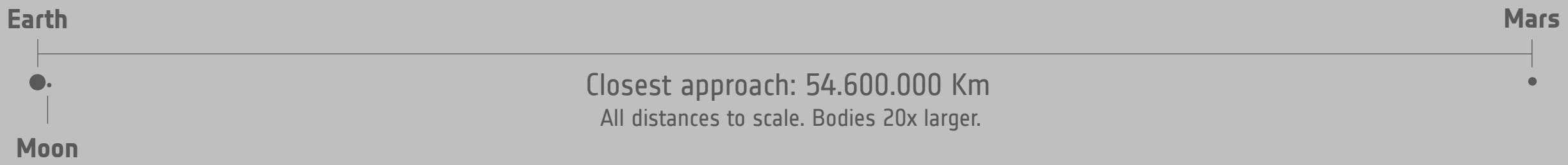
TERRAE NOVAE PROGRAMME



DRIVING PRINCIPLES

Continuity

Sustained presence in, and utilisation of low Earth orbit

Ambition

Europeans on the Moon by 2030

Strategic resilience

European autonomy

Vision

Europeans on Mars by 2043

Inspiration

Cargo / crew transportation and sample return mission

→ THE EUROPEAN SPACE AGENCY

PROPELLING EUROPE INTO THE NEW ERA OF SPACE EXPLORATION

Extend ISS operations until 2030: new science benefits - first flights of new astronauts - first astronaut with disability

Promote commercial exploration services

Prepare future science, missions & technology

Build Europe's ride to the Moon: Argonaut (EL3)

Deliver Mars science & communications: ExoMars Trace Gas Orbiter

Make science history: Mars Sample Return

Fly NASA & ESA astronauts to the Moon: Orion European Service Modules 4-9

Complete first life search rover: Rosalind Franklin

Build the first Moon research station: I-HAB and ESPRIT for the lunar Gateway

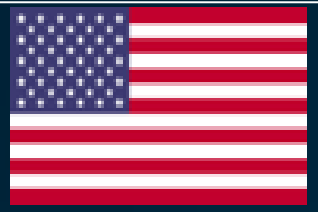
400 km

385 000 km

55 – 400 million km

→ THE EUROPEAN SPACE AGENCY

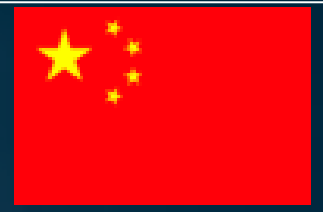
Context: accelerating US and Chinese activities



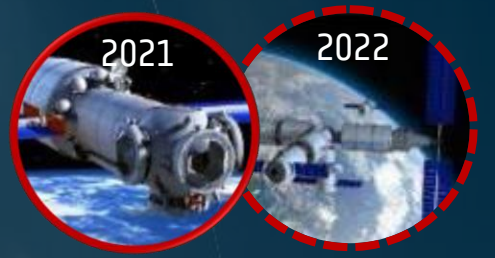
"Commercial"

NASA "in-house"

