European Innovation Council

Backing visionary entrepreneurs

Stela Tkatchova
EIC Programme Manager for Space Systems

3/10/2024

European Innovation Council and SME Agency

Introduction

Commercialisation

- ISS Commercialisation lessons learnt
- NASA Commercial Lunar Payload Services observations

EIC Introduction

- EIC role in the EU Space industry
- EIC space portfolio & roadmap
- WP2024 Pathfinder (TRL1-4) Strengthening the sustainability and resilience of EU space infrastructure
- Conclusions

Courtesy: ESA

Disclaimer: The views expressed in this presentation are the sole responsibility of the author and do not necessarily reflect the views of the European Innovation Council and SMEs Executive Agency.

The International Space Station

The centerpiece of exploration and model for a new future in space

Continuous and ongoing cargo and crew operations aboard space station, along with commercial and international partnerships, allows human exploration to advance at a sustainable pace

CARGO | **CREW**

Credits: NASA

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Commercialisation Lessons Learnt - Part I

Market Lessons

- Overoptimistic market estimates & market creation is "easy"
- Unknown markets & customers
- "Time-to market" too long for customer
- Competition from terrestrial technologies
- Failure to understand to complexity of space missions

Operational Lessons

- Relying primarily on institutional customers
- Changing end-user requirements in the design & development of p/l often result in schedule and cost slippage and delays in market entrance
- P/L qualification and integration too complex for Newspace companies
- TRL of products too low for commercialisation

Commercialisation Lessons Learnt - Part II

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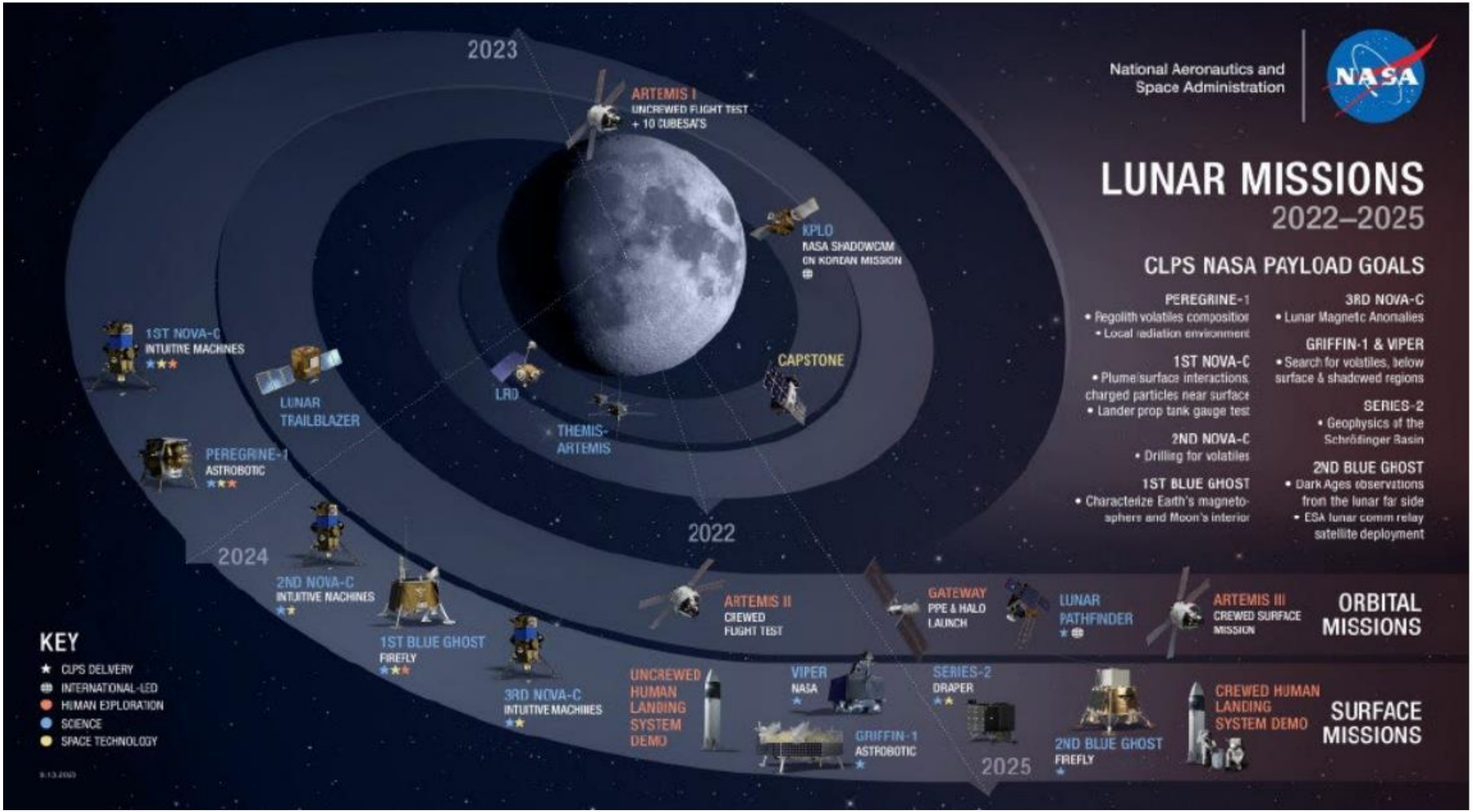
Economic & Funding Lessons

