

HORIZON EUROPE · TEAMING FOR EXCELLENCE · PHASE 2

SPACE ✦ Crete

CRETAN CENTRE OF EXCELLENCE IN EMERGING SPACE TECHNOLOGIES

SHAPING THE FUTURE FROM CRETE

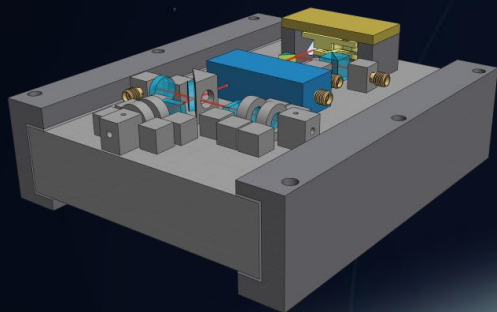
Info Day Heraklion · 2/10/2026

Optical/Quantum Sensing and Communications



Optical Hardware for Space

Optical Tools for
Quantum Sensing



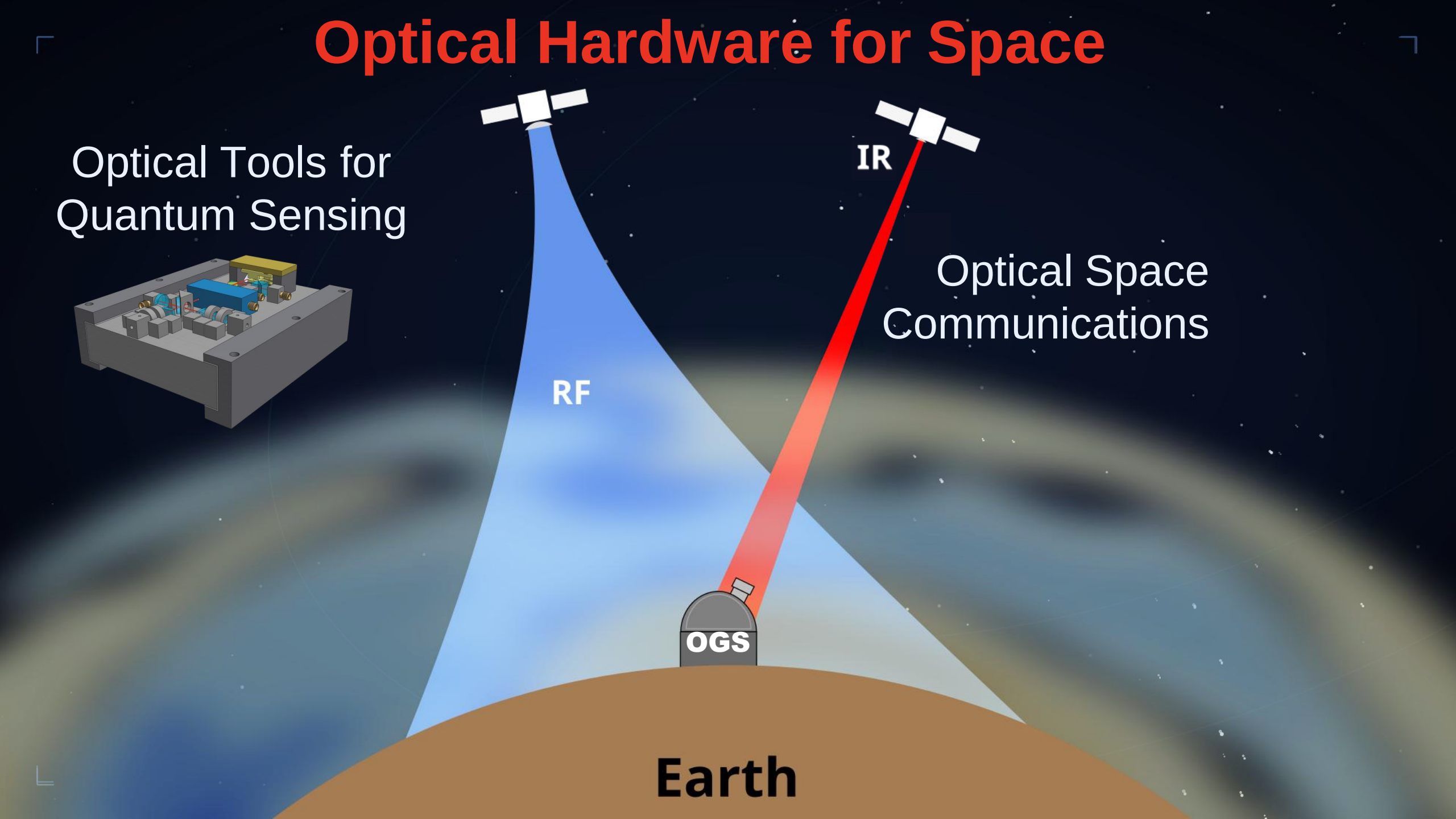
RF

IR

Optical Space
Communications

OGS

Earth



Space Optics Components



ESA: OBST1 & OBST2

ESA/DLR: QMem

ESA: RamanBC



ESA: Wire

Optical (Quantum) Communication

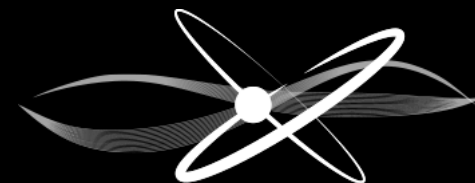
ESA: spaceTools



ESA: SkinUP

Large Space Projects

