



From Copernicus 1.0 to Copernicus 2.0

Mauro Facchini,
Head of Earth Observation
DG DEFIS, European Commission

The EU Space Programme

EU SPACE PROGRAMME OVERVIEW



COPERNICUS

Earth Observation (EO) and monitoring based on satellite and non-space data

Nr.1 world provider of space data and information



GALILEO

Global satellite navigation and positioning system (GNSS)

10% of the EU GDP enabled by satellite navigation



EGNOS

Reliable navigation signals for safety of life use

Operational in 360+ airports & helipads in 23 countries



SSA

Space situational awareness monitoring and protecting space assets

Providing surveillance and tracking services to 210+ satellites

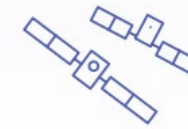


GOVSATCOM

Secure satellite communications for EU security actors

Delivering rapid support over crisis areas

AN INVESTMENT IN A FUTURE READY EUROPE



Competitive edge

Completing current satellite constellations, developing and launching the next-generation of satellites



Research innovation

Ambitious research and innovation programme benefiting from Horizon Europe



Fighting Climate Change

Monitoring biodiversity, environmental compliance and CO2 emissions (Paris Agreement)



EU as a global actor

Supporting disaster relief, humanitarian assistance and security operations

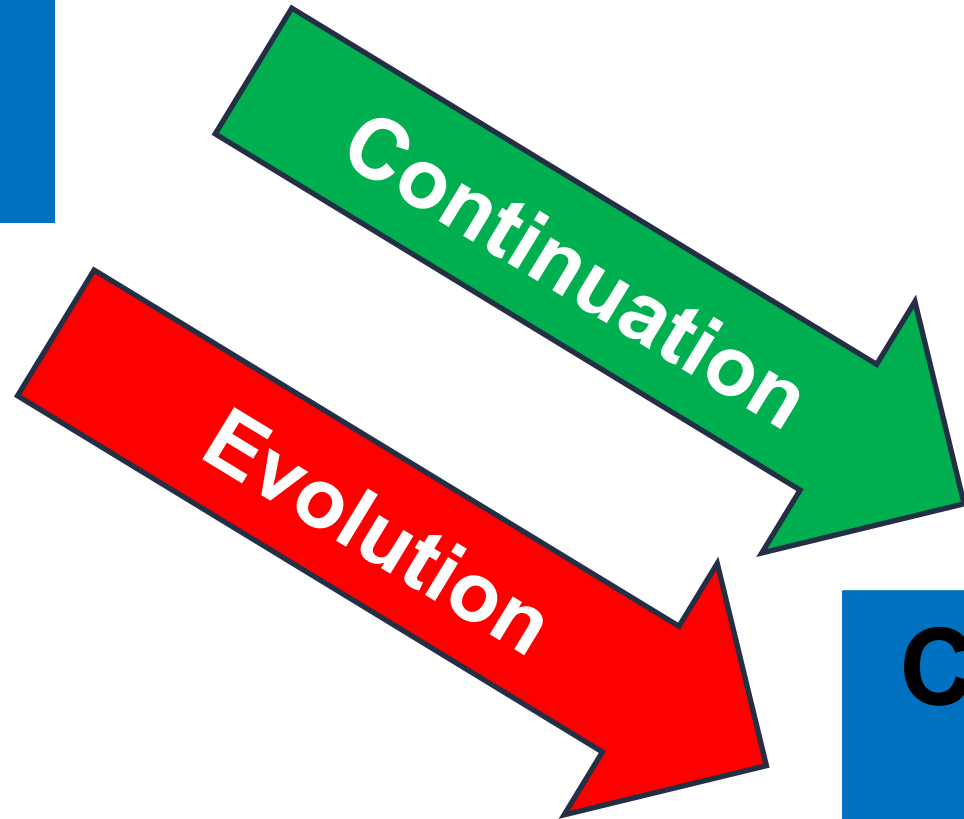
From Copernicus 1.0 to Copernicus 2.0

**COPERNICUS
1.0**

Continuation

Evolution

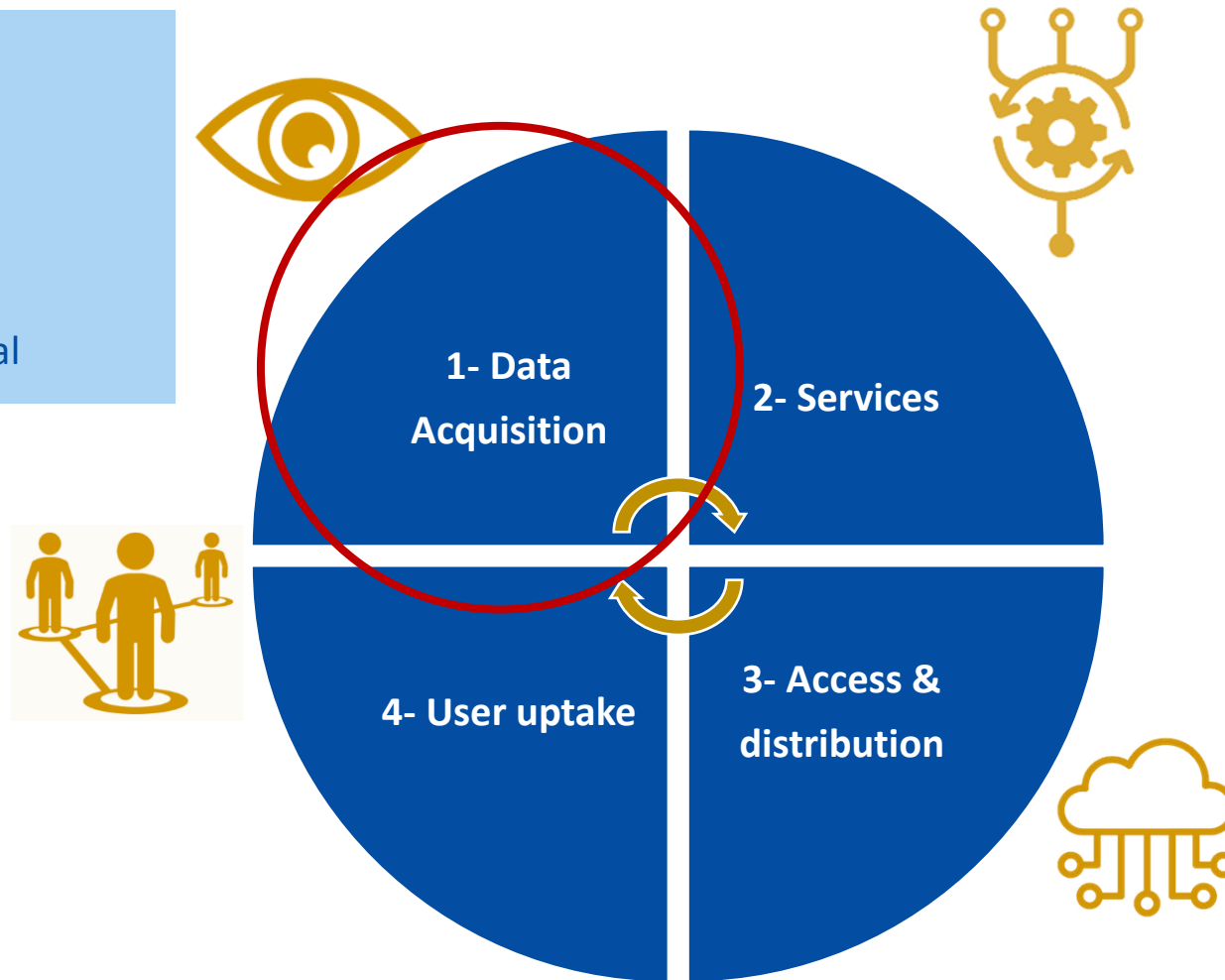
**COPERNICUS
2.0**



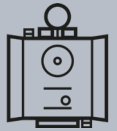
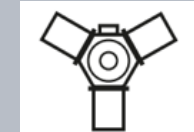
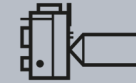
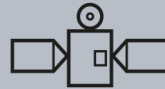
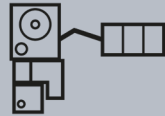
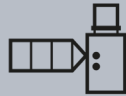
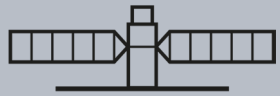
Four dimensions of Copernicus

Continuation of data + Agile observation

- Enhance performance
- Reduce dependencies
- Amplify observation potential



The Sentinels and their main uses



SENTINEL-1

All-weather, day and night observations to support services for sea-ice monitoring, marine environment surveillance, ship detection, land-surface motion risks, mapping of forest, water and soils, humanitarian aid and crisis management

2 satellites in orbit
Next launch: 2023

SENTINEL-2

Agriculture/vegetation monitoring, soil and water cover, forest management, border and maritime surveillance, emergency management: floods, fires

2 satellites in orbit
Next launch: 2024

SENTINEL-3

Ocean forecast, climate change and operational oceanography: sea surface height, ocean color, oceanic carbon fluxes, monitoring river or lakes level