- Non-space customers and investors may not be fully aware of the benefits of cis-lunar enabling space technologies
- Complex global macro-economic environment
- Different value chains in different market segments may be confusing for future customers and investors
- Exposure to technological, programmatic, operational and market risks
- Space SMEs and start-ups to focus on “early risk prevention” in order to achieve operational resilience and potential cost-savings


National Aeronautics and Space Administration
NASA
LUNAR MISSIONS
2022–2025
CLPS NASA PAYLOAD GOALS
PEREGRINE-1
• Regolith volatiles composition
• Local radiation environment
1ST NOVA-C
• Plume surface interactions, charged particles near surface
• Lander prop tank gauge test
2ND NOVA-C
• Drilling for volatiles
1ST BLUE GHOST
• Characterize Earth's magnetosphere and Moon's interior
3RD NOVA-C
• Lunar Magnetic Anomalies
GRIFFIN-1 & VIPER
• Search for volatiles, below surface & shadowed regions
SERIES-2
• Geophysics of the Schrödinger Basin
2ND BLUE GHOST
• Dark Ages observations from the lunar far side
• ESA lunar comm relay satellite deployment
2023
ARTEMIS I
UNCREWED FLIGHT TEST
+ 10 CUBESAT'S
KPLO
NASA SHADOWCAM
ON KOREAN MISSION
1ST NOVA-C
INTUITIVE MACHINES
LUNAR TRAILBLAZER
LRO
THEMIS-ARTEMIS
CAPSTONE
PEREGRINE-1
ASTROBOTIC
2022
2024
2ND NOVA-C
INTUITIVE MACHINES
1ST BLUE GHOST
FIREFLY
3RD NOVA-C
INTUITIVE MACHINES
ARTEMIS II
CREWED FLIGHT TEST
GATEWAY
PPE & HALO LAUNCH
LUNAR PATHFINDER
ARTEMIS III
CREWED SURFACE MISSION
ORBITAL MISSIONS
UNCREWED HUMAN LANDING SYSTEM DEMO
VIPER
NASA
GRIFFIN-1
ASTROBOTIC
SERIES-2
DRAPER
2025
2ND BLUE GHOST
FIREFLY
CREWED HUMAN LANDING SYSTEM DEMO
SURFACE MISSIONS
KEY
CLPS DELIVERY
INTERNATIONAL-LED
HUMAN EXPLORATION
SCIENCE
SPACE TECHNOLOGY