CLPS

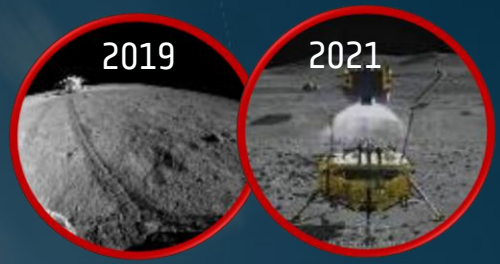


CNSA-CMSA



Tianhe

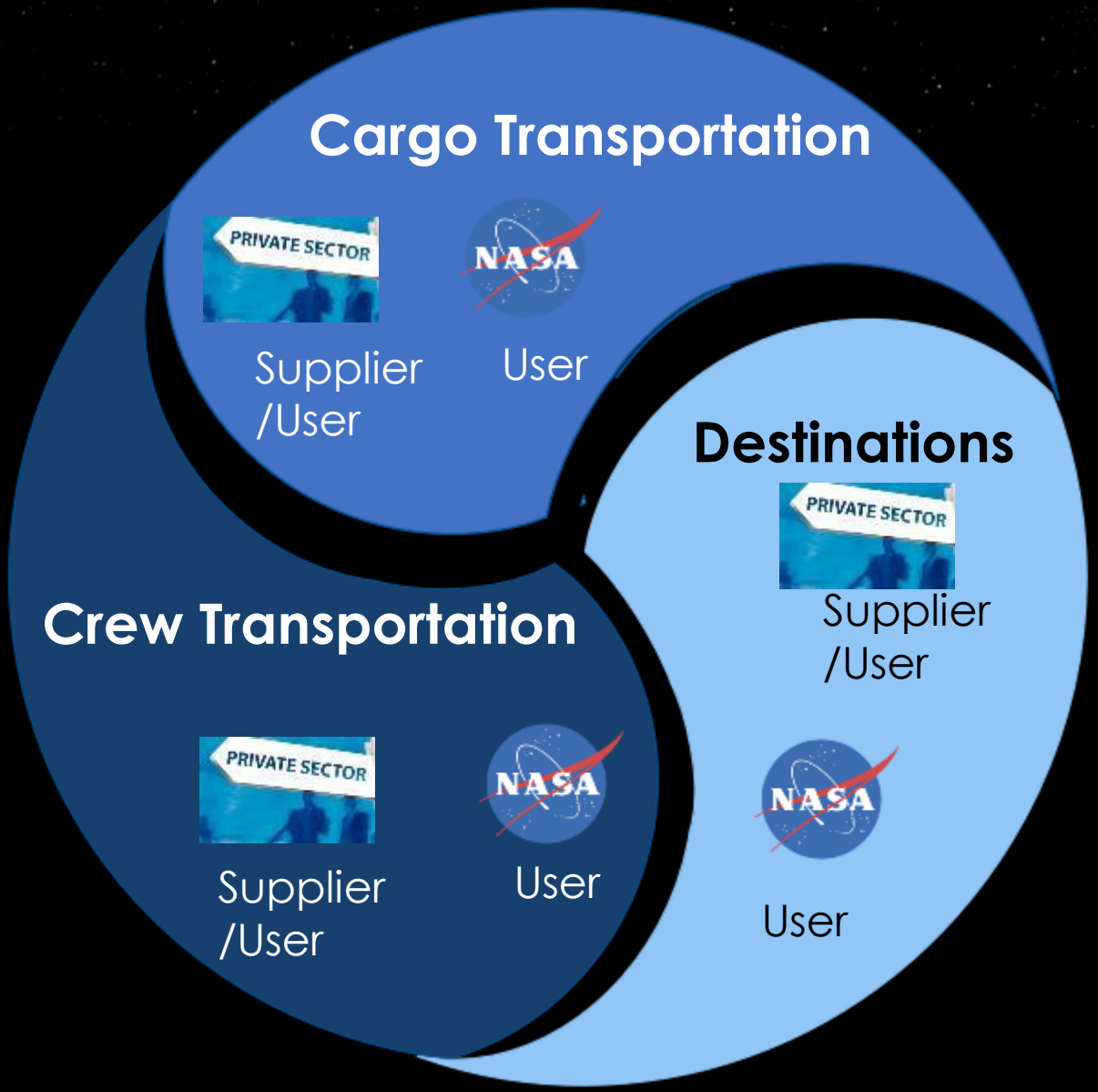
Chang'e series



Tianwen-1

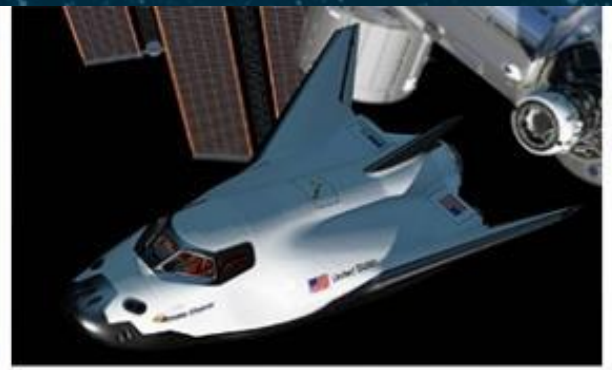
Deep space human-rated

FUTURE: COMMERCIAL LEO ECONOMY



NASA will be one of many customers in a robust LEO Economy.

