BUILDING A FUTURE-READY SPACE WORKFORCE

ASTRAIOS

Funded by the European Union

The project has received funding from the European Union's Horizon Europe research and innovation programme under Grant Agreement No. 101082636.

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WHAT IS ASTRAIOS?

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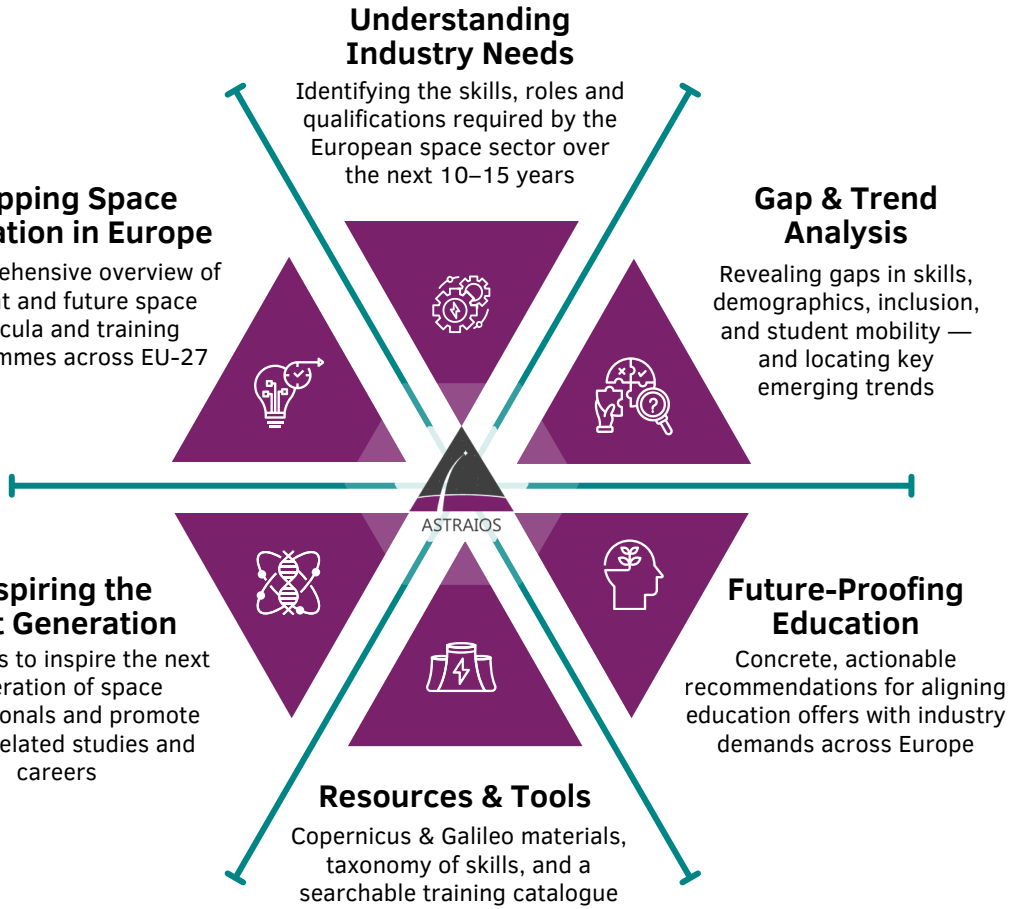

Analysis of Skills, Training, Research and Innovation Opportunities in Space

—Towards a skilled Europe for Space Innovation

PARTNERS

Empowering the Future of Space

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Your Gateway to Europe's Space Education Landscape

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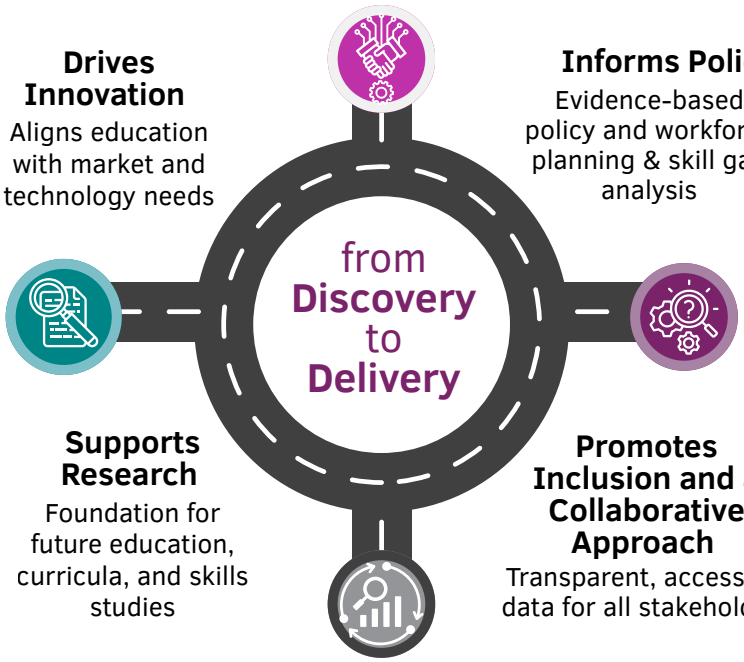
Making a Difference