2 satellites in orbit
Next launch: 2024-25

SENTINEL-4

Continuous monitoring of atmospheric composition focused on air quality over Europe, with main products Ozone (O₃), Nitrogen Dioxide (NO₂), Sulphur Dioxide (SO₂), Formaldehyde (HCHO) and aerosol properties

1st launch: 2023
(onboard MTG-S1)

SENTINEL-5

(Precursor of Sentinel-5) daily global monitoring of the main atmospheric pollutants (CH₄ and O₂ NO₂ CO₂ HCHO, SO₂) and two major greenhouse gases (CH₄ and tropospheric O₃)

1st launch: 2023-24
(onboard MetOp-SG A1)

SENTINEL-5P

Daily global monitoring for climate, air quality and ozone/surface UV applications, with key parameters O₃, NO₂, SO₂, HCHO, CHOCHO, Aerosols, CH₄ and stratospheric Ozone

1 satellite in orbit

SENTINEL-6

Ocean forecast, climate change and real time ocean topography: wave height, ocean surface, wind speed

1 satellite in orbit
Next launch: 2025

Sentinel-1, -2 & -5P: operated by ESA
Sentinel-4, -5 & -6: operated by EUMETSAT (with some support from ESA)
Sentinel-3: jointly operated by ESA & EUMETSAT

The Expansion missions



CO2M (CO2 Monitoring)

*Global monitoring
of anthropogenic CO2 emissions*
GS: ESA (acq service) & EUMETSAT



CRISTAL

*Copernicus Polar Ice and
Snow Topography Altimeter*
GS: ESA & EUMETSAT (products subset)



LSTM

*Copernicus Land Surface
Temperature Monitoring*
GS: ESA



ROSE-L

*L-band Synthetic
Aperture Radar*
GS: ESA



CHIME

*Copernicus Hyperspectral
Imaging Mission*
GS: ESA



CIMR

*Copernicus Imaging
Microwave Radiometer*
GS: ESA & EUMETSAT (products subset)

NEW SPACE

NewSpace is a global trend encompassing a series of technological and business model innovations leading to a reduction in costs, shorter lifecycles and a bolder approach to risk taking in the space sector.

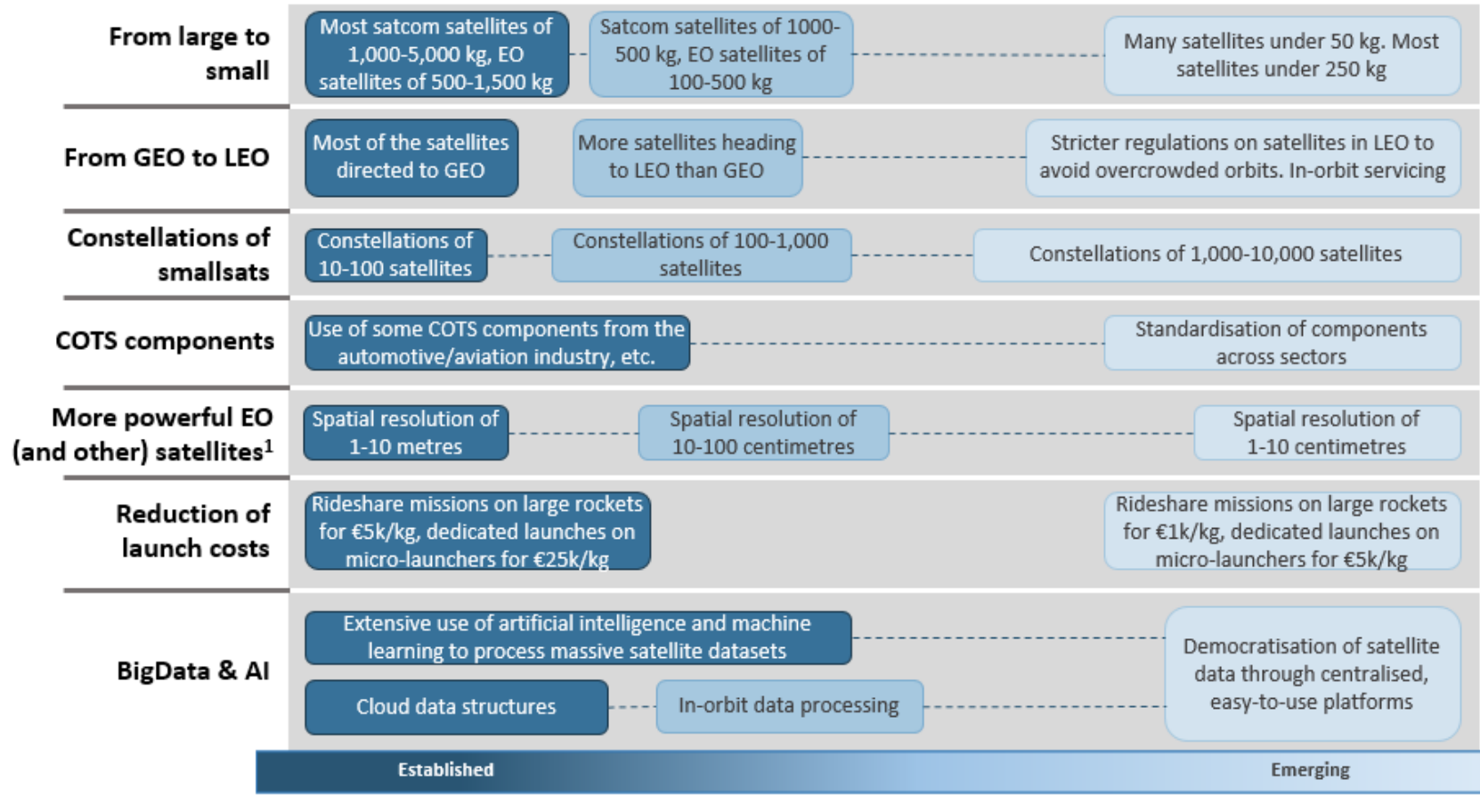
Thus, fostering the development of a private space industry that is primarily driven by commercial motivation and is often backed by risk capital seeking a return, while being supported by an innovative public sector aimed at promoting innovation, competitiveness and business creation.

