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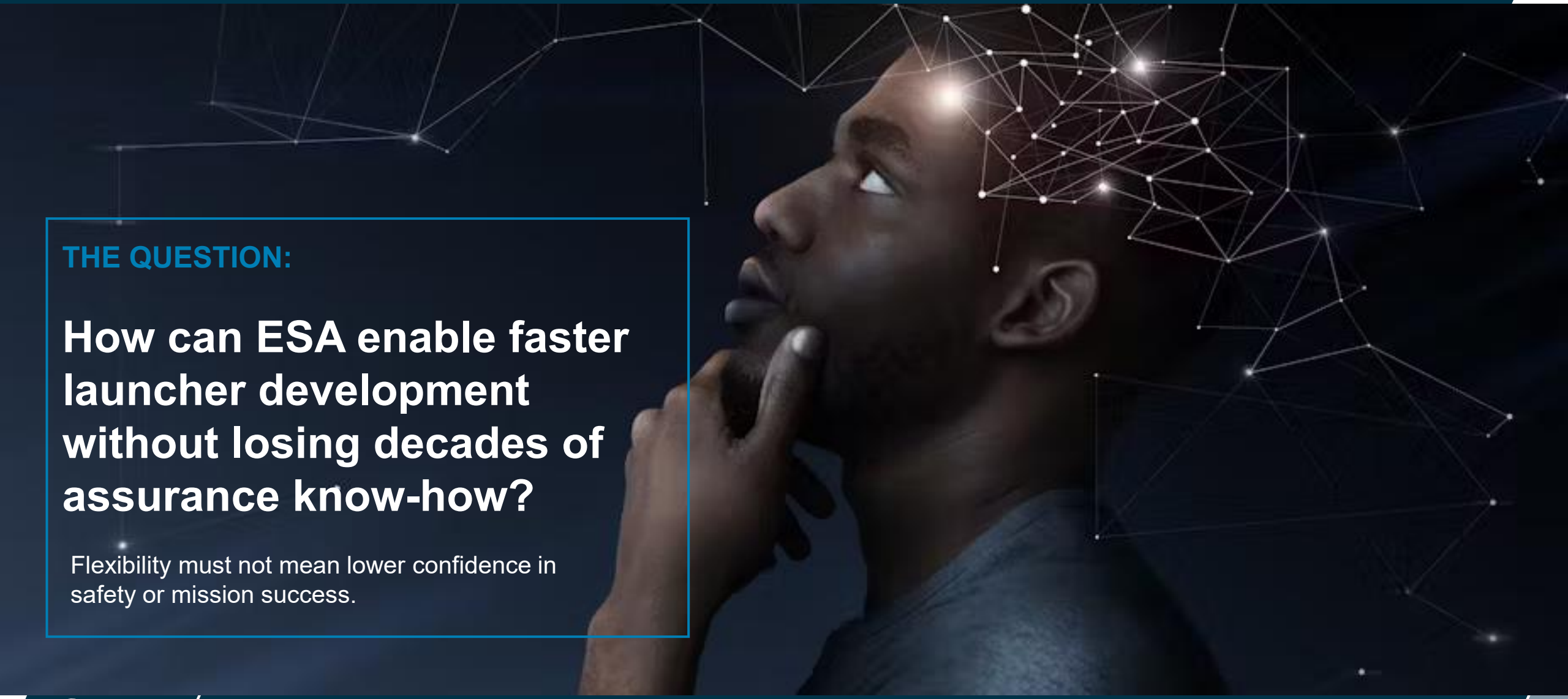
Sfide, Risultati e Opportunità
della Qualità nella Space Economy

FLEXIBLE, RISK BASED QUALITY APPROACHES FOR LAUNCHERS

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11-12 NOVEMBRE 2026 TORINO

Towards proportionate, evidence-based assurance



THE QUESTION:

How can ESA enable faster launcher development without losing decades of assurance know-how?

Flexibility must not mean lower confidence in safety or mission success.