NASA CLPS Lessons learnt

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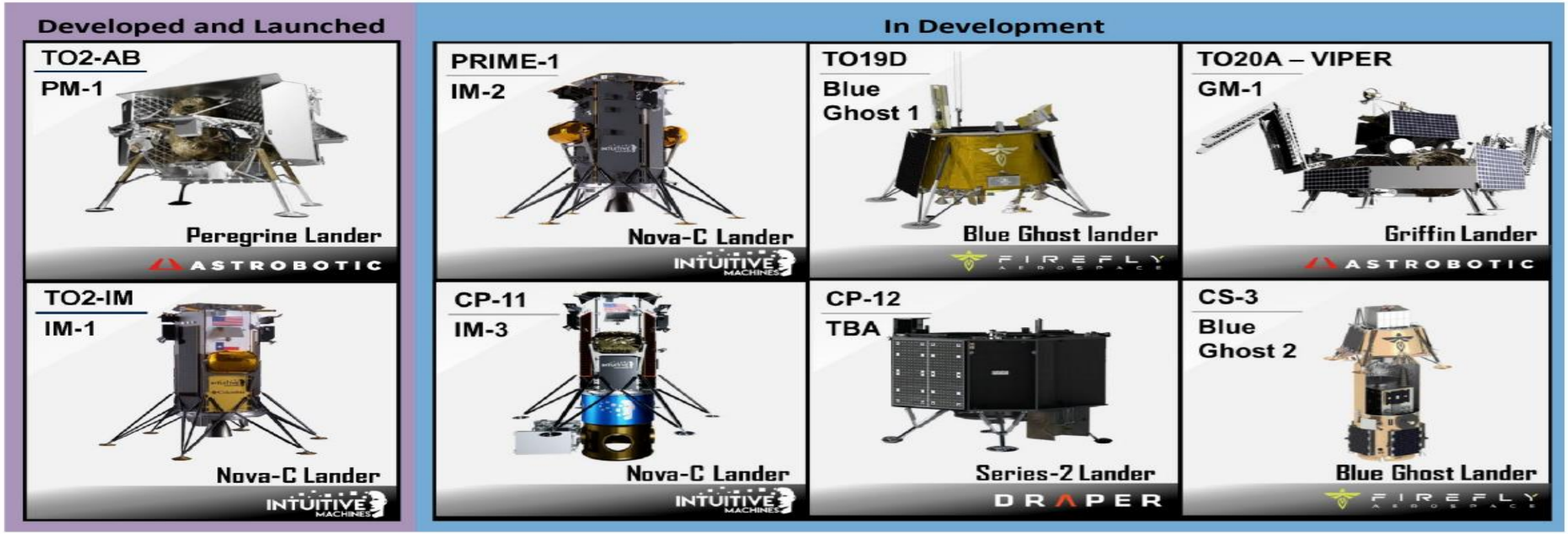
- Launch delays & cost overruns
- Mature requirements for payload integration in order to minimize cost overruns for commercial lunar landers



Source: NASA OIG presentation of CLPS vendor information.

