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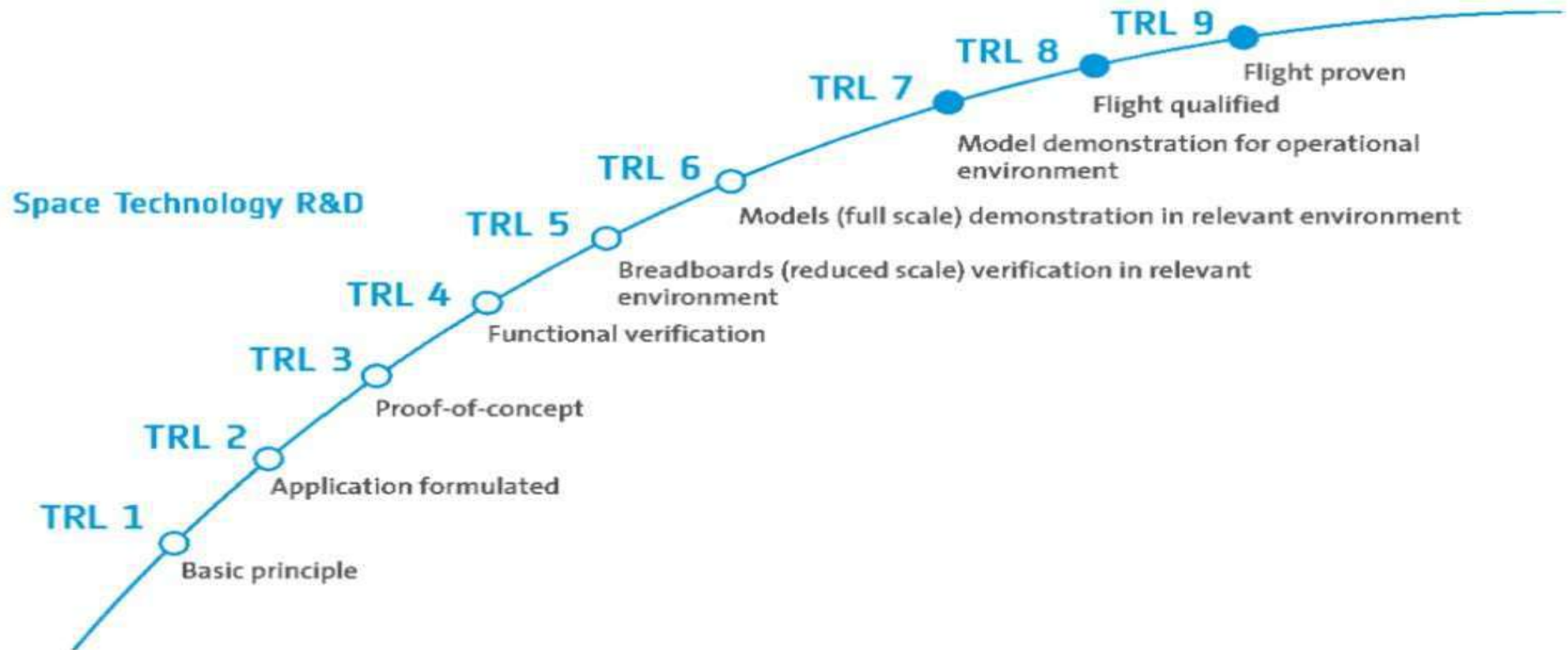