EU Quantum Pathfinder Mission



EU: CARIOQA-PMP

**BEC in Space:
Testing Einstein's
Weak equivalence
principle**



**Better Matterwave Bubbles
on the ISS**



CAL

Clocks in Space

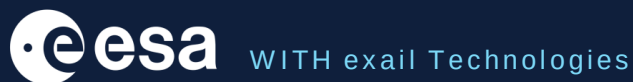


SAGE



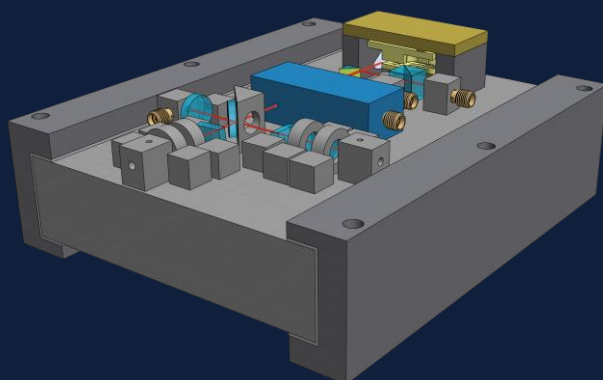
ESA: MAQUIS

BEC and SOL lab experience & heritage



RamanBC

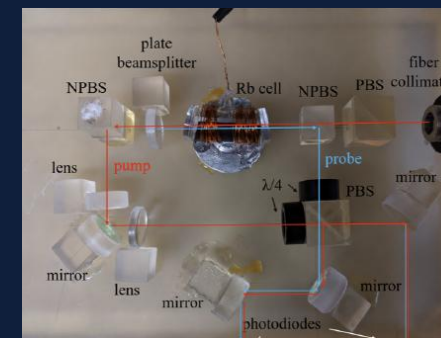
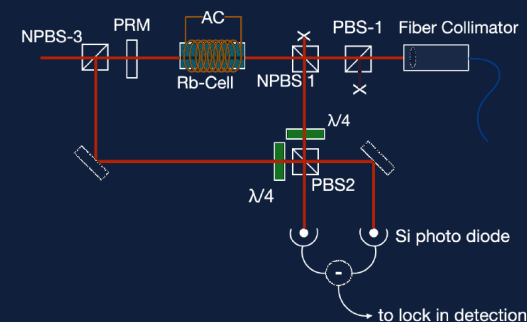
Development of an optical bread board which combines the light from two optical fibers via an acousto-optic modulator into a third fiber. The technology that we are creating is aimed at the first space mission, including a quantum gravity sensor (CARIOQA).