EIC role in the Space Industry

EIC role in the European Space Industry

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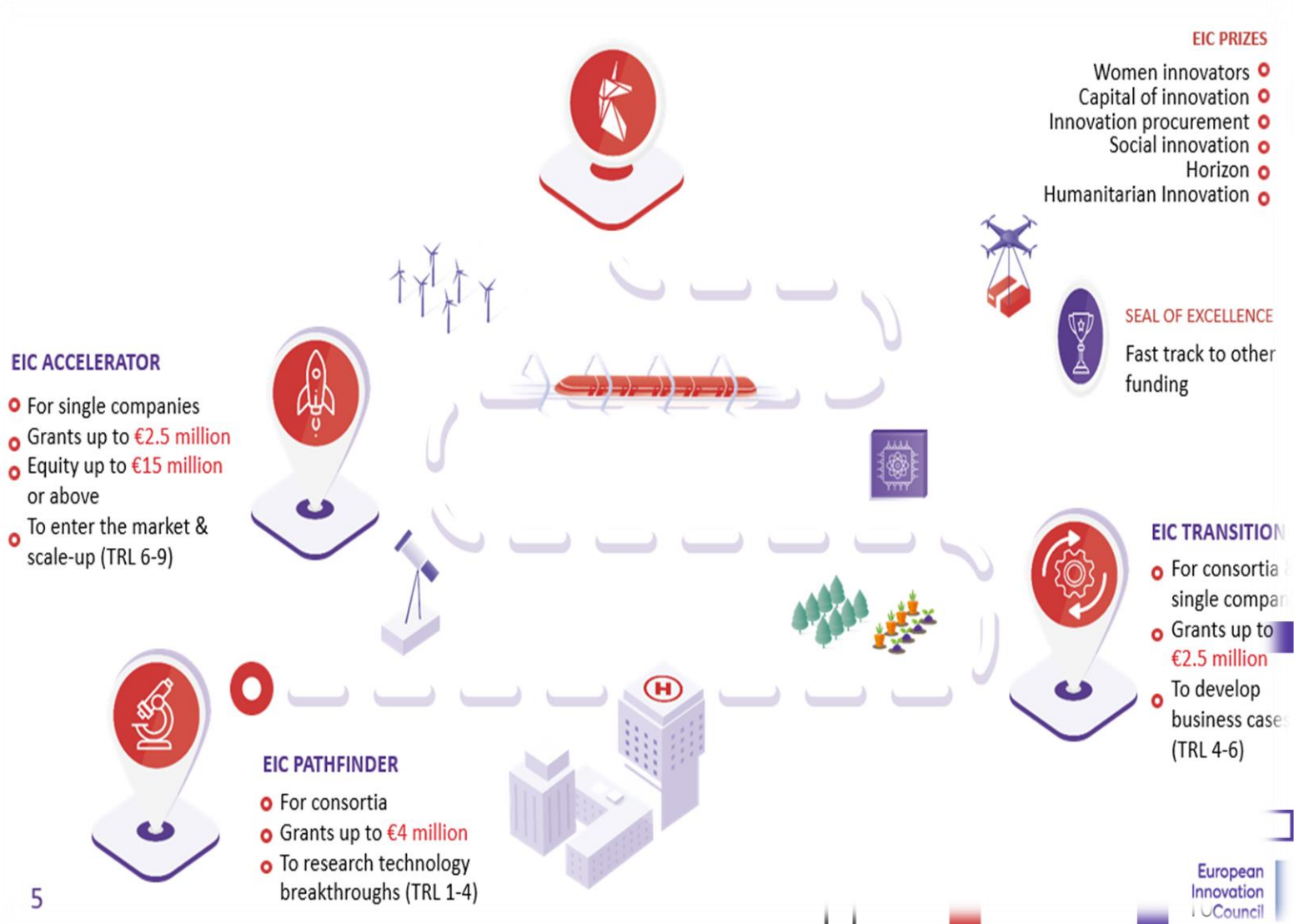
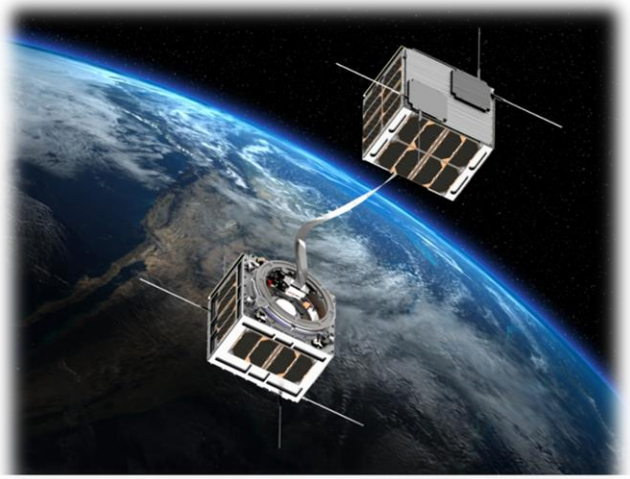
- EIC funds **game-changing innovations** and **high-risk ideas** of space SMEs & start-ups provides support in developing game-changing innovations, demonstration and commercialization through the complementary EIC schemes