MAIN ELEMENTS FOR LEO ECONOMY - TRANSPORTATION

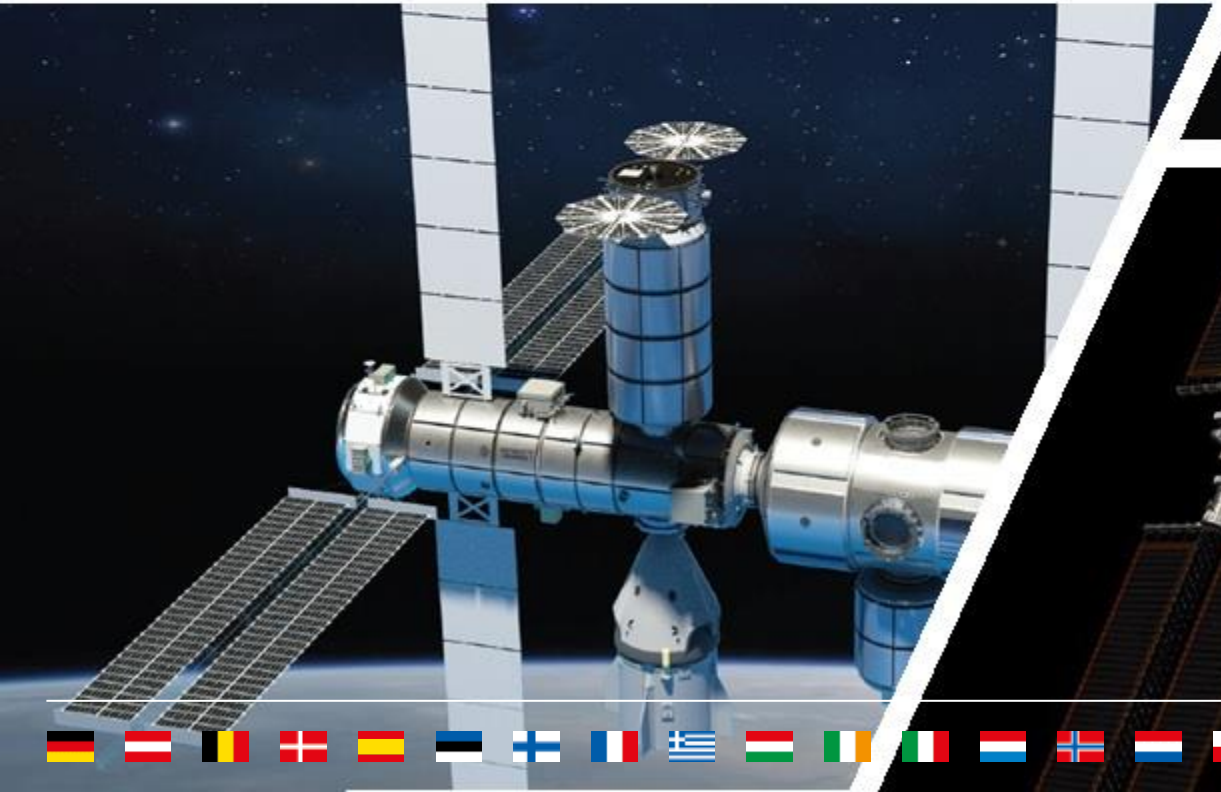


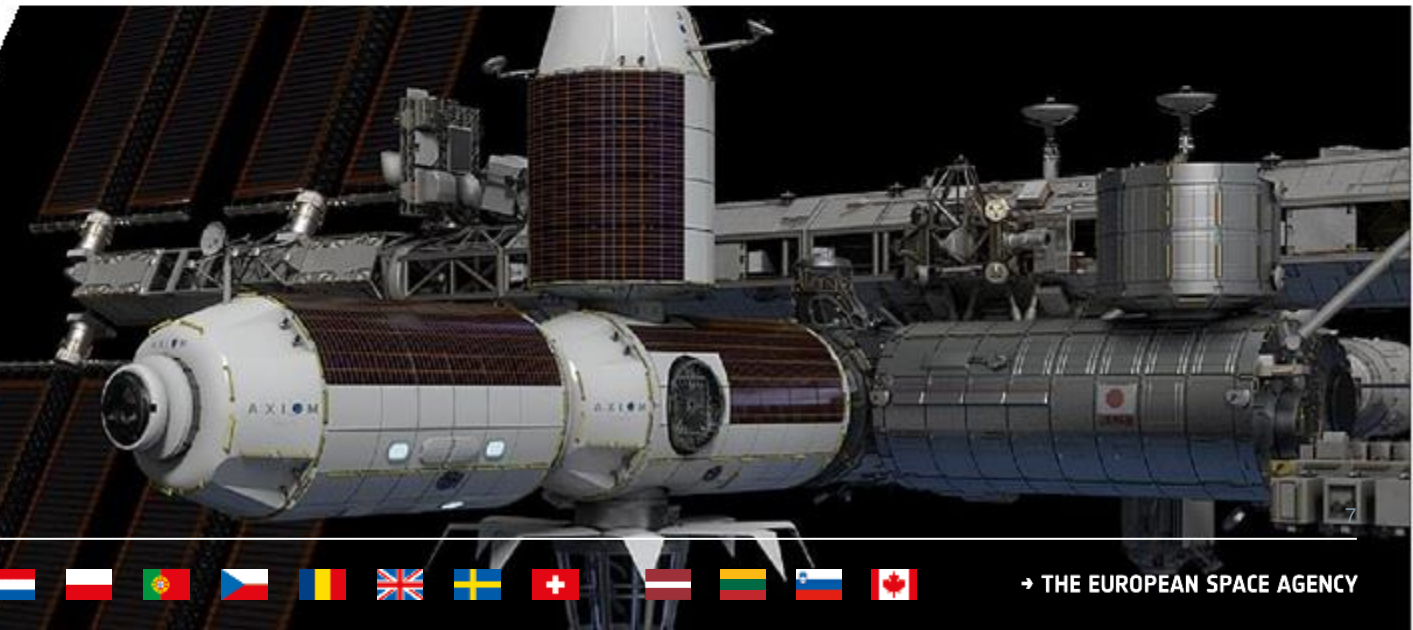


Transportation is 70% of the LEO Operational Cost

Europe

MAIN ELEMENTS FOR LEO ECONOMY - INFRASTRUCTURE





NEXT GENERATION EXPLORERS

Astronaut selection

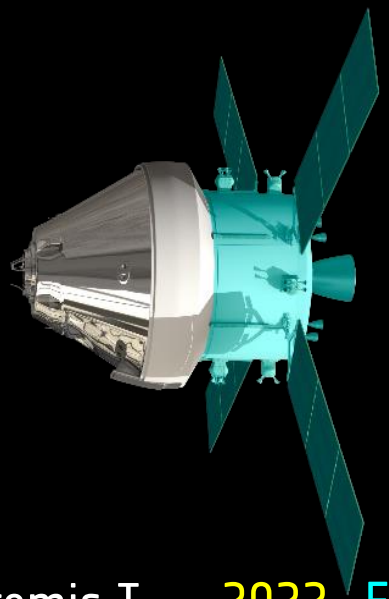
Class 2022

New ESA astronauts and parastronauts

→ THE EUROPEAN SPACE AGENCY

AT THE HEART OF MOON EXPLORATION

Orion and lunar Gateway



European Service Module
ESM

> 50% of the modules

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	
...	...	...	...

