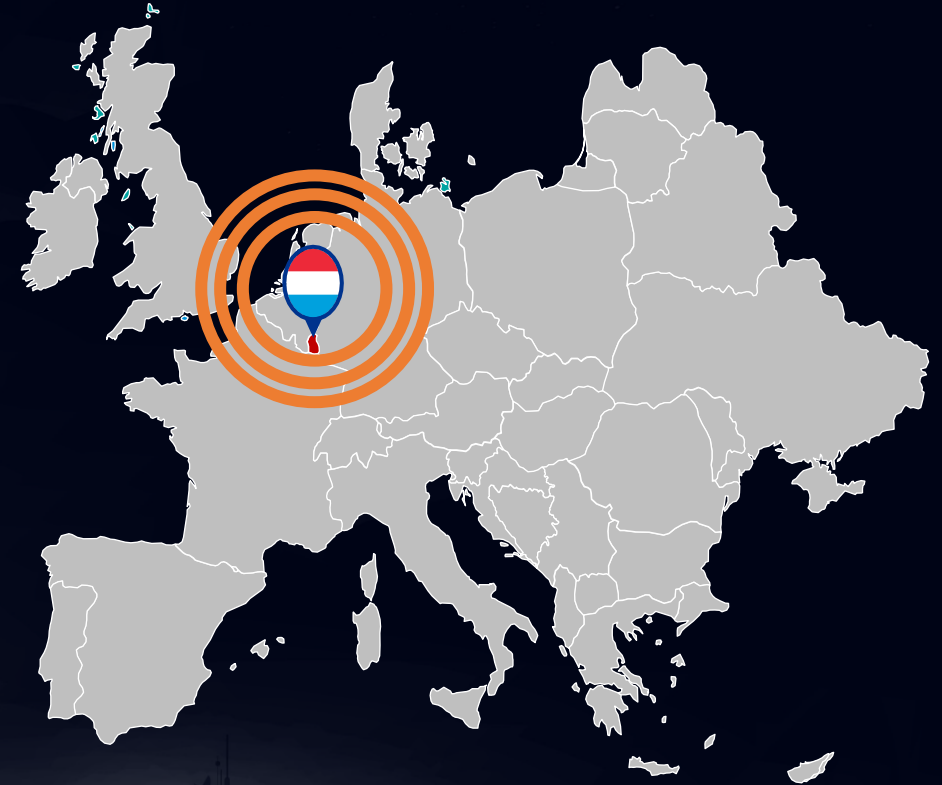
R&D CENTERS OF FOREIGN COMPANIES

HOSTED COMPANIES



Eligibility Requirements





OPEN CALL ESRIC SSP5 in 04 June 2024
Space Exploration and Lunar Prospecting Technologies

→ www.esric.lu



How and where to apply

The screenshot shows the ESRIC website with a navigation menu at the top. The menu includes 'Our mission', 'Research', 'Commercialization', 'Stay tuned', 'Space Resources Week', and 'Contact'. A box highlights the 'Commercialization' menu item, which has a sub-menu with 'Business Incubator' and 'Industry Accelerator'. Another box highlights the 'Commercialization' section of the main content area, which also lists 'Business Incubator' and 'Industry Accelerator'. Below the navigation menu is a large image of a lunar surface. The main content area features the title 'Start-up Support Programme description' and a brief description of the programme. A button labeled 'Calls and applications' is at the bottom left.

Start-up Support Programme description

First worldwide incubation programme, entirely dedicated to space resources utilization.

The ESRIC Start-up Support Programme (SSP) aims at supporting early-stage ventures and start-ups designing novel technologies for space resources applications in refining their business plan, attracting customers and securing their first investments.