Source: : EU Space Economics in the global context study – SpaceTec Partners for DEFIS, 2021

Trends

Several trends are unfolding in the satellite industry

Illustrative



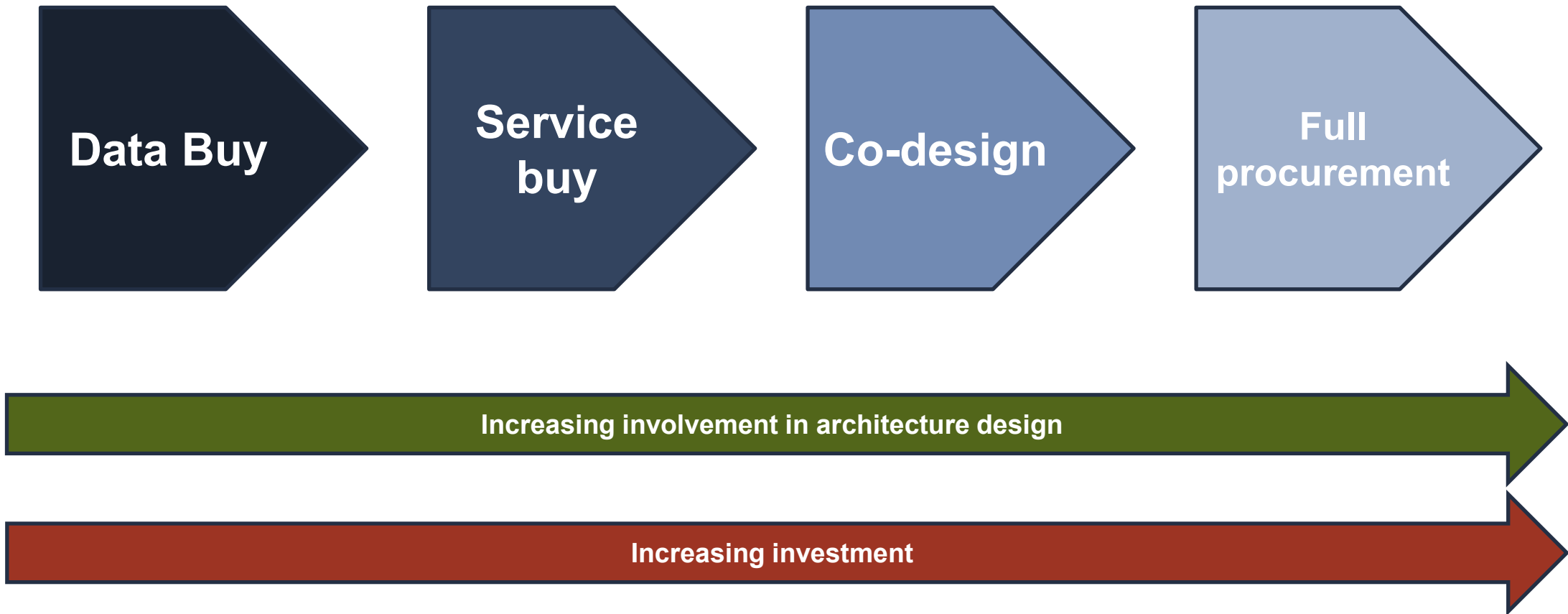
--- Trends that will coexist

¹Technology progress trends for each satellite sector are further developed in the report

