Terrae Novae – Europe’s path to outer space

Didier Schmitt

Strategy & Coordination head, human and robotic exploration

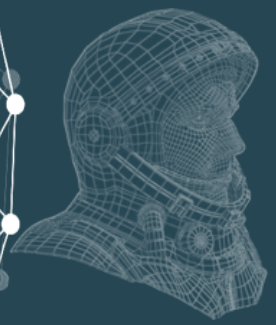
ANOTHER SPACE RACE…

61 years of human spaceflight

space race

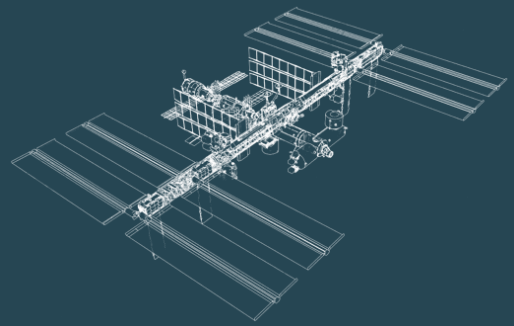
2nd space race

1961
1st human in space

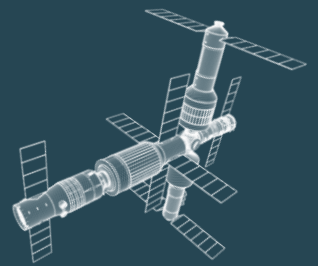


1969
1st human on the Moon

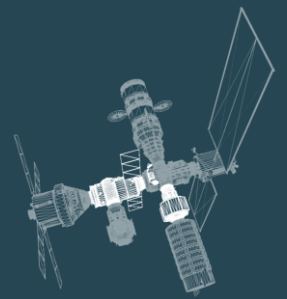
1998
International Space Station starts



2021
Chinese Space Station

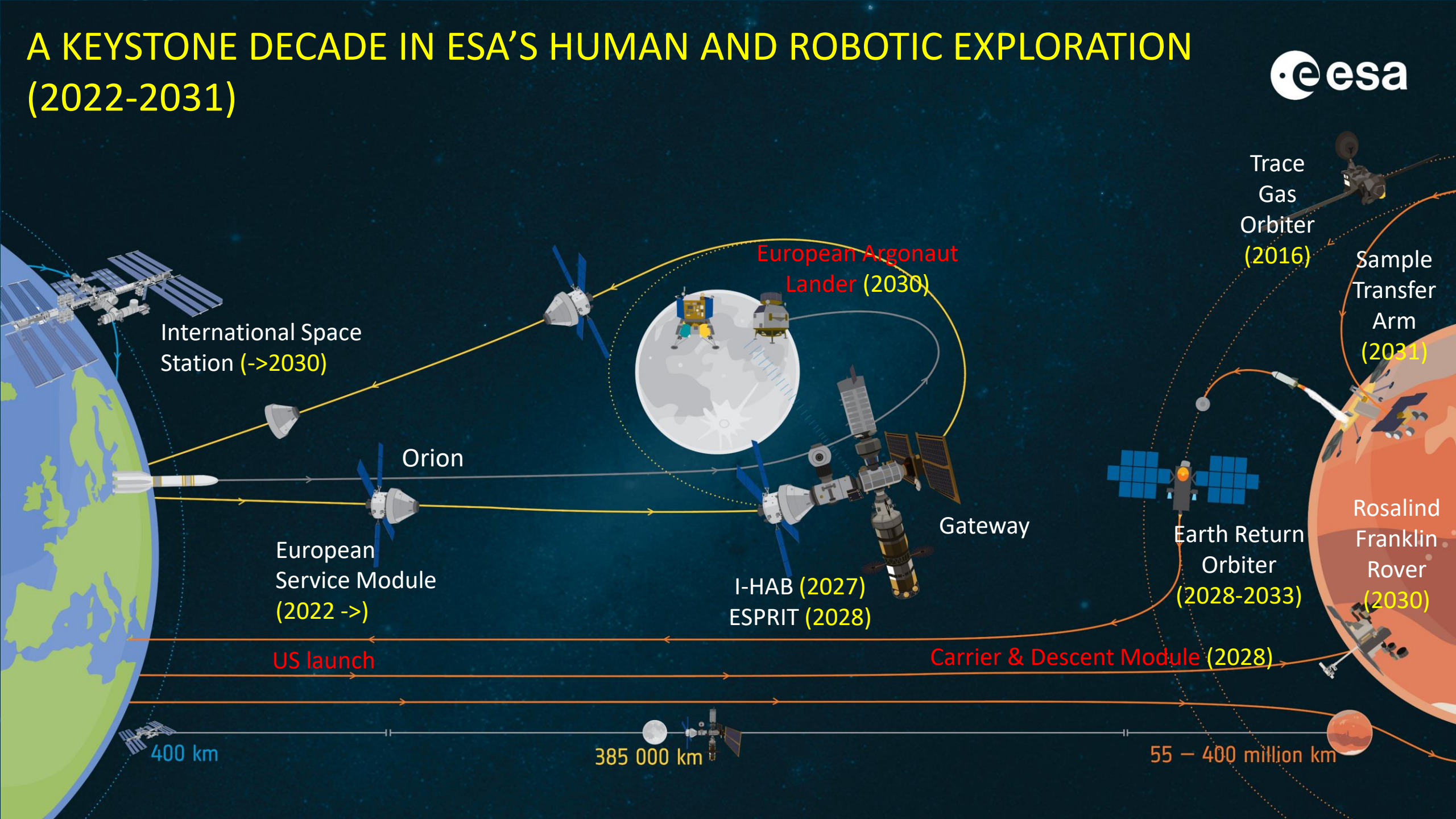