- › The SSP is a customised programme, dedicated to young start-ups looking to develop their project and increase their TRL and CRL
- › It is focused on the development of prototypes for terrestrial and space applications all along the Space Resources Value Chain
- › The programme enables access to technical laboratories from ESRIC/LIST and ESA

[Calls and applications](#)

The screenshot shows the 'Application process' section of the ESRIC website. It includes a brief description of the call, followed by two bullet points detailing the phases. A section titled 'Fifth call for applications' provides the dates for the fifth call (04 June to 31 July 2024) and a link to the application link. Below this is a section titled 'Discover the programme roadmap and find out more about previous cohorts, the solutions providers part of our B2B network!'. A timeline shows the progression of the SSP from 2022 to 2024, with specific dates and links for each cohort. At the bottom, there are two profiles of staff members: Lari Cujko, Start-up Support Lead, and Delia Malaut, Press and media relations. Both profiles include a 'Contact' button.

Application process

The call is open to small and medium-sized enterprises, incorporated no longer than 5 years ago. They must be in the Space Resources Utilization field, with a terrestrial and/or space application.

- › During Phase 1 there is no need to be physically present in Luxembourg (remote)
- › During Phase 2 the selected start-up needs to be registered and located in Luxembourg with R&D transferred in Luxembourg for the project in scope

Fifth call for applications

[The fifth call will be open between 04 June and 31 July 2024. Stay tuned for the application link](#)

Discover the programme roadmap and find out more about previous cohorts, the solutions providers part of our B2B network!

SSP 1 Summer 2022	SSP 2 Summer 2023	SSP 3 Winter 2023	SSP 4 Summer 2024	Call and P
Generic open call	Generic Open Call	Generic Open Call	Generic Open Call	
Find out more	Find out more	Find out more		

Interested to apply?

Through the programme, we aim to identify early-stage space resources ventures with near term business models (space and non-space activities), as well as build a consolidated space resources ecosystem and we are always eager to hear from the community.

Don't hesitate to reach out, we would be happy to discuss!

Lari Cujko
Start-up Support Lead
[Contact](#)

Delia Malaut
Press and media relations
[Contact](#)

European Space Resources Innovation Centre (ESRIC)

ESRIC Commercialization





SPACE RESOURCES ACCELERATOR

an •e esa Business in Space Growth Network (BSGN) Industry Accelerator



powered by LSA, ESA & LIST

The European Space Resources Innovation Centre is world's first innovation centre entirely dedicated to space resources utilization, for human and robotic space exploration, as well as for a future in-space economy.

- HQ in Luxembourg
- 20+ Researchers
- 20+ Projects

AIRBUS



SPACE RESOURCES CHALLENGE

competition • 5 projects, 500K€ prize

START-UP SUPPORT PROGRAMME

incubator • 45 start-ups, coaching, facilities,
up to 200K€ funding/company

AMBITION:

ACCOMPANY **CHAMPIONS**
TARGETING **THE MOON**

PARTNERS

► Institutional

Space Agencies, Financial Institutions,
Sovereign Wealth Funds...

► Strategic

Corporations, Scale-ups...

► Financial

Angel Investors, Family Offices, Venture
Capital/Private Equity Firms...

WORKSHOP

- What is your **lunar economy ambition** and **current innovation roadmap**?
- What terrestrial/space **use cases** with a lunar potential do you wish to push and/or pull?
- Are you interested in **co-building with ESA an accelerator and fund** to support the **Moon champions of tomorrow**?

OBJECTIVE:

**BUILD THE FIRST BUSINESS ACCELERATOR
DEDICATED TO THE MOON**

ESRIC Commercialization

Calendar

- **04-08 June 2024 - Space Resources Roundtable (SRR)**
USA, Colorado, Golden
- **24-27 June 2024 – International Conference on Space Robotics (iSpaRo)**
Luxembourg, Luxembourg
- **08-12 July 2024 – SpaceTide 2024 + 6th Summit for Space Sustainability**
Japan, Tokyo
- **18-19 September 2024 - ESA Industry Space Days (ISD)**
Netherlands, ESTEC
- **November 2024 – New Space Europe**
Luxembourg, Luxembourg

Thank you

www.esric.lu

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