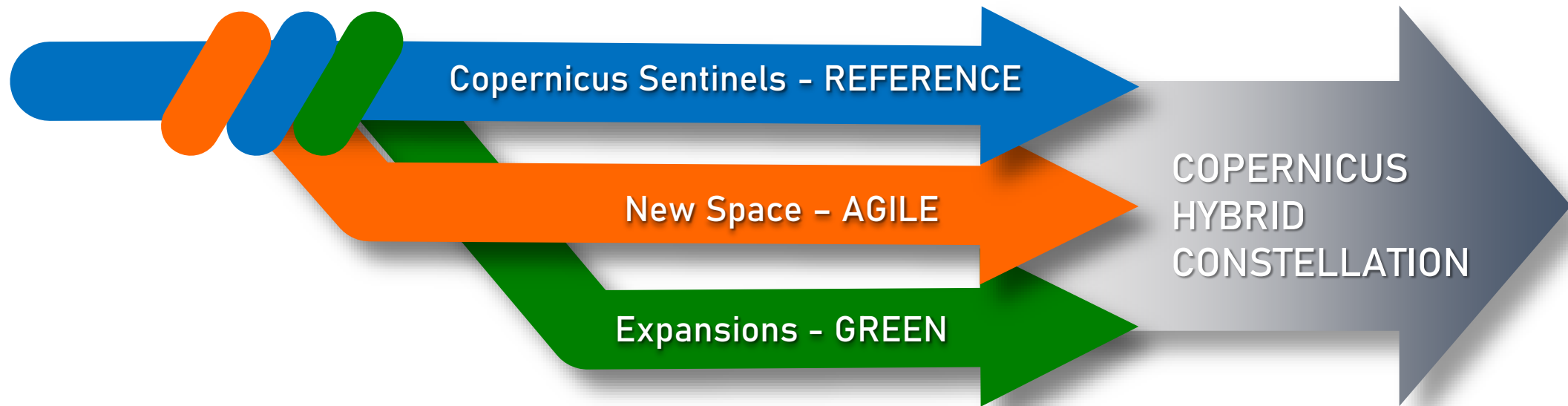
Source: SpaceTec Partners Analysis

Interaction with NEW Space

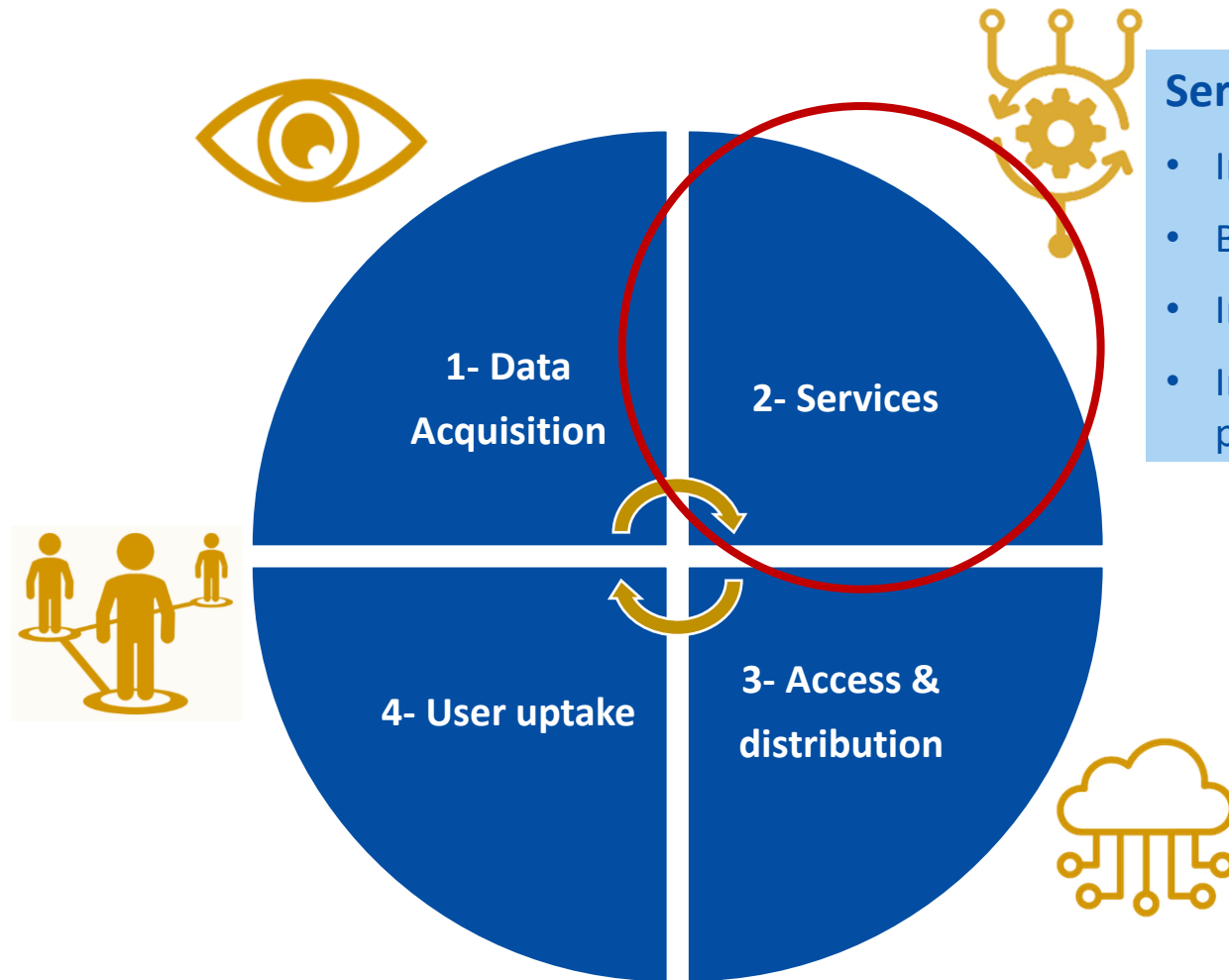
- ❖ The interaction can have several degrees of integration