2025
Lunar Gateway starts

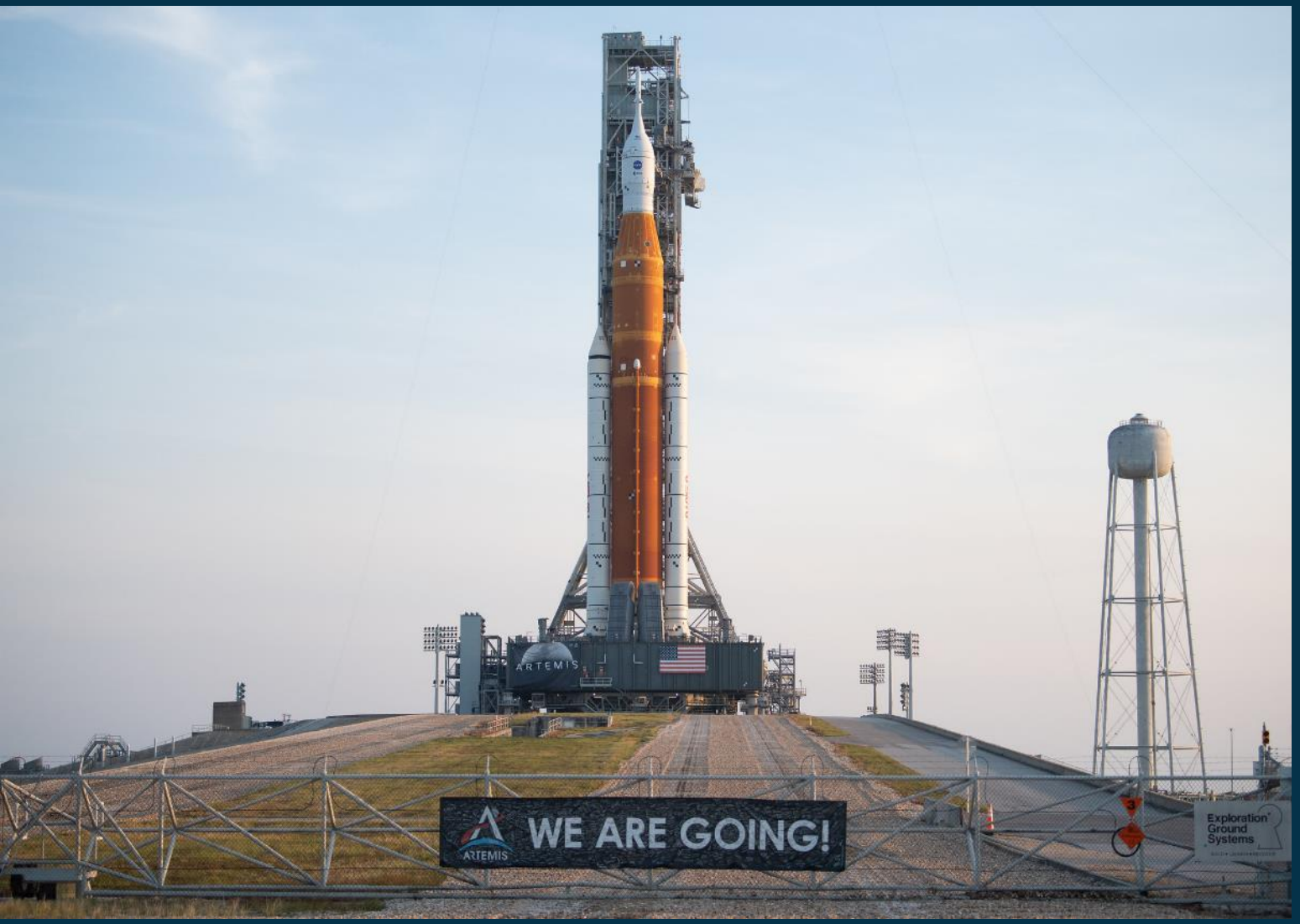


2030-2050
Mars

A KEYSTONE DECADE IN ESA'S HUMAN AND ROBOTIC EXPLORATION (2022-2031)



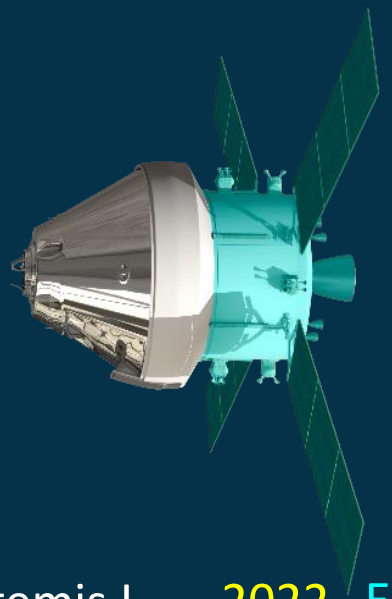
Artemis I update



- A few non-major technical issues on 29 August launch attempt
- Launch of the uncrewed flight test TBD

Launching 2022 - Europe at the Heart of Moon Exploration

The Orion Moonships and the lunar Gateway



European Service Module
ESM

European System Providing Refuelling, Infrastructure and Telecommunications
ESPRIT