QMem & SpaceTools

Development of a magneto-optical trap (MOT) to produce a cold atomic gas, which can serve as a platform for a quantum memory.

SOL builds the cooling laser system



◆ Frontier 1, 2 start from TRL 6 technologies, and the industrial partners that will exploit them are already collaborating with us



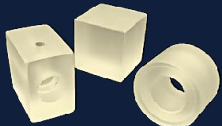
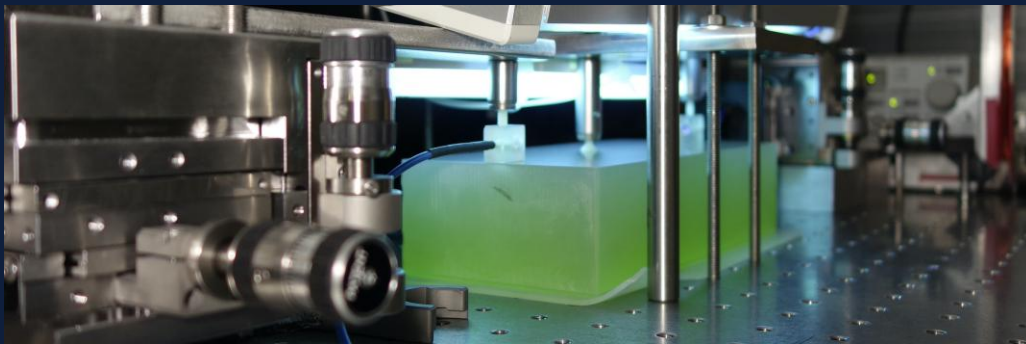
BEC and SOL lab experience & heritage



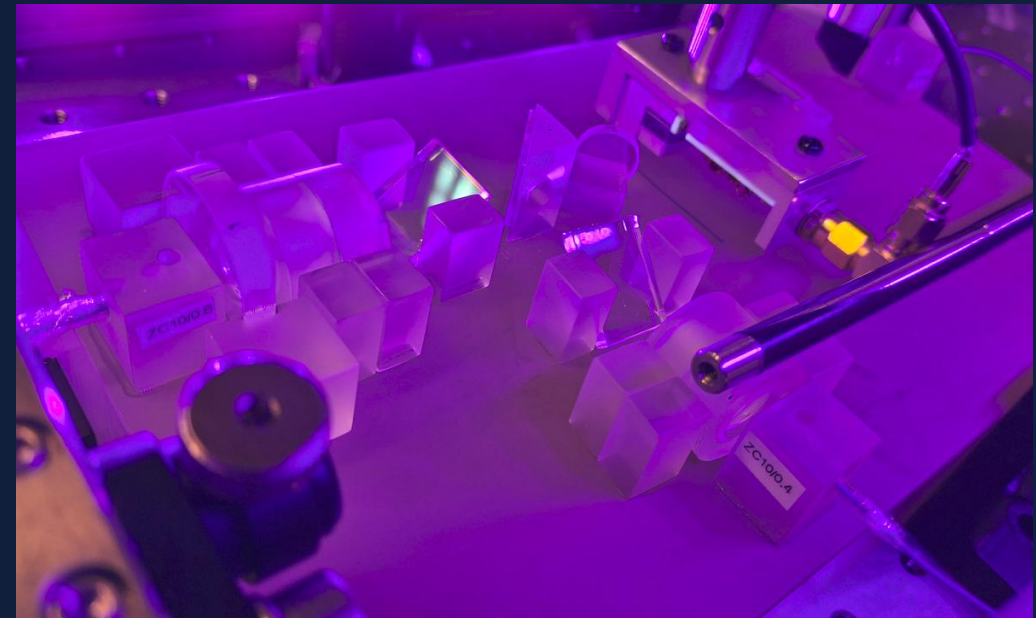
Optical breadboard beam steering technology for Space-Based Quantum Sensors and quantum Memories

OBST1 & OBST2

Developing novel beam steering technologies to be used in optically complex quantum space missions.