Bridges academia, industry and policy through a unified knowledge base

Created the first EU-wide web catalogue of space education and training

Enables search by country, institution, language, knowledge area, knowledge domain, space sector and European Qualifications Framework level

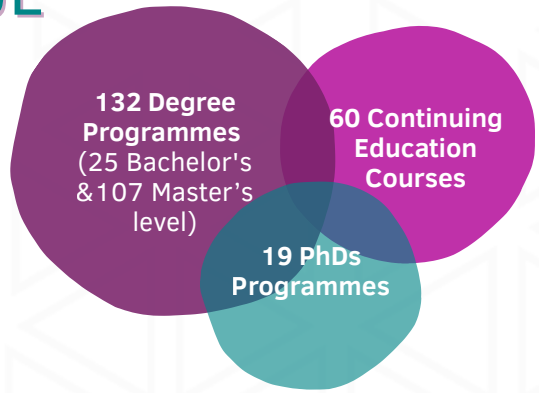


Key Beneficiaries

- General Public
- Students
- Researchers
- Academia/ Universities
- Educators & Teachers
- RTOs
- Private Sector
- Industry
- Policy/Decision Makers

THE CATALOGUE

28 Knowledge Domains and **105 Knowledge Areas** mapped upstream, midstream and downstream within the space value chain.



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The European Taxonomy of Space Knowledge (EU-TaSK)

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from Research to Results

Covers upstream, midstream, downstream & ancillary sectors

The first comprehensive taxonomy of space-related knowledge in Europe

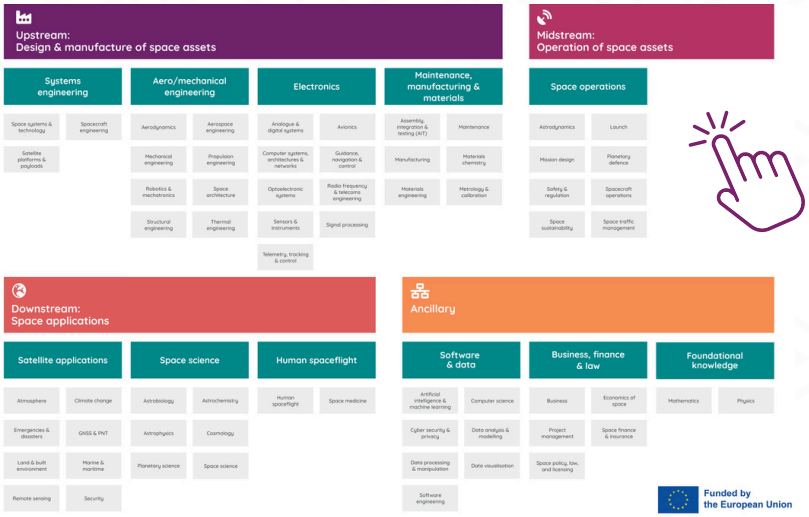
EU-TaSK has integrated leading frameworks (SpaceCRAFT, EO Taxonomy, Copernicus, the PwC space value chain, OECD) into one common standard

Revealed key gaps in European Skills, Competences, Qualifications and Occupations (ESCO) knowledge concept, e.g. space & spacecraft engineering, and recommended updates

28 domains / 112 knowledge areas structured for clarity and consistency

Impact in Action

- A common structured language for education, policy, and industry
- Better curriculum design, workforce planning, and targeted policymaking by aligning academic content with industry needs
- Help students explore study options and career paths
- Strengthens Europe's skills ecosystem by reducing mismatches
- Supports a diverse, future-ready space workforce



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Skills Demand & Workforce Capabilities at a Glance

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What the Data Shows

+140 programmes analysed
(educational mapping, workforce demographics, employer surveys, Erasmus+ records)

Top skill gaps identified
1) Systems engineering
2) Advanced data analytics & AI,
3) Cybersecurity,
4) Mission operations

Transversal skills lacking
communication, leadership, adaptability

Persistent challenges
gender imbalance, regional brain drain (esp. Eastern & Southern Europe), underused digital learning tools