International Habitation Module
I-HAB

YOU ARE HERE

Artemis I	2022	ESM-1	Uncrewed flight test
Artemis II	2024	ESM-2	Crewed flight test
Artemis III	2025	ESM-3	Moon landing
Artemis IV	2027	ESM-4	I-HAB delivered to Gateway
Artemis V	2028	ESM-5	ESPRIT delivered to Gateway
Artemis VI	2029	ESM-6	Moon landing
…	…	…	

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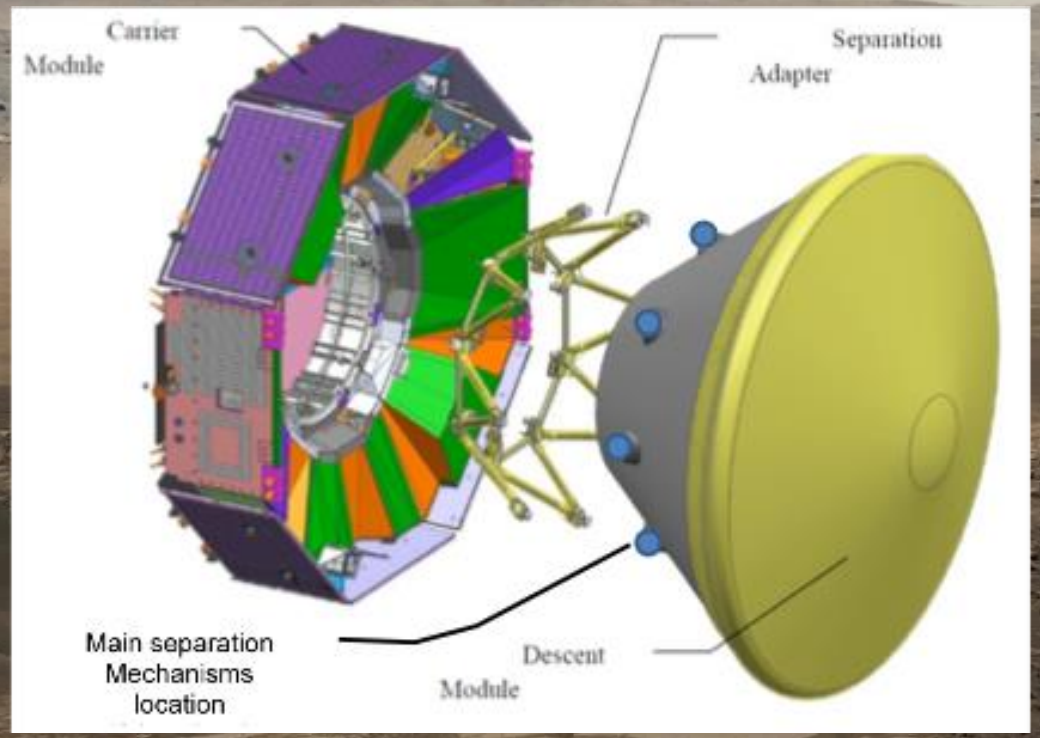
European Large Logistic Landers: the *Argonauts*

→ THE EUROP… SPACE AGENCY

Not Yet At The Red Planet

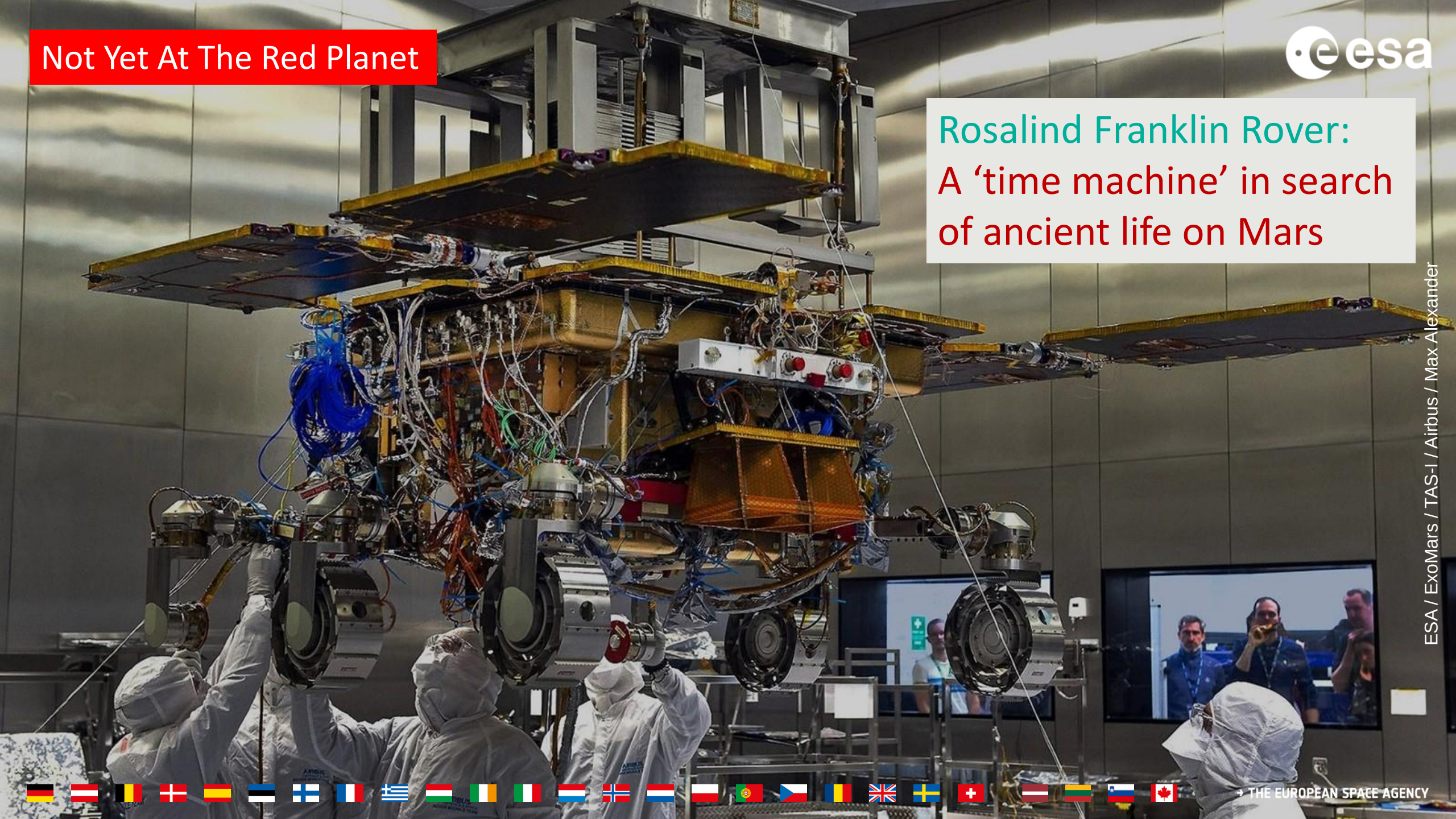
A political and technical challenge facing Europe:

can we mitigate the impact of the Ukraine crisis and recover Europe's science flagship ?



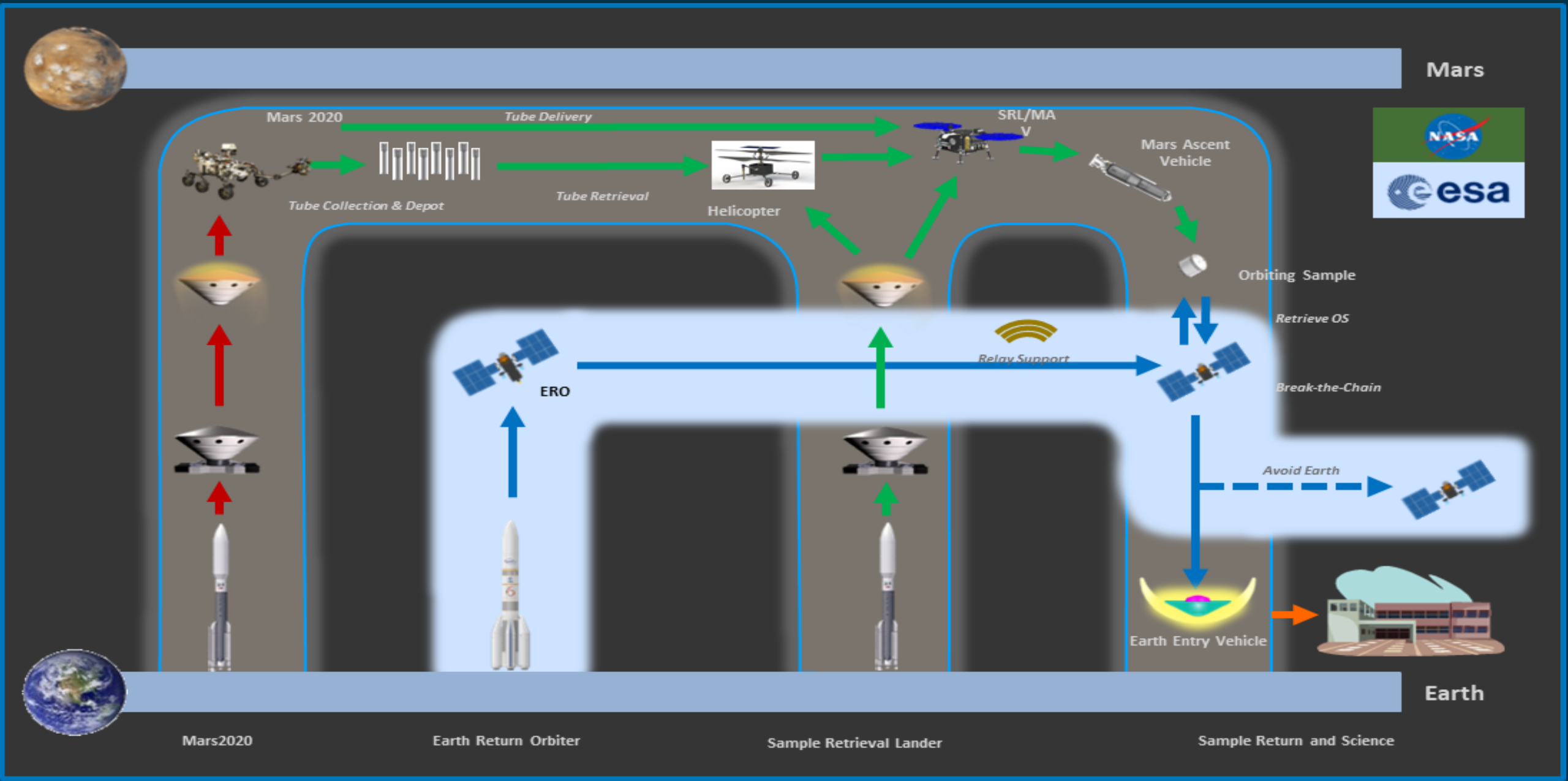
Not Yet At The Red Planet

Rosalind Franklin Rover:
A ‘time machine’ in search of ancient life on Mars



ESA / ExoMars / TAS-I / Airbus / Max Alexander

Mars Sample Return campaign



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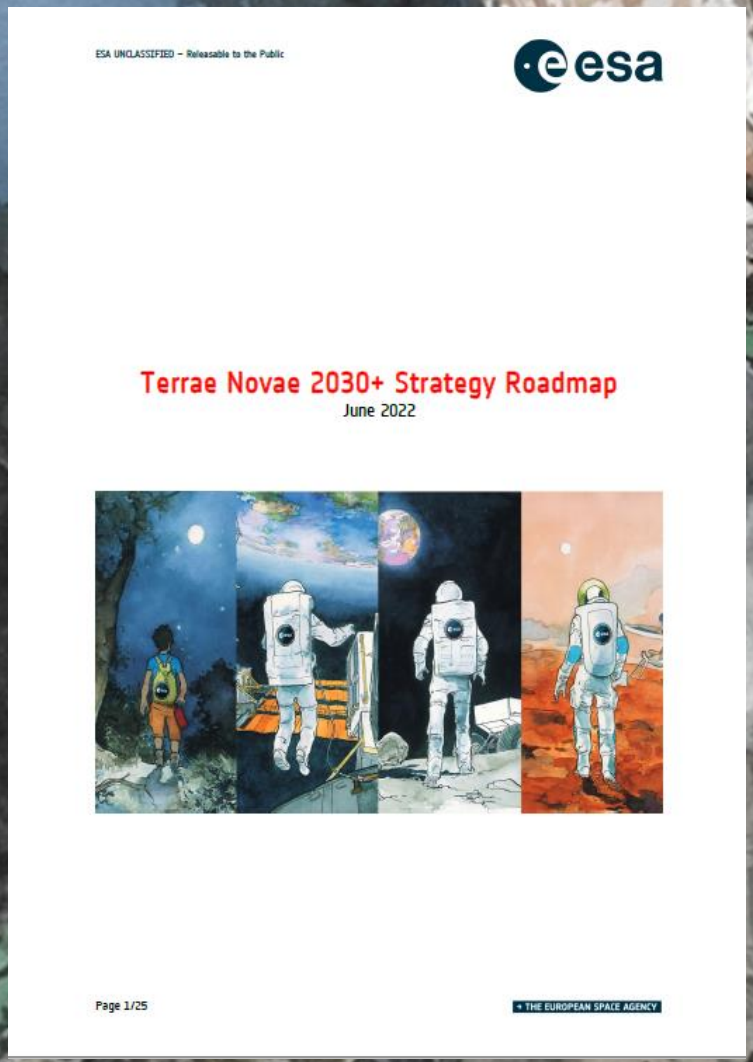
Strategy roadmap

Executive summary



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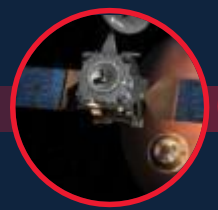
2020 > 2030