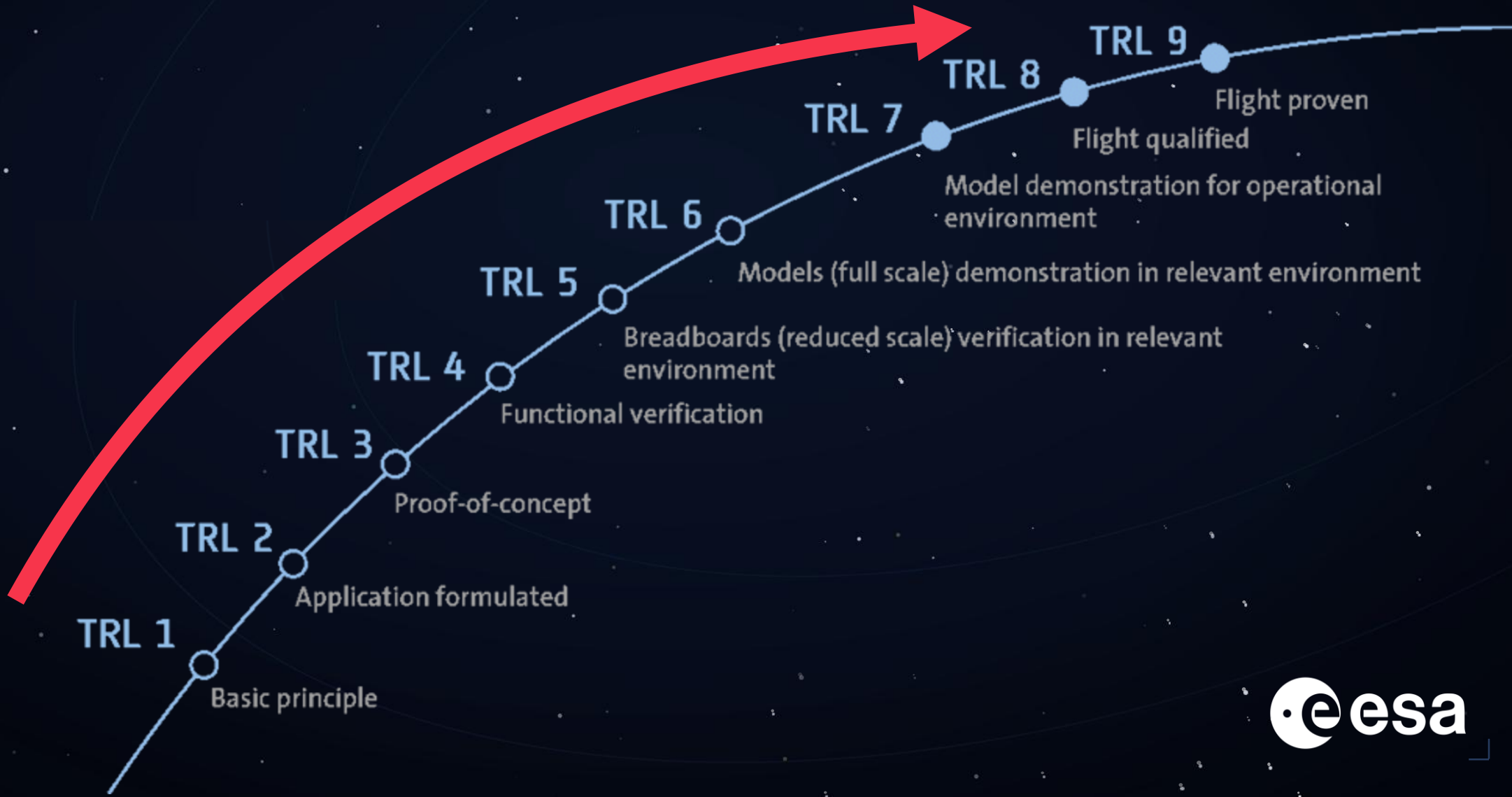


Stability under relevant environment (+/- 1K)
0.13 %_{RMS} in 135 h