Hybrid constellation



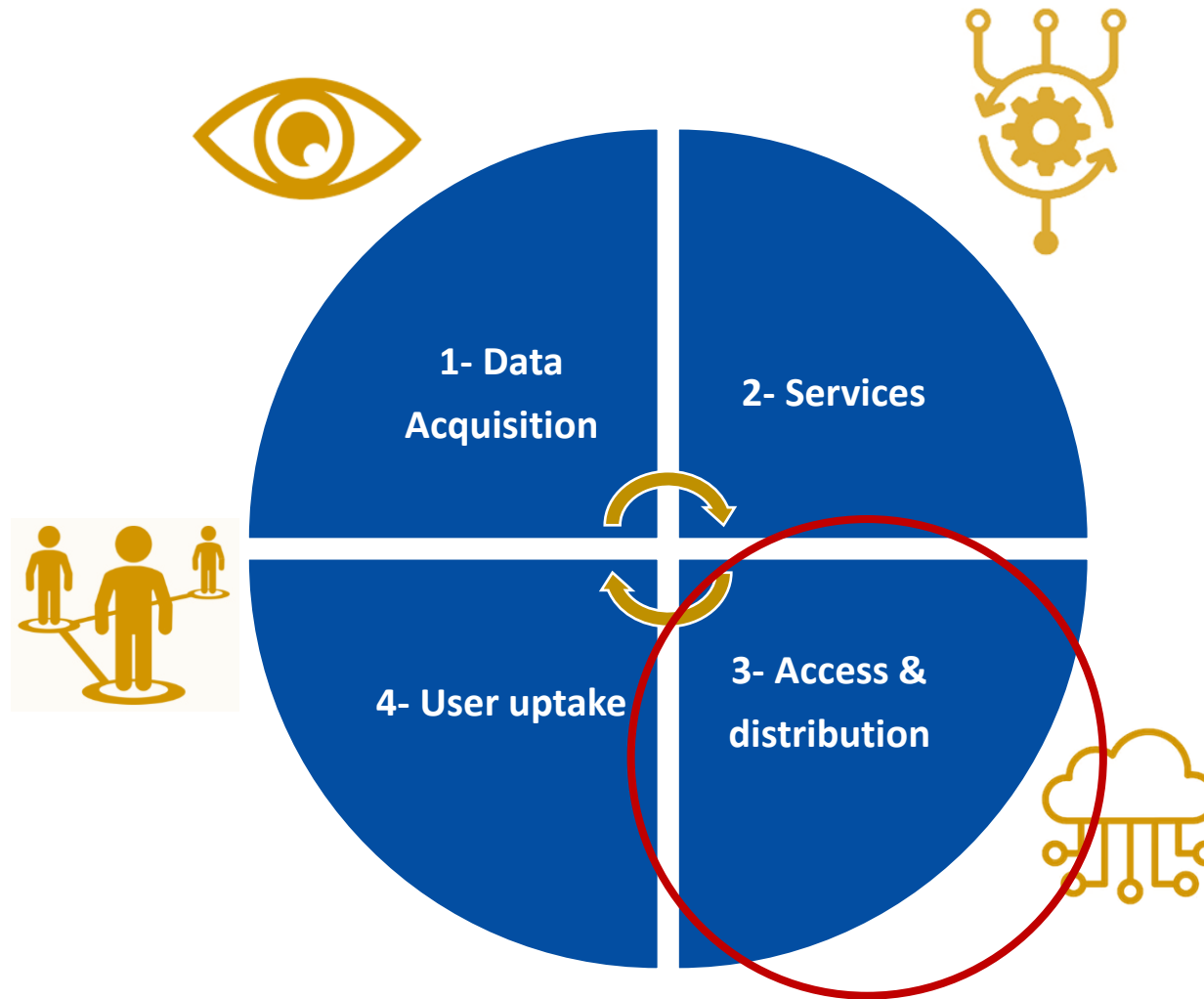
Four dimensions of Copernicus



Service uplifting

- Integrate faster with digital, AI, HPC
- Be instrumental to Green Deal objectives
- Increase support to resilience needs