ESA in mutual inter-dependence

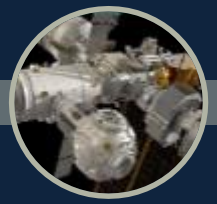


ExoMars 2016

ExoMars Rover 2026

Mars Sample Return

Orion - European Service Module



Gateway – permanent habitation in deep space

Core ISS Partner

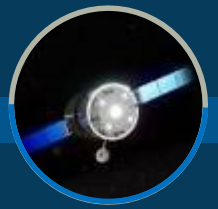
2030 > 2040

European-led capabilities

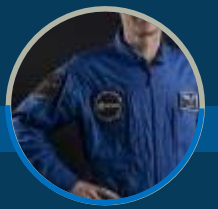
Preparing to send humans to Mars

Living and working on the Moon

Post-ISS Commercial stations



Cargo launch and return



Independent human transport

→ THE EUROPEAN SPACE AGENCY

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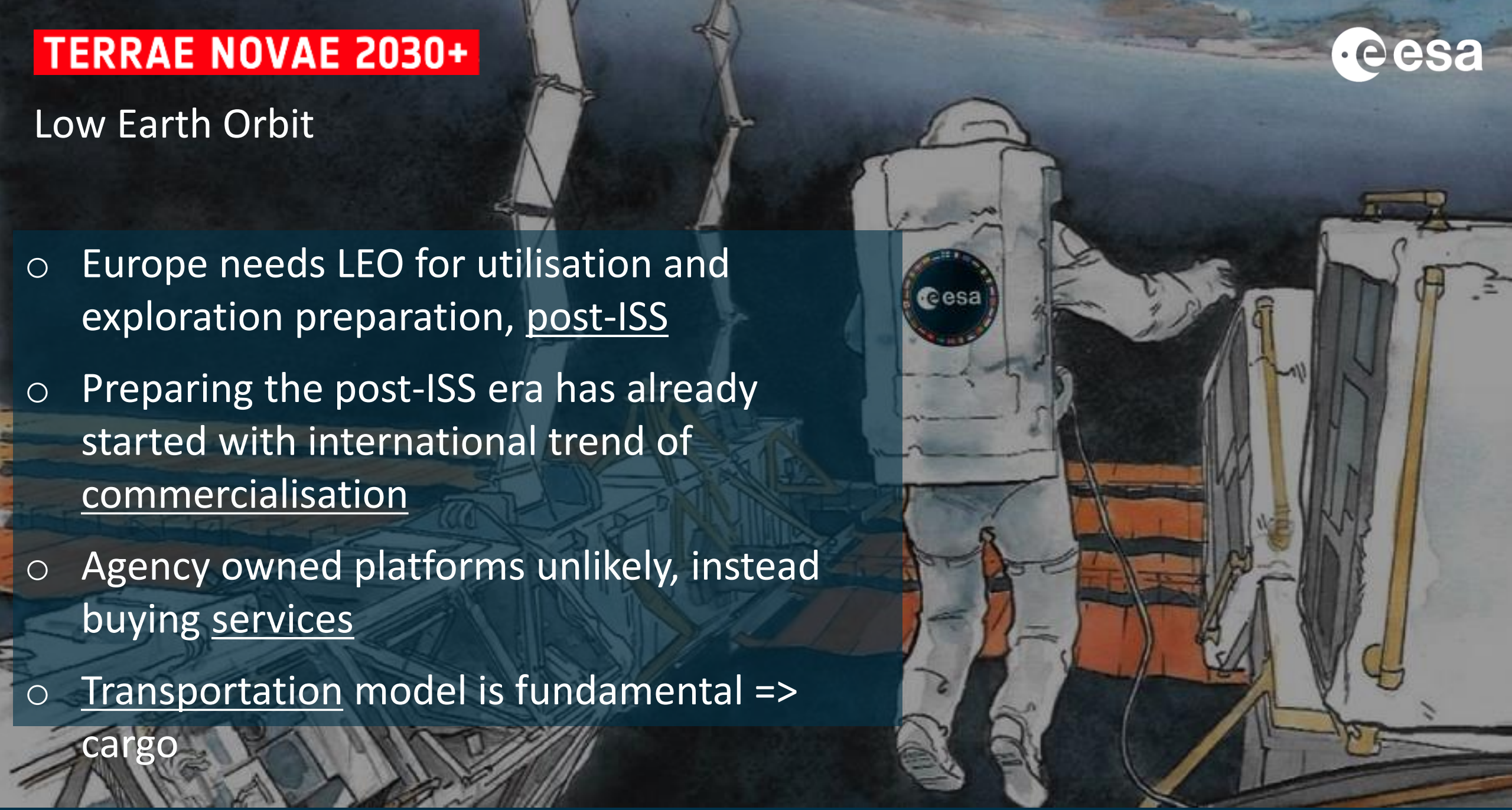
Low Earth Orbit