PROGRAMAS TECNOLÓGICOS EN LA ESA

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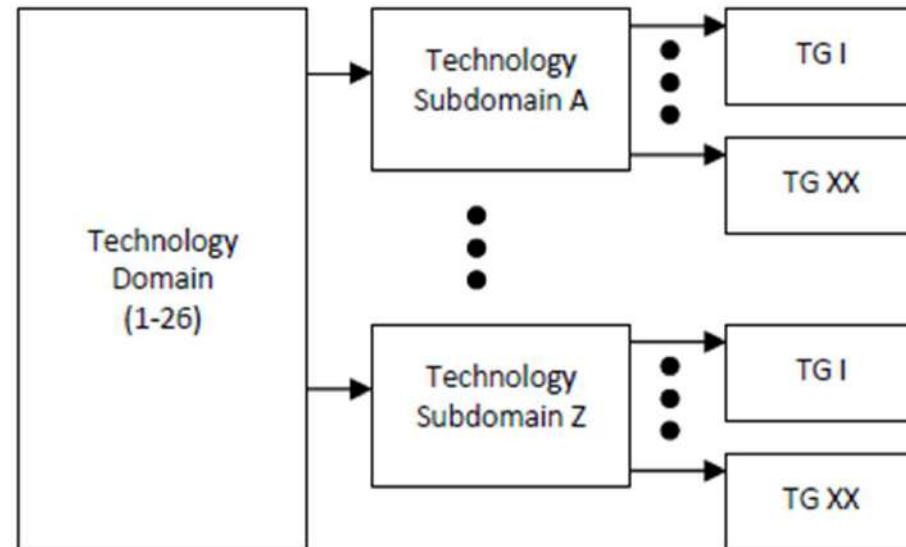
Centro para el Desarrollo Tecnológico y la Innovación

ESA TRLs



— Technology Readiness Level (TRL) scale levels applied to ESA's Technology Programmes

ARBOL DE TECNOLOGÍAS DE LA ESA

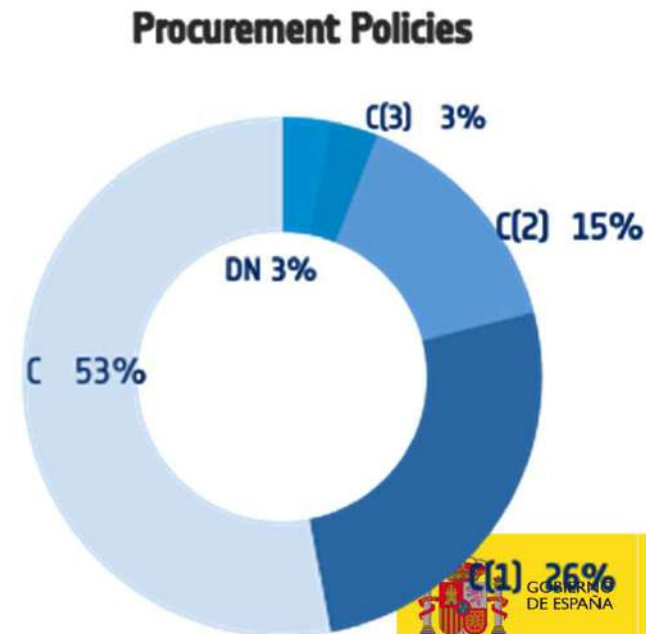
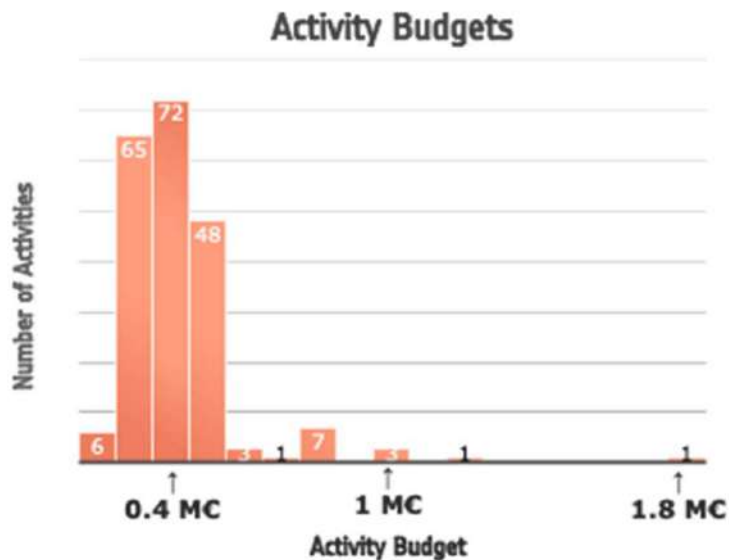