- **EIC schemes -** full cycle from research (EIC Pathfinder) to spinout (EIC Transition) to startup and scaleup (EIC Accelerator)

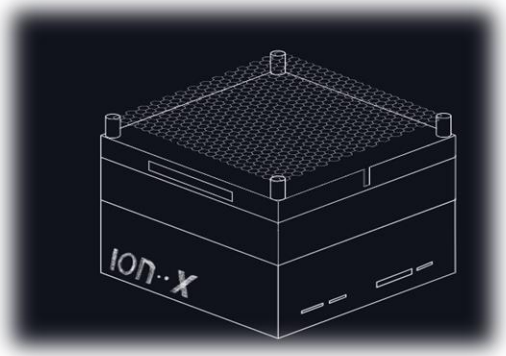


EIC Space Portfolio

- **Space Debris Sustainability** - space debris monitoring, active debris removal, in- orbit satellite servicing, etc.
- **Enabling Space Technologies** - actuators, high temperature superconductors, propulsion technologies e.g. electrospray propulsion, optical intersatellite links, etc.
- **Earth Observation & Meteorology -** thermal infrared p/l, precision agriculture, predictive monitoring



Courtesy: E.T.Pack-F project – EIC Transition



Courtesy: HYPERION EIC Accelerator, ION-X

Courtesy: EMBRACE II-EIC Accelerator, THRUST ME

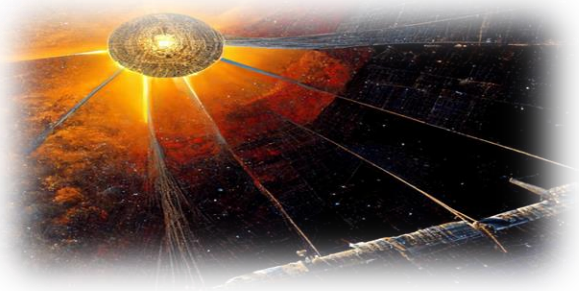
Courtesy: CASSIOPEE-EIC Accelerator,Aldoria

EIC Space Technology Roadmap

WP 2023

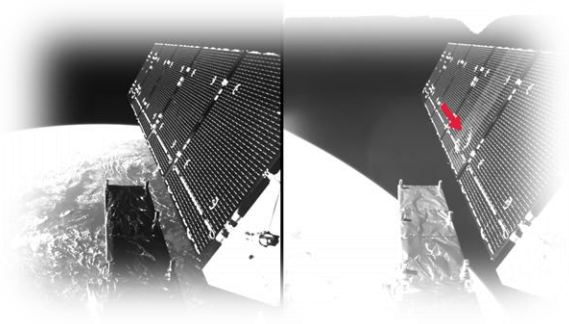
Pathfinder (TRL1-4): In space solar energy

- Collect
- Conversion
- WPT
- In space green propulsion



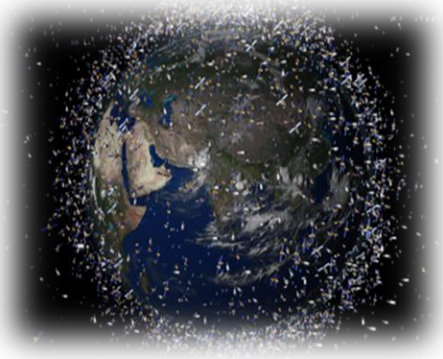
Accelerator (TRL6-9): "Customer driven" innovative space applications