Benefits

1. Strengthens industry-academia collaboration and workforce planning
2. Informs policies for regional balance, inclusivity, and diversity
3. Ensures Europe has a competitive, resilient, and innovative-driven space sector

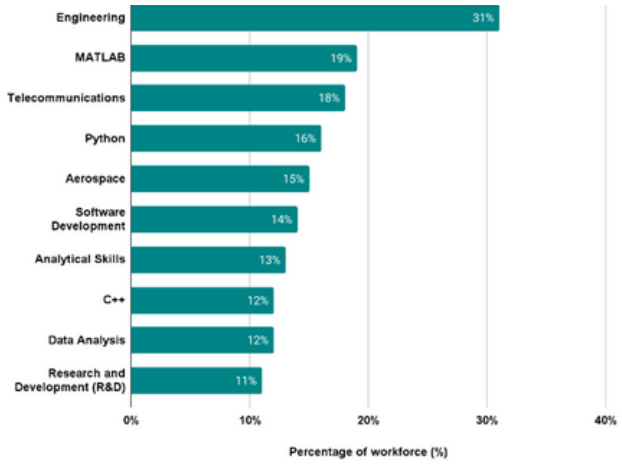
Game Changing Results

- First taxonomy-based workforce analysis covering technical & transversal skills (using the ASTRAIOS EU-TaSK)
- Linked employer needs with academic provision, exposing misalignments
- Delivered evidence-based recommendations for education, industry, and policymakers for a future-ready workforce
- Proposed curriculum reform and modern teaching (project-based learning, MOOCs, digital tools)

SHAPING TOMORROW, TODAY

- Tackles workforce mobility issues & brain drain → stronger regional development & inclusivity
- Aligns training with high-demand domains (AI, autonomy, sustainability) → boosts innovation & SME competitive-ness in the NewSpace economy
- Strengthens knowledge transfer between research, training & industry → faster application of science to space technologies
- Expands access to space education & STEM → reduces gender imbalance and diversifies Europe's talent pool

10 most common skills in the European space workforce



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Understanding Student Mobility & Regional Gaps in Space Education

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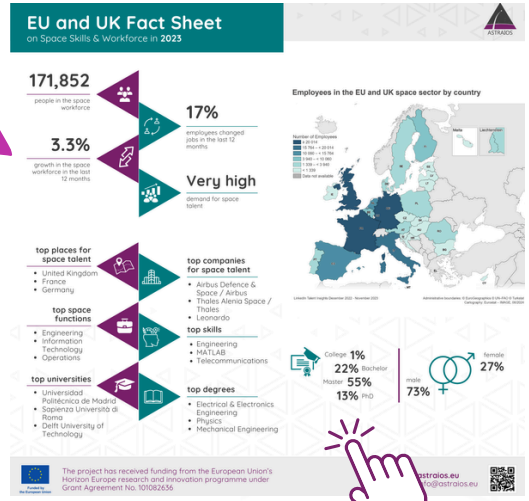
KEY FACTS & FIGURES

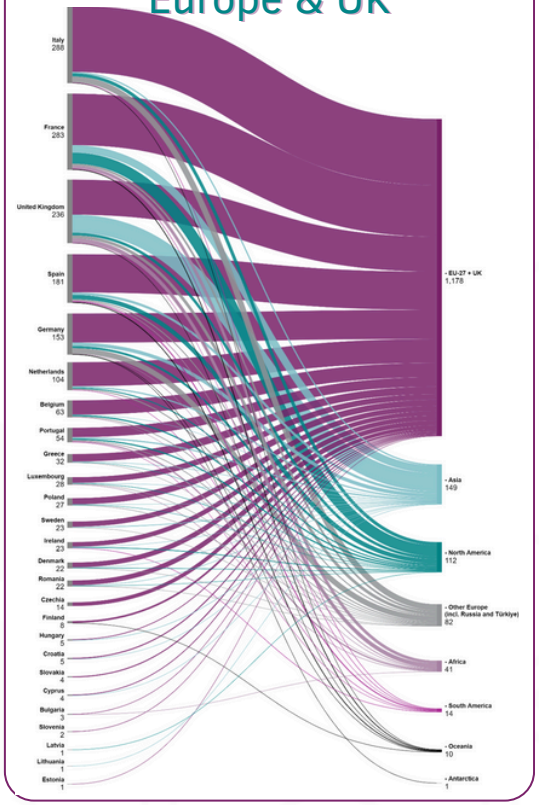
- 33 countries analysed in EU-27, the UK, and Associated and participating countries
- Main barriers: High tuition fees, limited scholarships, language constraints & lack of joint degree programmes
- >60% of student mobility directed towards Western Europe
- France, Germany, & the UK host the majority of space-related higher education programmes
- Italy, Spain, Eastern Europe show high talent outflows and lower retention rates
- Eastern & Southern Europe underrepresented, showing significant regional imbalance
- Top mobility drivers: English-taught programmes, cutting-edge curricula & strong industry & ESA connections
- Despite Erasmus+, stationariness remains high in emerging regions



Check out the full report

Data-backed evidence for a more balanced, inclusive, and future-ready European space workforce — ensuring every region has the chance to reach for the stars.