ESA astronauts

2027 2028 2030

BRINGING STUFF TO THE MOON

European Large Logistics Lander

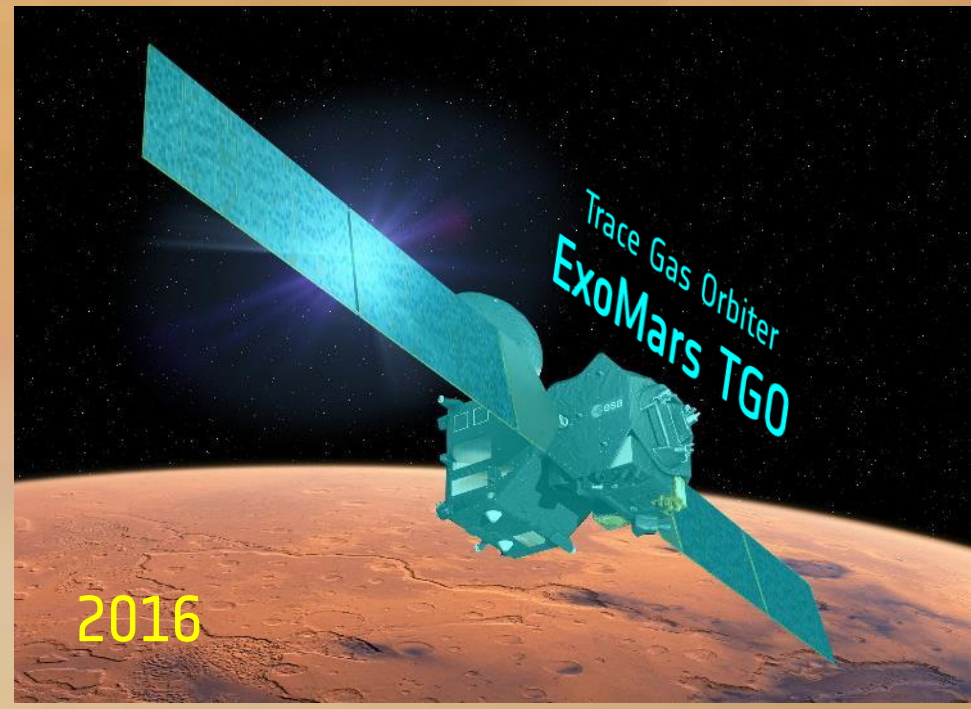
TERRAE NOVAE 2030+

→ THE EUROPEAN SPACE AGENCY

AT THE RED PLANET

ExoMars

YOU ARE HERE



2016

Rosalind Franklin rover

ExoMars Rover

2028 (tbc)

AT THE RED PLANET

Mars Sample Return

YOU ARE HERE

Earth Return Orbiter
ERO

> 20% of the partnership

Sample Transfer Arm
STA

→ THE EUROPEAN SPACE AGENCY

GETTING SET AND READY

ExPeRT

ExPeRT integrates, coordinates, and manages
the development of **studies** and **technologies**
for **future exploration missions** to low Earth orbit, Moon and Mars.