ΔΡΡΟΙ ΝΕ ΤΕΧΝΟΛΟΓΪΑΣ ΝΕ Ι Δ ΕΣΔ

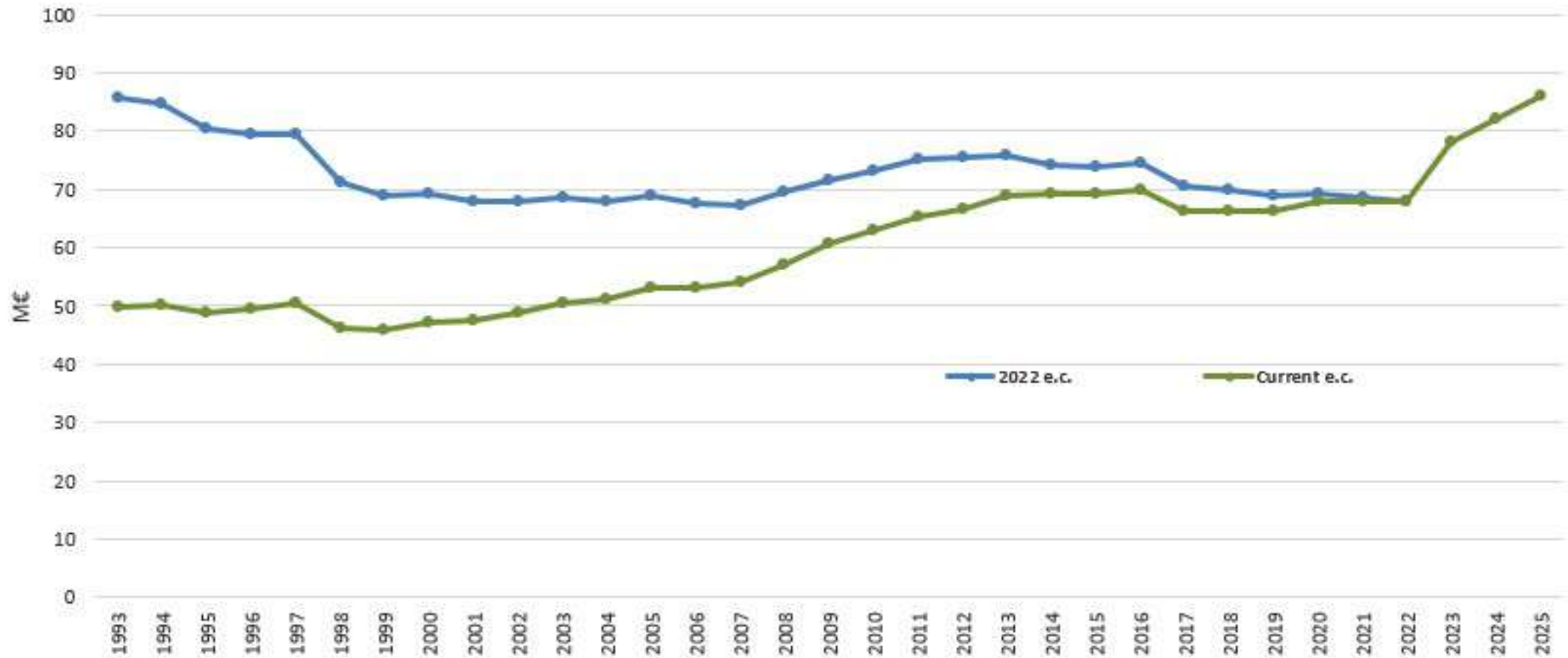
TD	TECHNOLOGY DOMAIN	TS	TECHNOLOGY SUBDOMAIN	TG	TECHNOLOGY GROUP
6	RF Subsystems, Payloads and Technologies All technologies and techniques operating in the RF domain related to satellite systems and networks, spacecraft payloads, instruments and specific ground equipment (see note below), for telecommunication, TT&C, navigation, Earth observation and space science, including security aspects. <i>(Note 6-1: Technologies for control centres, TT&C and Earth Observation Payload Data Transmission Ground Stations and Ground Station Networks are covered in TD12)</i>	A	Telecommunication Subsystems Telecommunication techniques and algorithms (coding, modulation, access, synchronisation, networking, security etc.), subsystem tools and telecommunication equipment.	I	Telecommunication Subsystem and Engineering Tools All aspects related to satellite telecommunication subsystem analysis, design tools and methodologies.
				II	Telecommunication Signal Processing All signal processing techniques and algorithms related to coding/decoding, modulation/demodulation, access, synchronisation, medium access control.
				III	Telecommunication Networking Techniques Telecommunication satellite networking aspects related to radio resource management, network management and control aspects, traffic modelling, etc.