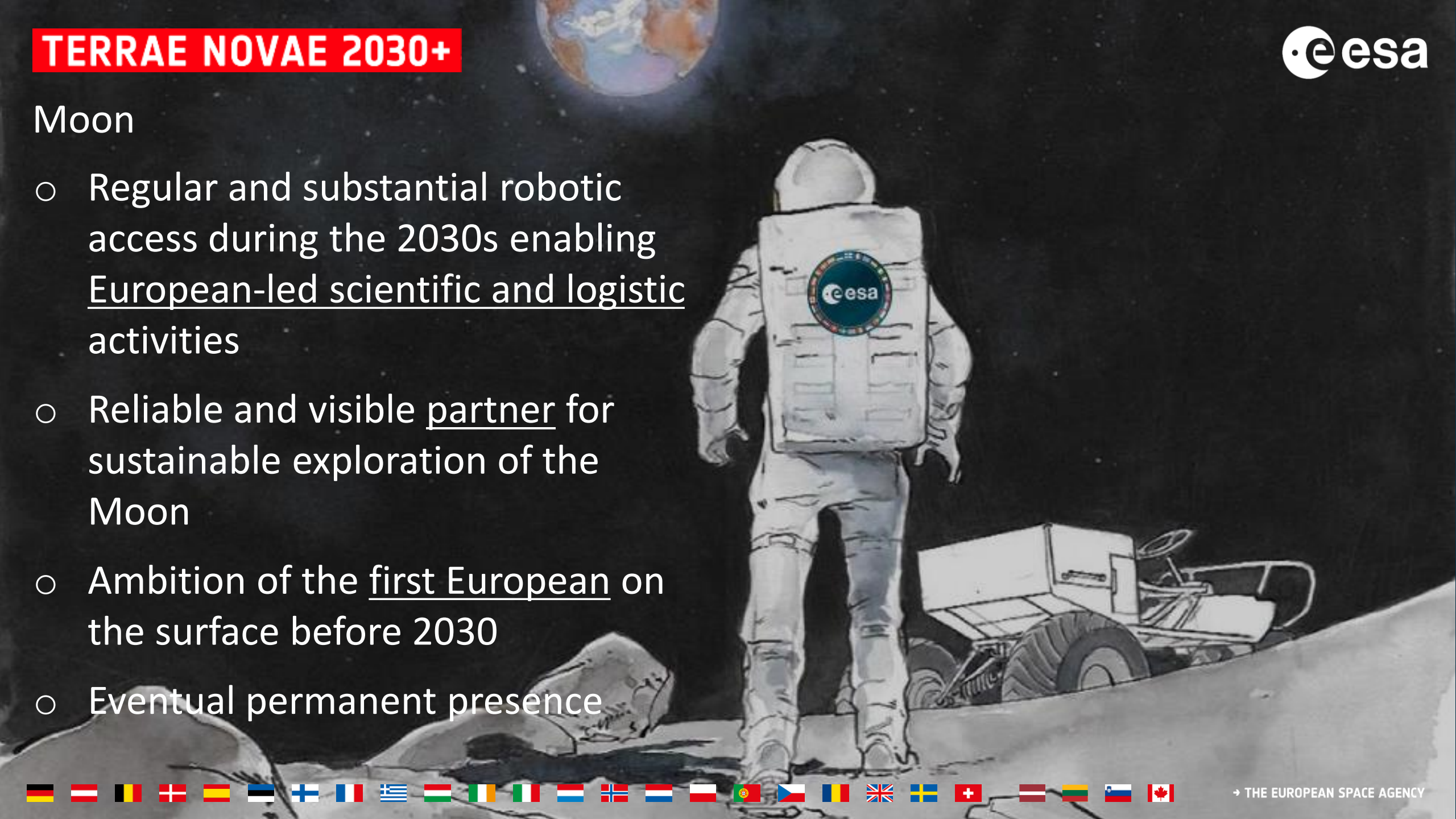


- Europe needs LEO for utilisation and exploration preparation, post-ISS
- Preparing the post-ISS era has already started with international trend of commercialisation
- Agency owned platforms unlikely, instead buying services
- Transportation model is fundamental => cargo

TERRAE NOVAE 2030+

Moon