- Increase support to EU and National policies

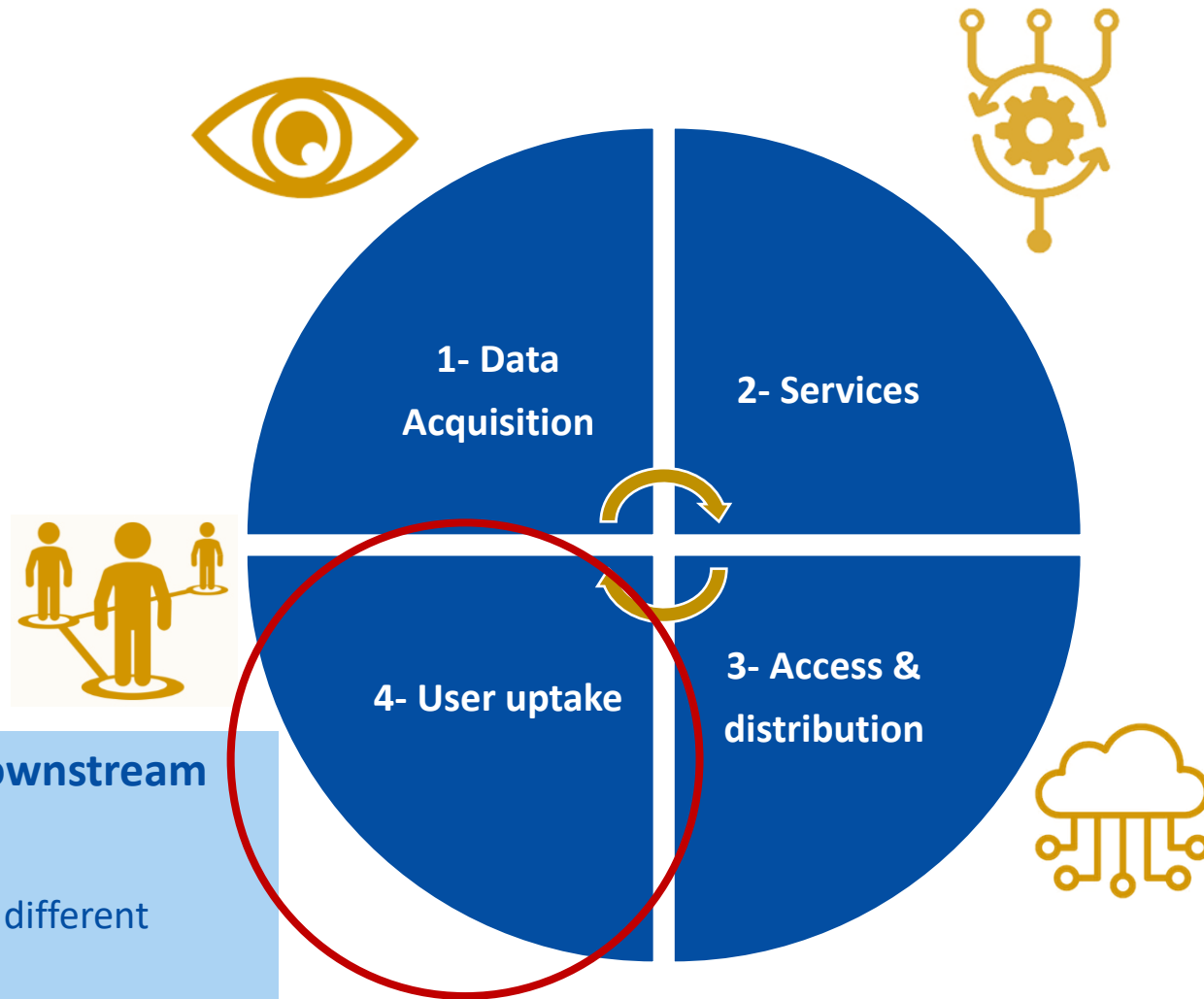
Four dimensions of Copernicus



Boosting EU infrastructures

- Develop Integrated Data Management
- Streamline data platforms
- Develop Data analytics with Destination Earth