				IV	Telecommunication Equipment All baseband telecommunication equipment (e.g. modulators, demodulators, front-ends). Used for fixed, mobile and broadcast satellite or hybrid satellite/terrestrial telecommunication subsystems, also including user terminals.
				V	Telecommunication Security Techniques and Technologies The techniques and technologies to secure end-to-end telecommunication subsystems. Quantum Key Distribution (with TD17-E-II).
		B	Radio Navigation Subsystems Radio navigation techniques and technologies, subsystems capable of generating, receiving, exploiting and analysing the signals from current and upcoming radio navigation subsystems (GPS, Glonass, EGNOS, Galileo), including subsystem tools and navigation equipment. <i>(Note 6-B-1 : RF Technologies are covered in 6-E.)</i>	I	Navigation Subsystems and Concepts and Engineering Tools All aspects related to ground and space navigation subsystems, Signal in Space, simulators, analysis tools and methodologies. Techniques and technologies to secure end-to-end Navigation services. Antispoofing and Antijamming techniques.
				II	Navigation Ground and User Equipment All technologies related to RF and baseband aspects, positioning and integrity algorithms, integration with other sensors, local augmentation, and integration with telecommunication subsystems and services.
				III	On-board Radio Navigation Receivers All aspects related to navigation space (reference) receivers, and related algorithms and technologies, including security aspects (antijamming and antispoofing).