- S/C inspection
- Collision avoidance
- Collection, recovery & reuse space debris
- IOS,ADR, EoL
- ISAM
- Microgravity platforms



WP 2024

Pathfinder (TRL1-4): Strengthening the sustainability and resilience of EU space infrastructure



- Space debris mitigation
- Space debris remediation
- In-space recycling and re-use of orbital assets (ISRROA)

WP2024 space challenge deadline the 16/10/2024

[EIC 2024 work programme - European Commission (europa.eu)]

WP2024 EIC Pathfinder (TRL 1- 4) - Strengthening the sustainability and resilience of EU space infrastructure

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Goal

The challenge address the emerging need for green, compact and affordable de-orbiting solutions and in-space recycling of space debris

- Space Debris Mitigation & Remediation – using very little propellant
- In Space Recycling and Re-use of Orbital assets (ISRROA)
- Game changing innovations for collision avoidance, SSA, tools, etc.

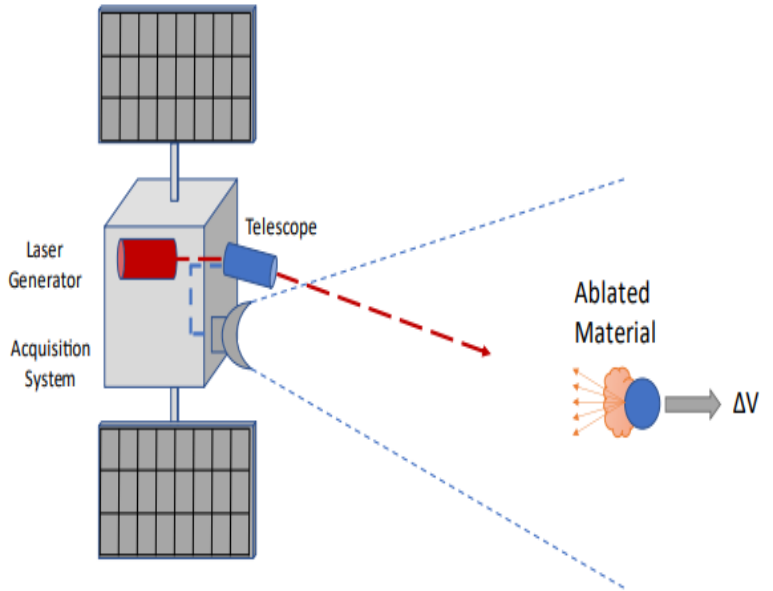

Figure 10. A space-based laser functions similarly to a ground-based laser; however, it requires much less powerful lasers and does not need adaptive optics to correct for atmospheric distortions to the beam.

Courtesy: NASA, L'ADROIT concept

WP2024 Portfolio Categories

- Category I - Space Debris Mitigation
- Category II - Space Debris Remediation
- Category III - In-space Recycling and Re-use of Orbital Assets (ISRROA)

Shared components or potential complementarities among projects

Categories	Overall System/sub-system functions and solutions
Category I: Space debris mitigation	• Innovative concepts for in-orbit spacecraft recognition and space debris detection • Controlled Space debris mitigation • Innovations for space situational awareness (SSA) • Others
Category II Space debris remediation	• Active debris removal (robotic and de-orbiting mechanisms, magnets, nets, harpoons, etc.) • Propellant less debris removal (space-based lasers, laser pushed sails, tethers, solar concentrators, ion beam shepherd methods, etc.) • Others
Category III In-space recycling and re-use of orbital assets (ISRROA)	• Design & development of technologies, methods, and processes for recycling (mechanical, space welding and additive manufacturing) • Re-use of parts and components of defunct satellites or upper rocket stages • Others