Four dimensions of Copernicus



Re-energise Copernicus downstream

- Anticipate user needs
- Use space data to transform different ecosystems
- Develop innovative tools for greater uptake

Evolution of Copernicus - EO strategy

Copernicus Sentinels - REFERENCE

New Space - AGILE

Expansions - GREEN

COPERNICUS
HYBRID
CONSTELLATION

NEW: EO dual use - RESILIENT

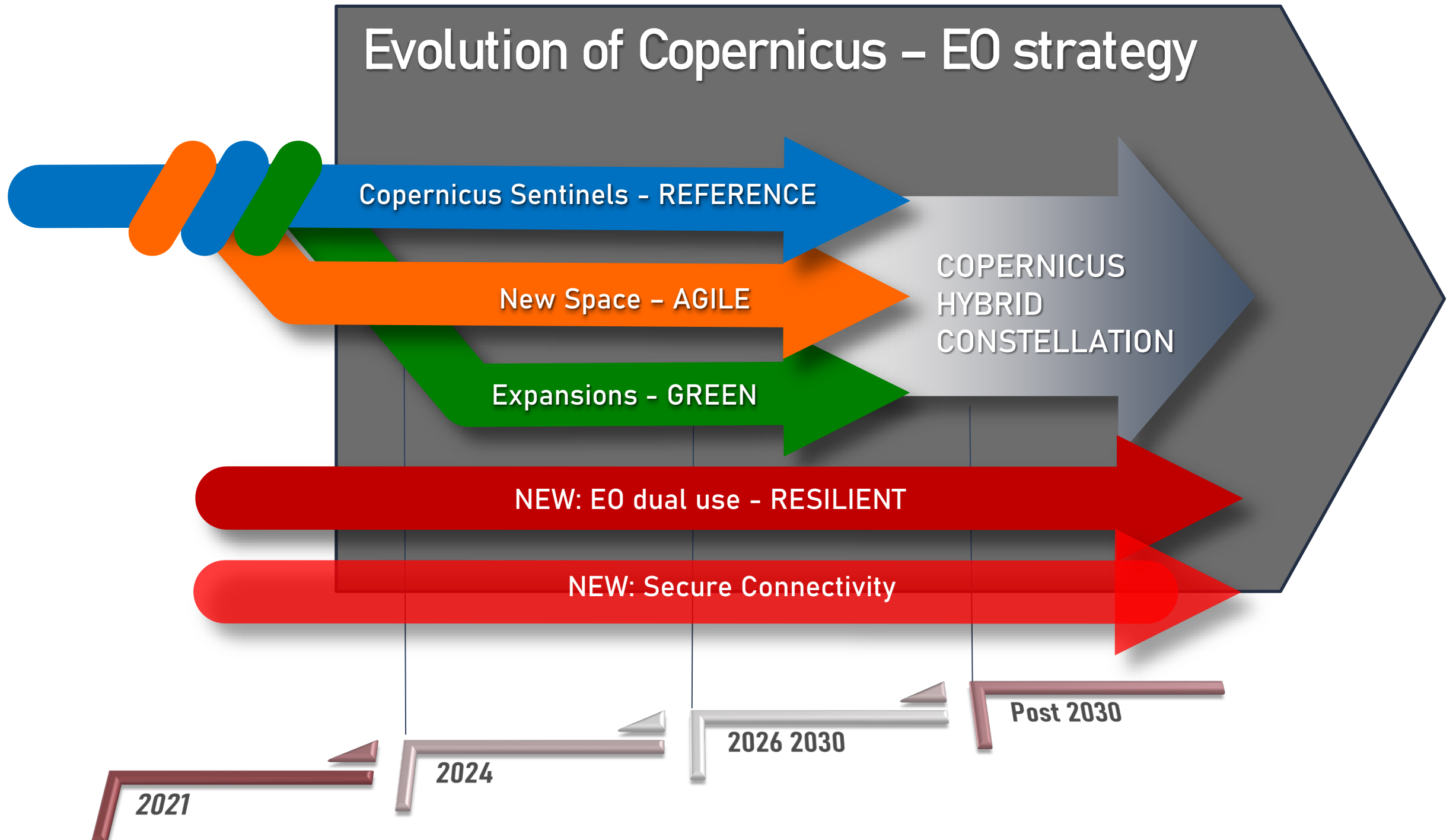
NEW: Secure Connectivity

2021

2024

2026 2030

Post 2030



Thank you