TECHNOLOGY DEVELOPMENT ELEMENT (TDE/TRP)

- La investigación tecnológica es parte de la Convención de la ESA;
- TDE cubre todos los pilares programáticos y todas las áreas tecnológicas;
- Se centra en TRL 1 -4 y es gestionado por expertos de TEC, OPS&EOP-G;
- El Comité que se ocupa de su gestión es el IPC;
- Planes de Trabajo bianuales con actualizaciones anuales;



TECHNOLOGY DEVELOPMENT ELEMENT (TDE/TRP)



GENERAL SUPPORT TECHNOLOGY PROGRAMME (GSTP)

- GSTP se estructura en torno a tres elementos y cuatro componentes;
- En el caso de España la participación en los elementos del programa se realiza por medio de procesos de habilitación competitivos con una periodicidad anual (en torno a los 9 M€/año);
- Los principales temas tecnológicos serán: ciberseguridad, digitalización, inteligencia artificial, tecnologías cuánticas, IOS y propulsión avanzada.

ELEMENT 1: DEVELOP

supports technology developments, building blocks and ESA technology targets

ELEMENT 2: MAKE

industry initiated and driven co-funded activities to strengthen competitiveness

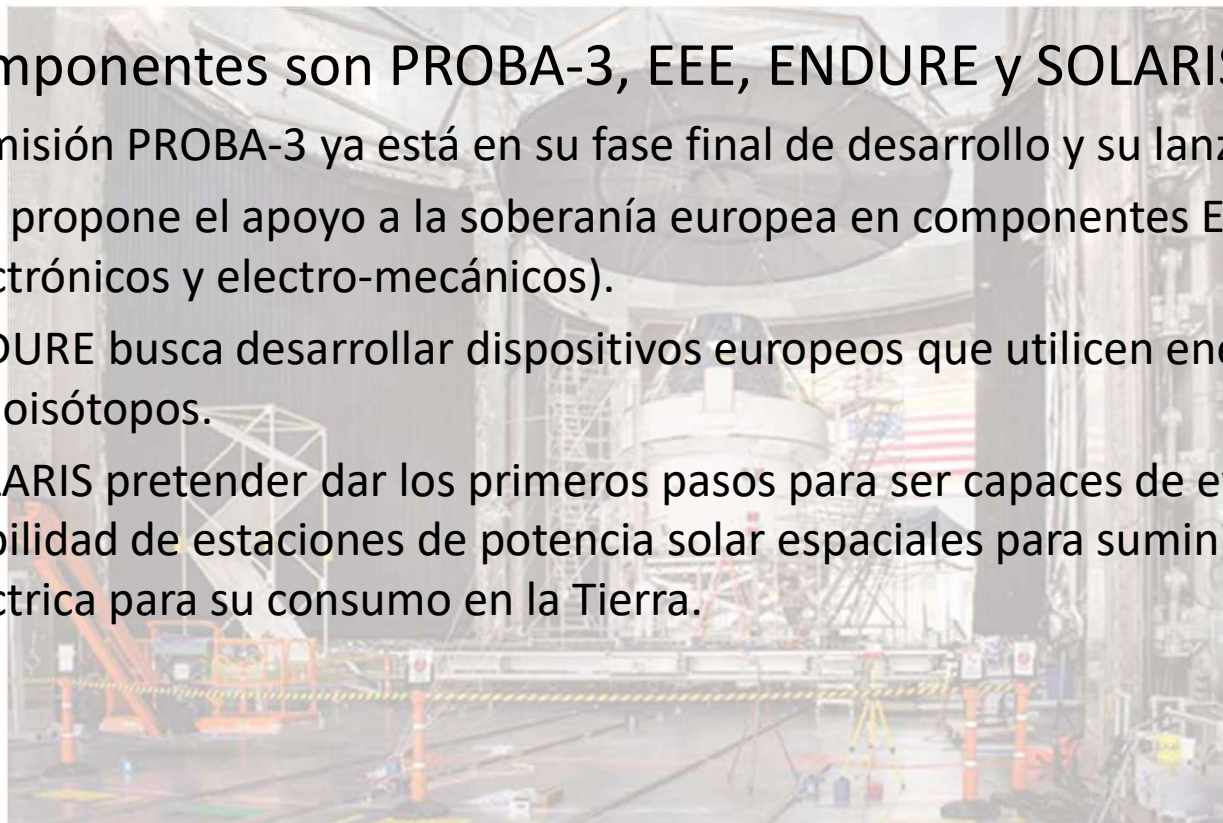
ELEMENT 3: FLY

implements in-orbit demonstrations of technologies in need of acquiring flight heritage



GENERAL SUPPORT TECHNOLOGY PROGRAMME (GSTP)