WP2024 information

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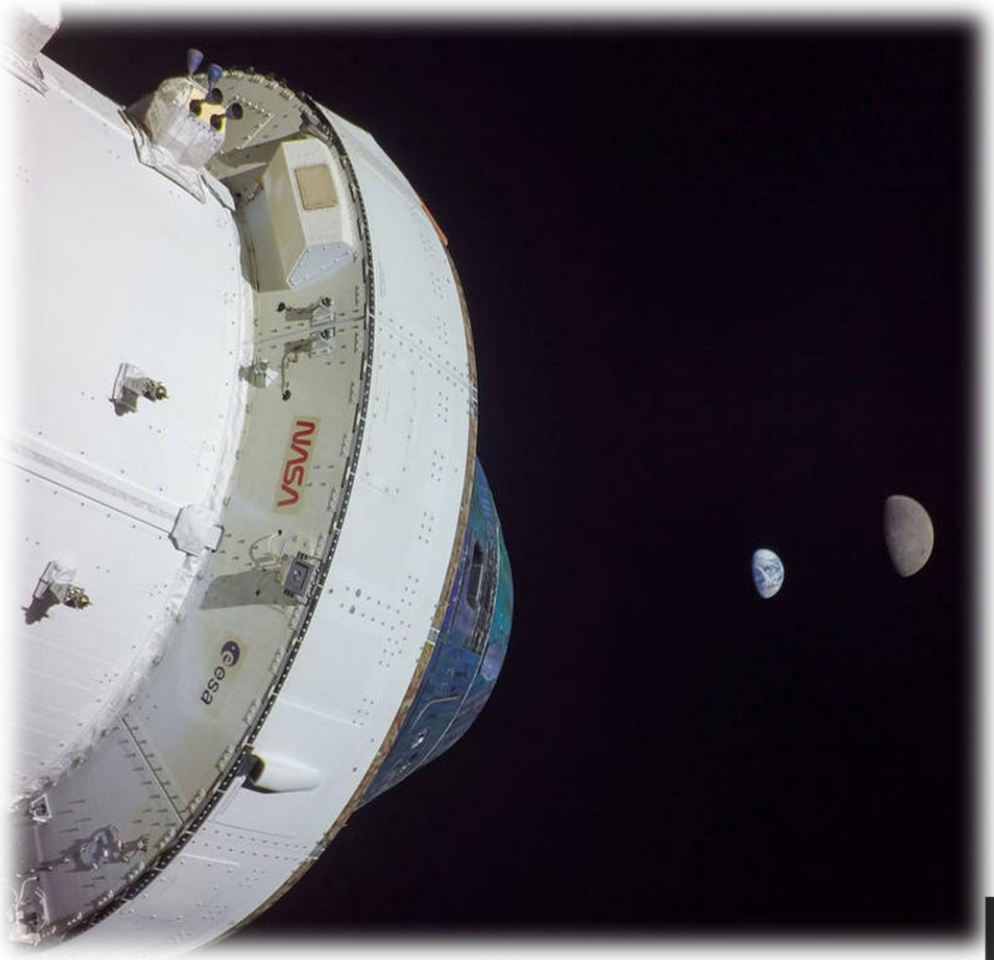
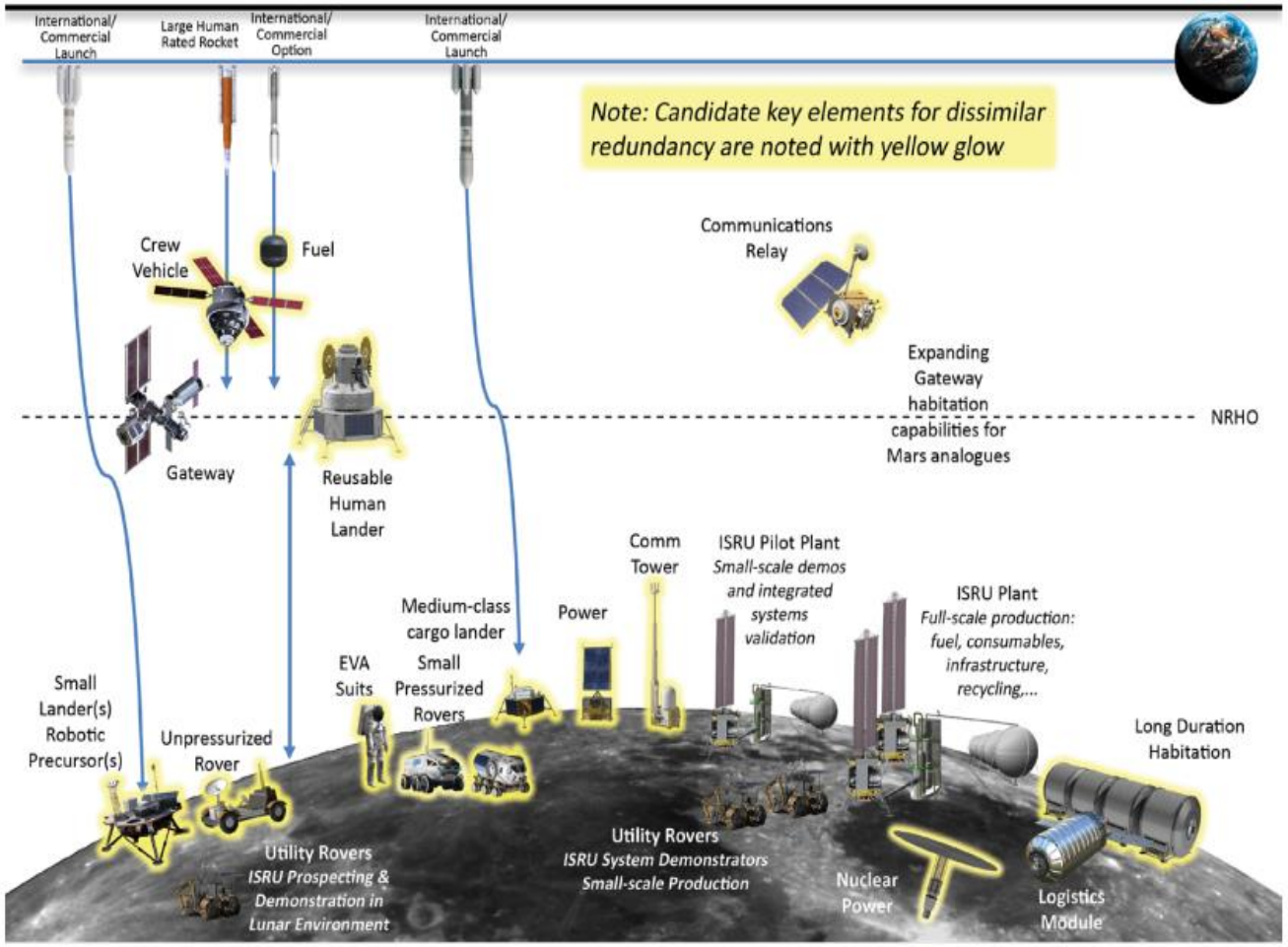
- **WP 2024 –** EIC 2024 work programme - European Commission (europa.eu)
- **Pathfinder Challenge guide –** EIC Pathfinder Challenges - European Commission (europa.eu)
- **Pathfinder deadline 16/10/2024**



Courtesy: NASA Orion image taken the 28/11/2022, imagery of the Earth and Moon together from its distant lunar orbit, including this image on Nov. 28, 2022, taken from camera on one of the spacecraft's solar array wings.

Conclusions

- Space SMEs and start-ups will have to offer affordable and cost-effective technologies exploration
- Target new commercial markets, meet investors' expectations & implement sustainable business models
- Space SMEs need to be aware of early commercialisation lessons and become risk averse and resilient in a complex macro-economic environment



Courtesy: International Space Exploration Coordination Group, Global Exploration Roadmap

Thank you!
Q&A session