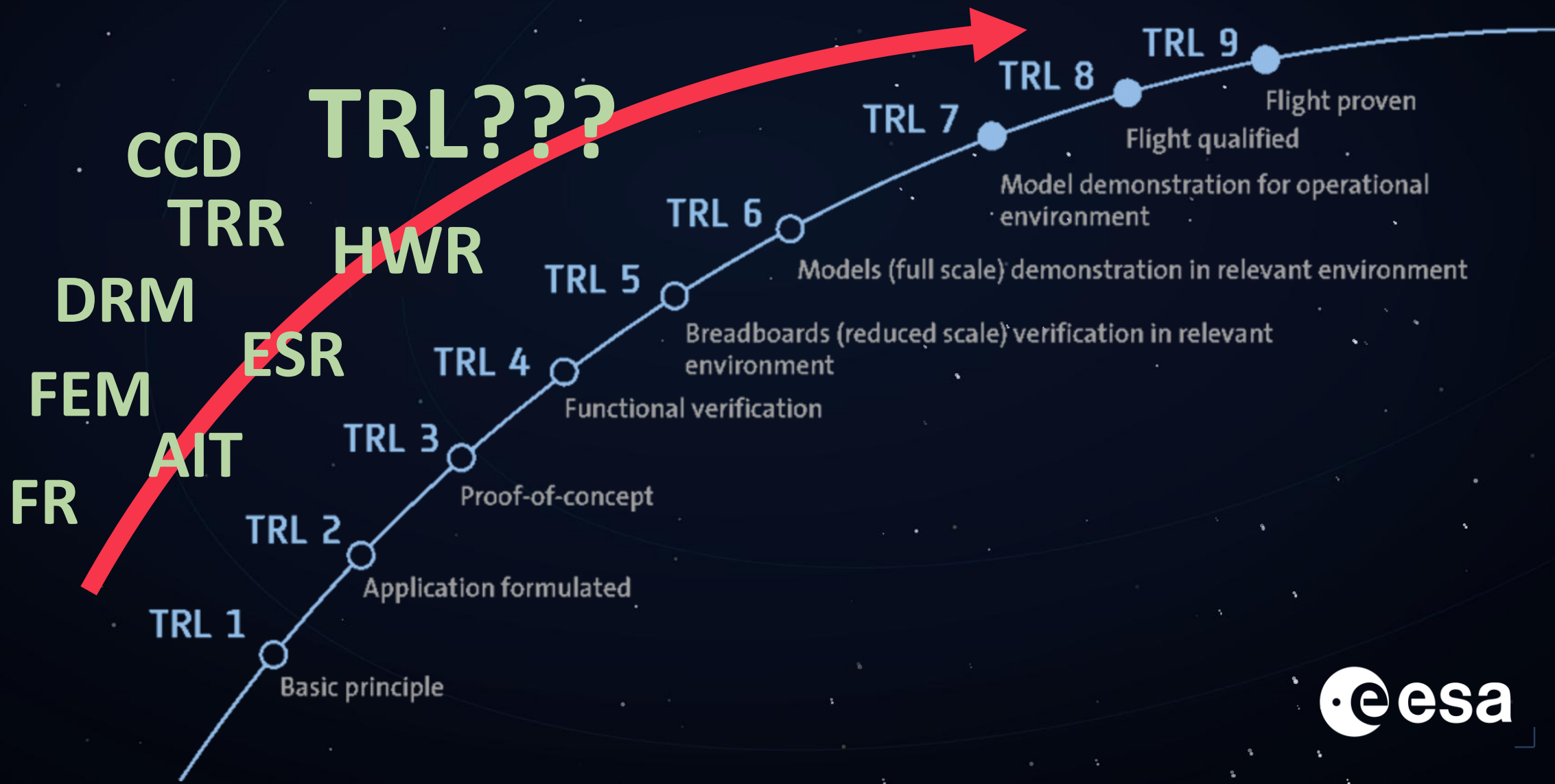


◆ Frontiers 1, 2 starts from TRL 6 technologies.