- Regular and substantial robotic access during the 2030s enabling European-led scientific and logistic activities
- Reliable and visible partner for sustainable exploration of the Moon
- Ambition of the first European on the surface before 2030
- Eventual permanent presence



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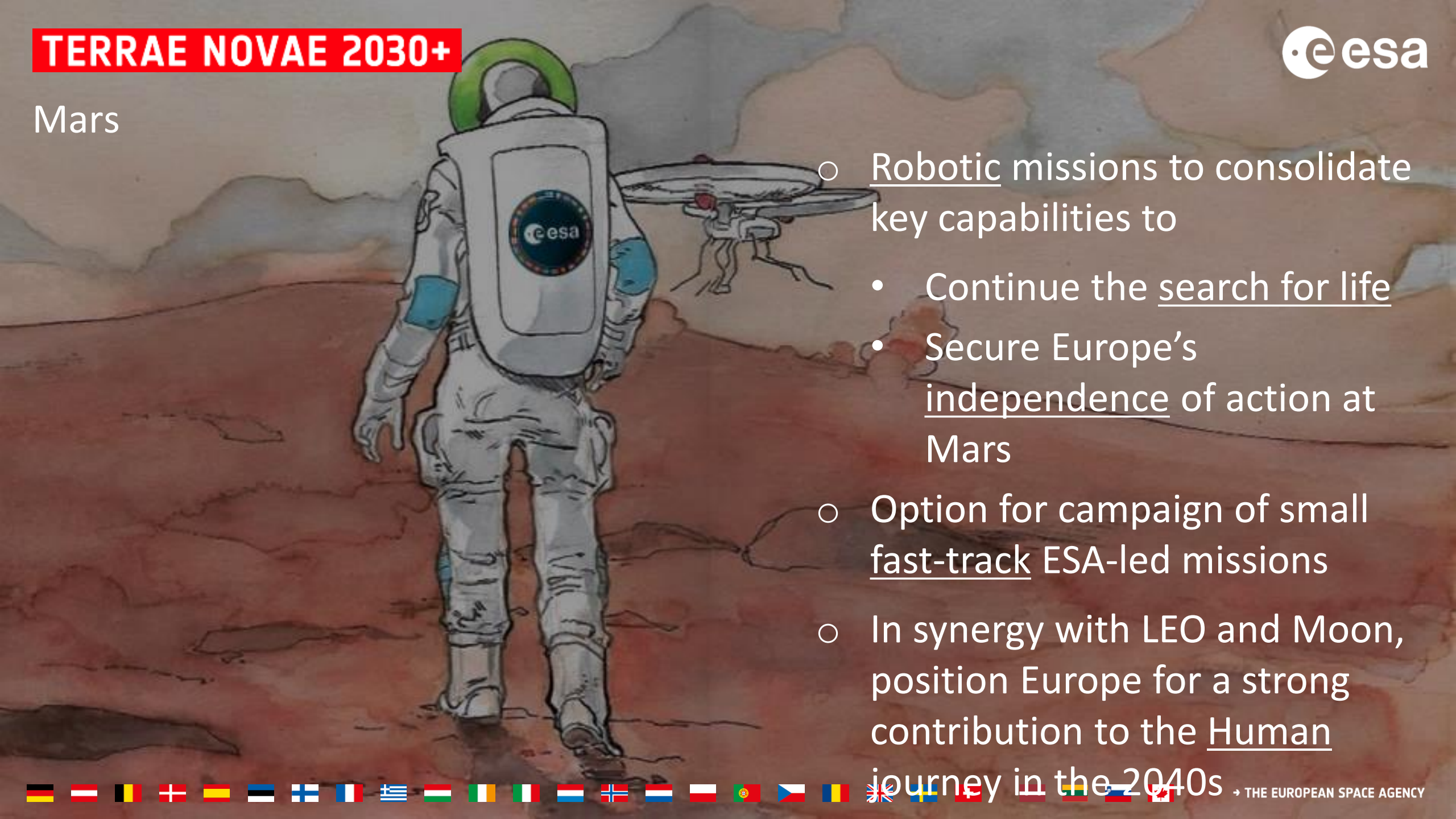
Mars