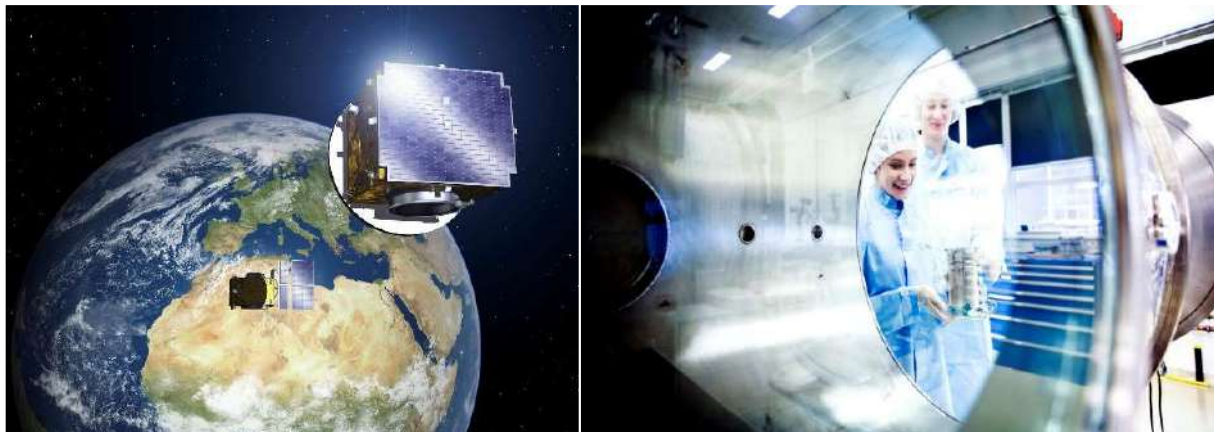
- Los componentes son PROBA-3, EEE, ENDURE y SOLARIS:
 - La misión PROBA-3 ya está en su fase final de desarrollo y su lanzamiento próximo.
 - EEE propone el apoyo a la soberanía europea en componentes EEE (eléctricos, electrónicos y electro-mecánicos).
 - ENDURE busca desarrollar dispositivos europeos que utilicen energía de radioisótopos.
 - SOLARIS pretender dar los primeros pasos para ser capaces de evaluar en 2025 la viabilidad de estaciones de potencia solar espaciales para suministrar energía eléctrica para su consumo en la Tierra.



GENERAL SUPPORT TECHNOLOGY PROGRAMME (GSTP)

Apoyo a la mejora de la competitividad del sector espacial español.
Continuidad en la inversión de España.

Elemento	Envolvente (M€)	España (M€)
CM22 - GSTP Element 1 "Develop"	225	5
CM22 - GSTP Element 2 "Make"	75	5
GSTP TBA		20



- Continuación de procesos de habilitación.
- Programa de trabajo (ciberseguridad, ...)
- Finalización de Proba-3.

PILARES TECNOLÓGICOS ESA*

TRL 9 Actual system "flight proven" through successful mission operations											
TRL 8 Actual system completed and accepted for flight ("flight qualified")											
TRL 7 Model demonstrating the element performance for the operational environment											
TRL 6 Model demonstrating the critical functions of the element in a relevant environment											
TRL 5 Component and/or breadboard critical function verification in a relevant environment											
TRL 4 Component and/or breadboard functional verification in laboratory environment											
TRL 3 Analytical and experimental critical function and/or characteristic proof-of-concept											
TRL 2 Technology concept and/or application formulated											
TRL 1 Basic principle observed and reported											
	TDE	CTP	GSTP	ARTES CC	ECI	EOEP	SciSpacE	ExPeRT	EGEP	NAVISP	FLPP

* 2020



PILARES TECNOLÓGICOS ESA*

- **TDE - Technology Development Element**

- CTP - Science Core Technology Programme

- **GSTP - General Support Technology Programme**

- ARTES Core Competitiveness - Advanced Research in Telecommunications Systems

- ECI - European Component Initiative – now part of TDE

- EOEP - Earth Observation Envelope Programme

- SciSpace - Science in Space Environment

- ExPeRT - Exploration, Preparation, Research and Technology

- EGEP - European GNSS Evolution Programme

- NAVISP – Navigatoin Innovation and Support Programme

- FLPP - Future Launchers Preparatory Programme

* 2020



+info sobre programas y ayudas CDTI
para
proyectos de I+D empresarial e innovación



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