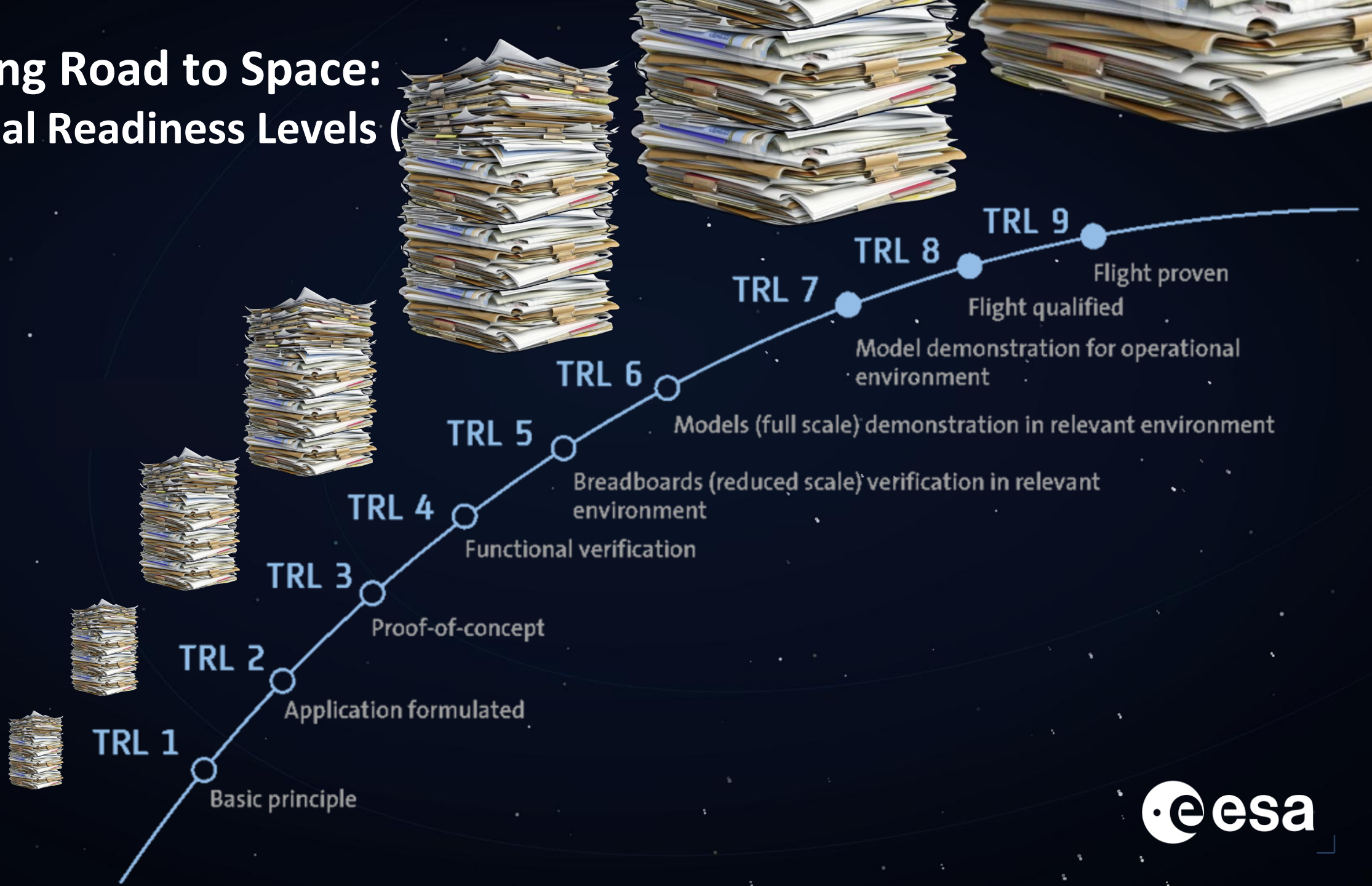
The Long Road to Space: Technical Readiness Levels (TRL)