The launcher development model is changing



Courtesy ISAR

Faster cycles

Rapid iteration and continuous testing



Courtesy PLD

New production models

Additive manufacturing and tighter integration



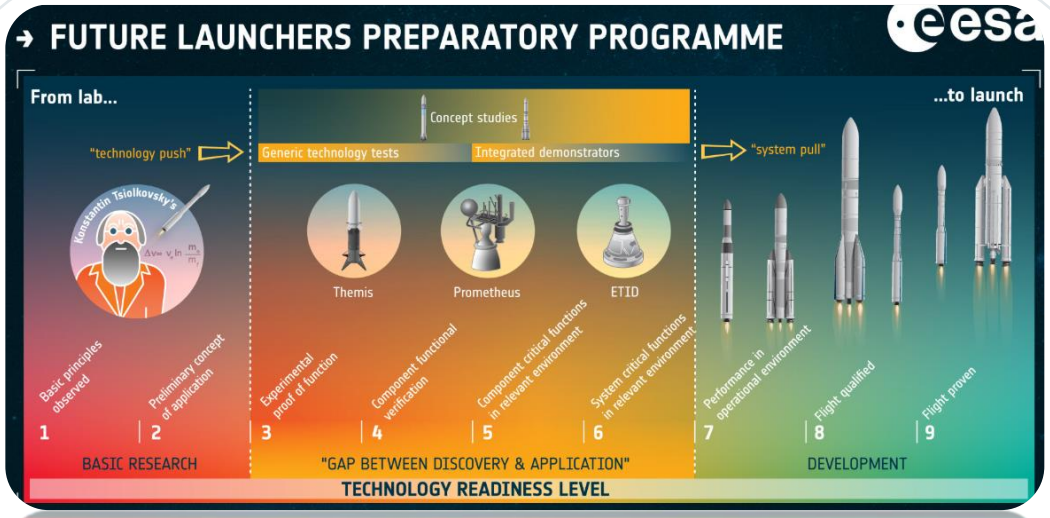
Courtesy SSC

New operating models

Alternative spaceports and evolving supply chains

Quality approach must remain robust while becoming faster, more targeted and proportionate

ESA is already exploring this evolution



FLPP

Technology maturation and demonstrators
De-risking • open competition • cooperation



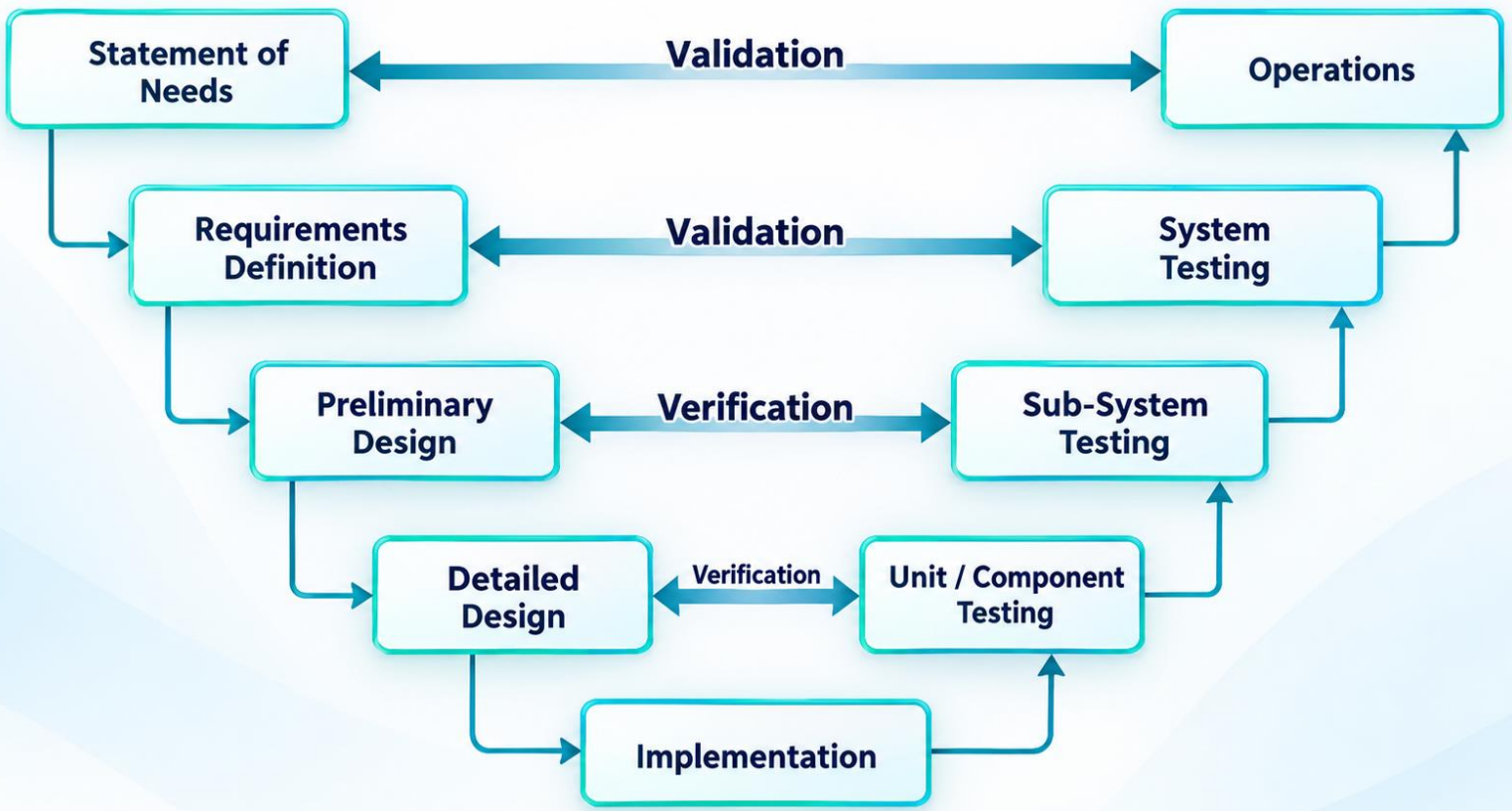
PNRR

Selected technologies under a challenging timeframe
Integrated ESA–industry project team

Different programme environments → the same need: tailor assurance to evidence and risk

The familiar baseline: structured, phase-driven assurance

Development lifecycle



Standards & requirements



Robust and proven — but not always proportionate to fast, iterative development.