- Robotic missions to consolidate key capabilities to
  - Continue the search for life
  - Secure Europe's independence of action at Mars
- Option for campaign of small fast-track ESA-led missions
- In synergy with LEO and Moon, position Europe for a strong contribution to the Human journey in the 2040s

WARNING – LACKING MAJOR CAPABILITIES…

Expected capabilities by 2030

Super heavy space transportation (beyond LEO)	V	V	V	XX
Crewed space transportation (LEO)	V	V	V	X
LEO crew vehicle (docking & return)	V	V	V	X
LEO cargo vehicle (docking & return)	V	V	V	X
LEO space station	V	V	V	{V} (ISS)
Lunar orbit – human	V	?	V	{V} (Orion-ESM)
Lunar surface – robotic	V	V	V	X (EL3 - TBC)
Lunar surface – human	V	X	V	XX
Mars orbit - robotic	V	V	V	V (MarsExpress, TGO)
Mars surface - robotic	V	V	V	V (ExoMars - TBC)
Mars sample return	V	X	V	V (no landing/take off)

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Continuity

Sustained presence in, and utilisation of **Low Earth Orbit**

Ambition

Europeans on the **Moon** surface by 2030

Enabler for science, technology, and commercialisation

Provider of end-to-end capabilities

Partner that is reliable

Leader and **Inspirator**

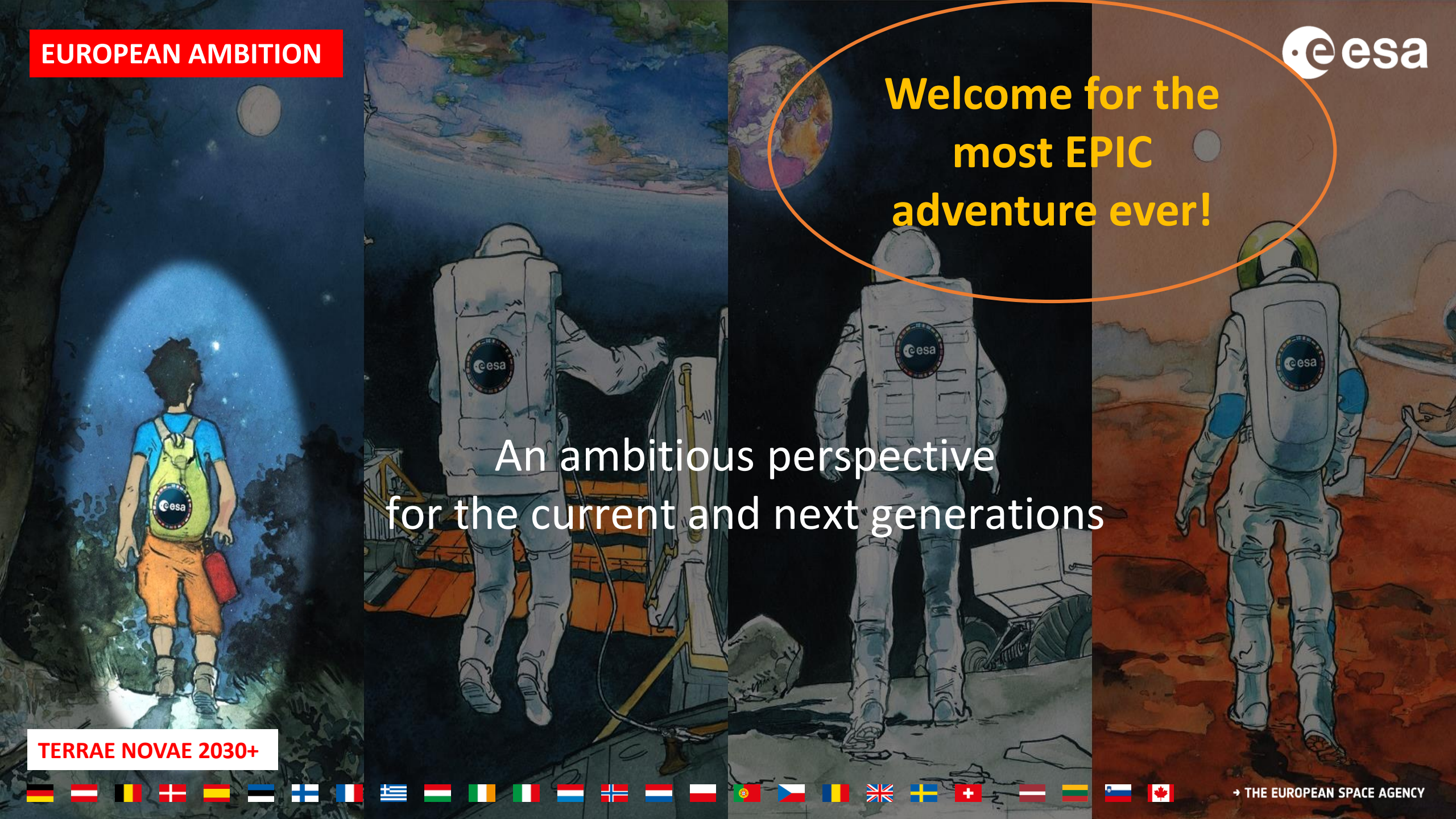
Vision

Europeans to **Mars** by 2040

Inspiration

Cargo and crew transportation

→ THE EUROPEAN SPACE AGENCY


EUROPEAN AMBITION
esa
Welcome for the most EPIC adventure ever!
An ambitious perspective for the current and next generations
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