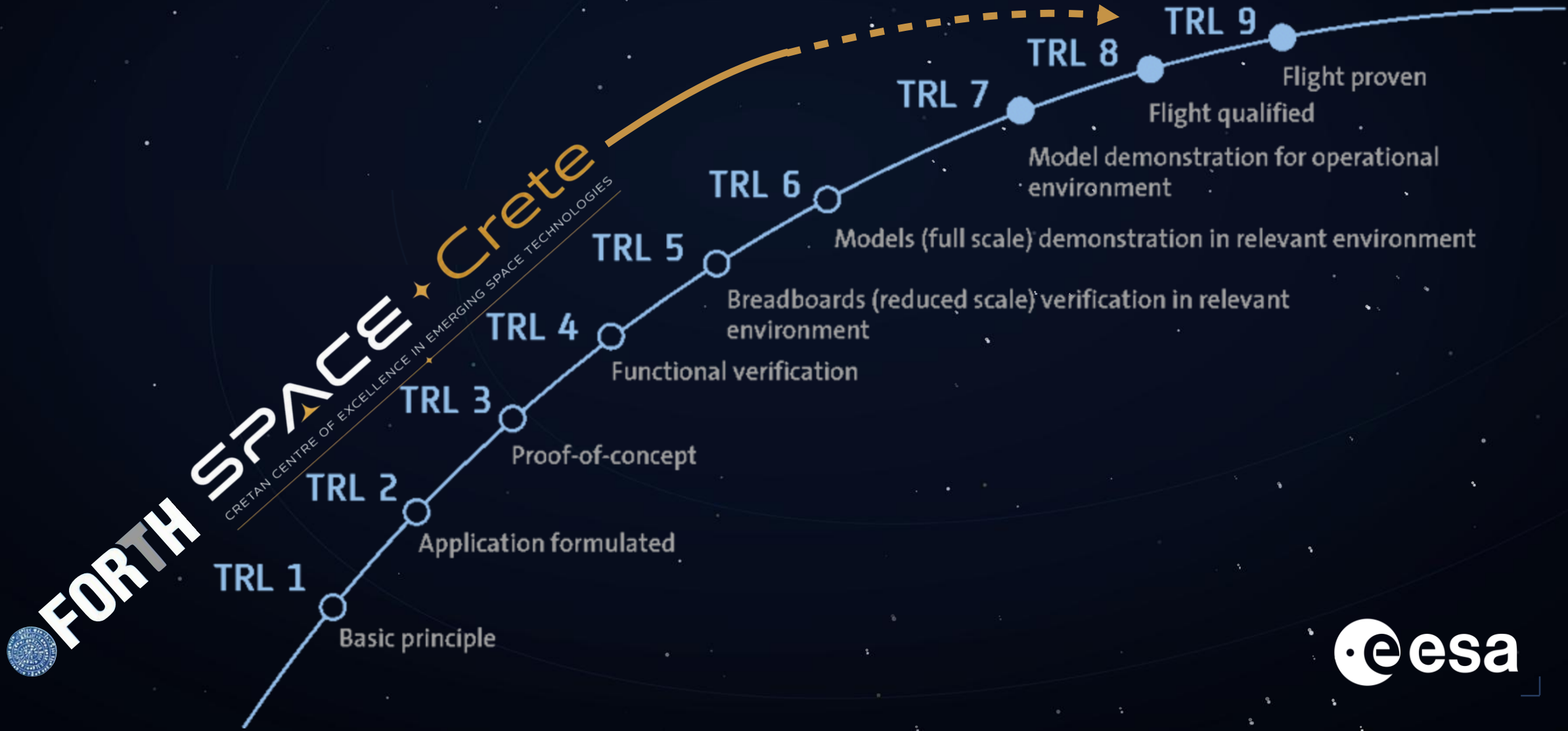
The Long Road to Space: Technical Readiness Levels (TRL)