Tailoring should follow evidence — not fashion

01

Supplier maturity

Governance, repeatability and ability to manage assurance autonomously.

02

Demonstrated performance

Evidence from delivery, non-conformances and previous programme outcomes.

03

Process capability

Stability and control of the processes that actually create product quality.

04

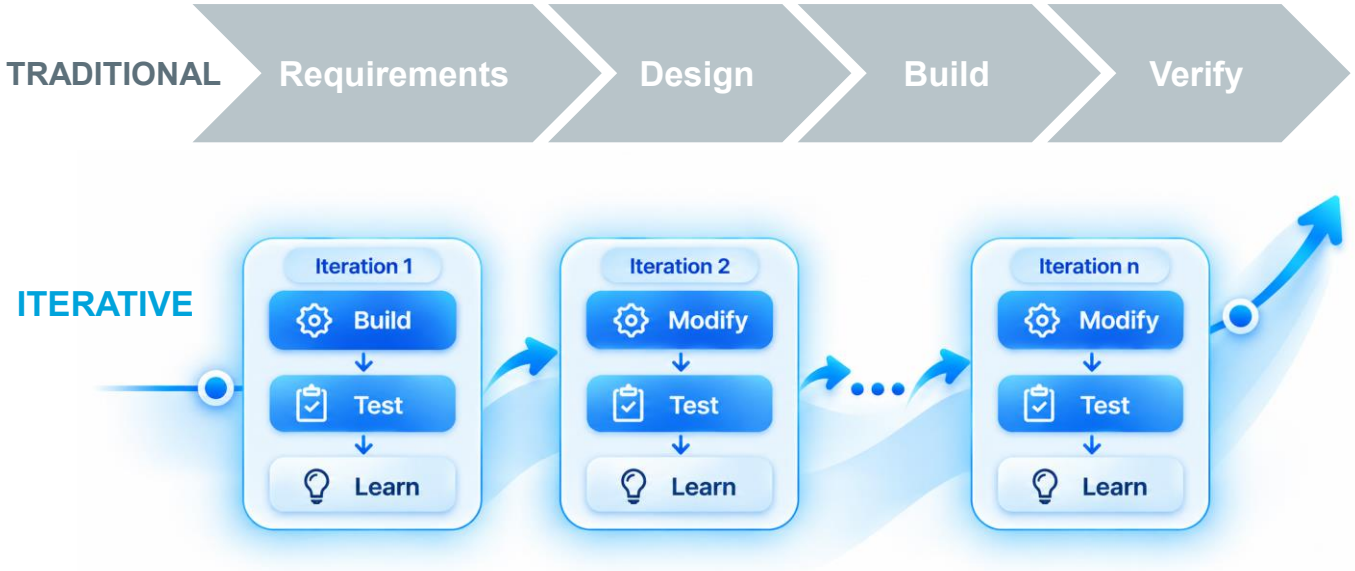
Product criticality

Consequences of failure for safety, mission success and system resilience.

Combine these factors to set the appropriate level of ESA oversight

From phase gates to continuous assurance

A shift in the assurance rhythm



evidence accumulates → assurance is re-targeted

Practices already tested in STS

- ✓ Iterative and incremental development
- ✓ Test as early as possible
- ✓ Minimise formal reviews where evidence allows
- ✓ Reassess risk continuously

AGILE® and Spiral approaches

Risk-based assurance: different levers, one logic

Use the mechanism that fits the risk — while keeping the confidence target explicit.



COTS & Architecture

- Failure-tolerant sub-systems
- Failure Detection Isolation and Recovery (FDIR)
- Acceptable level of confidence



Mission Classification

- Streamlined requirements by mission class
- Systematic and standardized tailoring
- More freedom where risk is acceptable



People & Culture

- Empowered teams
- Pragmatic decisions
- Close ESA–industry collaboration

More freedom only where the evidence supports an acceptable risk

ESA's role is shifting

From detailed control towards enabling, guiding and challenging industry.



Prescribe and inspect	Create the conditions for success	Steer with evidence and experience	Ask the difficult questions

NON-NEGOTIABLE FOUNDATIONS

- ✓ **Safety & mission success**
- ✓ **Accumulated knowledge & lessons learned**

Three messages to take away

1

Proportionate oversight

Tailor assurance to maturity, performance, process capability and product criticality.

2

Evidence over habit

Use risk, testing and demonstrated performance to target surveillance where it adds value.

3

Preserve what works

Keep safety, mission success and decades of lessons learned as the fixed reference points.

TRANSITION CHALLENGES

Complex hardware, MAIT & constrained supply chains

Cultural and behavioral change takes time

EUROPEAN SPACE AGENCY

THANK YOU!

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