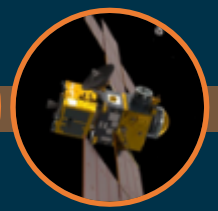
TERRAE NOVAE 2030+

2020 > 2030

ESA in mutual inter-dependence

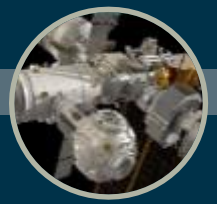
ExoMars 2016

ExoMars 2022



Mars Sample Return

Orion - European Service Module



Gateway – permanent habitation in deep space

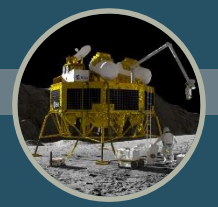
Core ISS Partner

Post-ISS Commercial stations

2030 > 2040

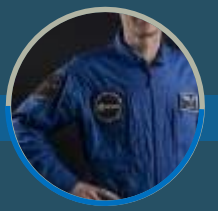
European-led capabilities

Preparing to send humans to Mars



Living and working on the Moon

Cargo launch and return



Independent human transport

→ THE EUROPEAN SPACE AGENCY

AAA WANTED – EUROPEAN SPACE TRANSPORTATION AUTONOMY

esa

ESA Programmes

Heritage

Inspirator

European independent access to LEO

+ Crew and cargo transport vehicles
+ Launcher

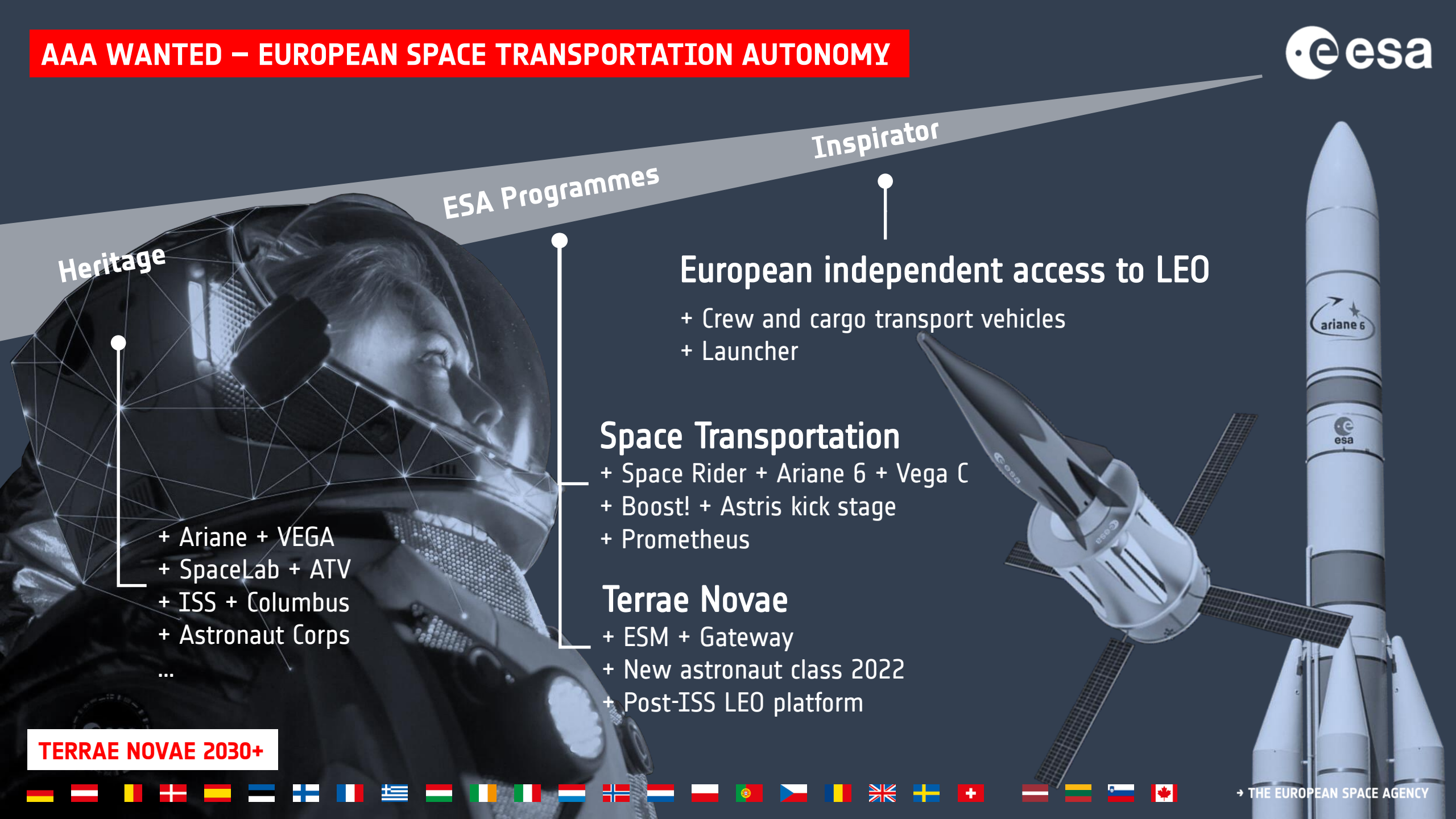
Space Transportation

+ Space Rider + Ariane 6 + Vega C
+ Boost! + Astris kick stage
+ Prometheus

Terrae Novae

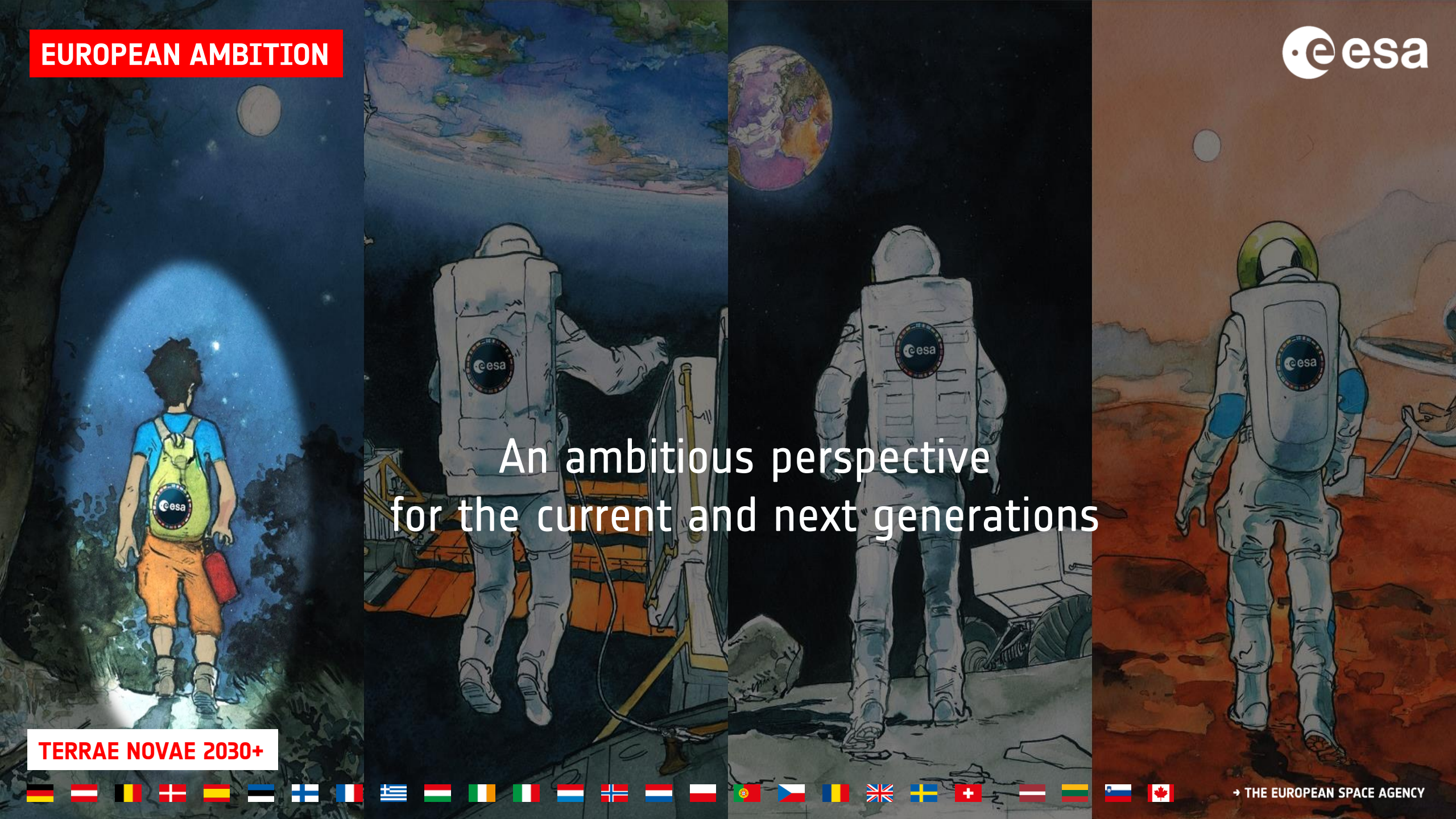
+ ESM + Gateway
+ New astronaut class 2022
+ Post-ISS LEO platform

+ Ariane + VEGA
+ SpaceLab + ATV
+ ISS + Columbus
+ Astronaut Corps
...



TERRAE NOVAE 2030+

EUROPEAN AMBITION



An ambitious perspective
for the current and next generations

TERRAE NOVAE 2030+

→ THE EUROPEAN SPACE AGENCY

Once explorers, always explorers.