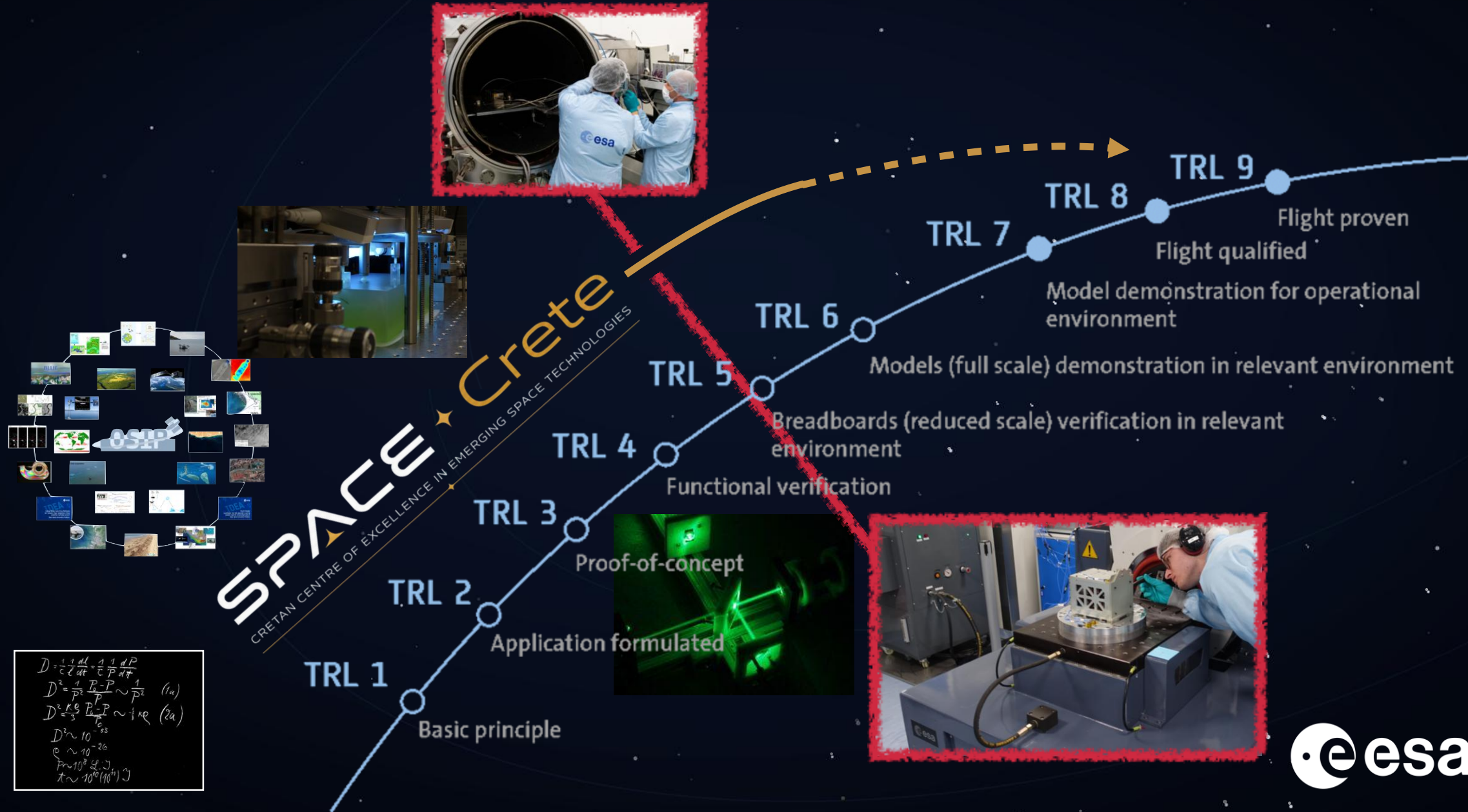
The Long Road to Space: Technical Readiness Levels (



The Long Road to Space: Technical Readiness Levels (TRL)



Technical Readiness Levels (TRL)



$$\begin{aligned}
 D &= \frac{1}{c} \frac{dI}{dt} = \frac{1}{c} \frac{dP}{dt} \\
 D^2 &= \frac{1}{P^2} \frac{dP}{dt} \sim \frac{1}{P^2} \quad (1a) \\
 D^2 &= \frac{K_0}{P} \frac{dP}{dt} \sim \frac{1}{P} \quad (2a) \\
 D^2 &\sim 10^{-23} \\
 e &\sim 10^{-26} \\
 P &\sim 10^3 \text{ W} \\
 t &\sim 10^6 (10^4) \text{ s}
 \end{aligned}$$