Workforce Migration Internationally inwards to Europe & UK



Impacts of the Findings

Closing Gaps
→ Tackling regional inequalities & reducing brain drain

Expanding Access
→ Lowering barriers to mobility & boosting inclusivity

Future-Ready Skills
→ Aligning education with evolving industry demands

Driving Innovation
→ Building a balanced, competitive European space ecosystem

Key Beneficiaries

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Trends that will define Europe's Space Future

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Exploring Europe's 5 Pillars of Space Innovation

- **Value Chain assessment**
- **Identification of demand and supply trends**
- **Characterisation of upcoming technologies and services**

Earth Observation	AI analytics, mini satellites, hyperspectral imaging, and sustainability reporting integration
Satellite Communications	Secure connectivity (ARTES, GOVSATCOM, IRIS²) and 5G/6G integration, new business models, and resilient networks
Satellite Navigation	(Galileo, EGNOS) underpins precision, safety, and autonomy for transport, logistics, and defence. Innovation trends include quantum, blockchain & autonomous mobility
Access to Space	Investments in micro-launchers, reusable rockets, green propulsion, and sustainable launch technologies
Space Safety	Debris mitigation, space traffic management, and AI-based situational awareness

Key Beneficiaries

- General Public
- Students
- Academia/ Universities
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- RTOs
- Private Sector
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Driving European Excellence

- Mapped Europe's future space priorities & skill needs
- Linked scientific excellence with sustainability goals
- Informed policy, investment & education strategies
- Strengthened Europe's strategic autonomy & innovation capacity

Future Impact Outlook

- **Technology & Economy** → Boosts investments and competitiveness through innovation & green tech
- **Skills & Policy** → Guides training, workforce planning & decision-making
- **Science** → Shapes future missions like LISA & NewAthena
- **Society** → Enables climate monitoring, disaster response, and global connectivity

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Mapping the Future Workforce of the European Space Sector

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Understanding Workforce Dynamics

1. Surveyed & Analysed trends across the EU space industry
2. Analysed the workforce demand evolution through two key methodologies: analysis of job adverts, and of CVs
3. Mapped skills gaps, workforce movement & future needs
4. Assessed workforce demand evolution and geographical distribution, integrating socioeconomic implications on European countries, regions, and space industry sectors

With a special emphasis on AI, space safety, and mobility of talent

Key Findings

- The space industry needs talents skilled in AI, space safety, and advanced and technical and non-technical problem-solving to keep up with rapid technological change
- Movement of professionals within and outside the EU highlights both opportunities and challenges in attracting and retaining skilled workers
- An ageing workforce signals an urgent need for knowledge transfer and training to prepare the next generation of space professionals

Turning Insight Into Action

Smarter policies

=

stronger space sector

Stronger SMEs

=

more innovation & growth

Better skills match

=

happier, more productive workforce and profitable sector

Did you know?

Space employees build their careers both in private companies and in the public sector. Most private companies are SMEs; they employ roughly 50% of the private sector.

Key Beneficiaries

- Industry & SMEs
- Students
- Educators & Teachers
- STEM Communities / Society

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Addressing People, Culture, and Community in the Space Sector

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Main Results & Achievements

Produced a **comprehensive report mapping diversity challenges** across Europe's space ecosystem. This report is based on original survey data and analysis of five years of equality, diversity, and inclusion (EDI) reports from several key organisations and agencies.

Identified major gaps:

- 70% of the space workforce is male, revealing a persistent gender imbalance
- Mismatch between education levels offered (mostly Master's/PhD) and industry needs (mainly Bachelor's)
- Limited implementation of practical EDI actions within organisations

Designed and delivered a pioneering **mentoring pilot programme**, including~20 mentor–mentee pairs across Europe and beyond to support mid-career transitions and inclusive career development.

Pathways to Impact

Helps align education and job markets to fill the skills gap

Raises awareness of gender imbalance and fosters equality in STEM and space careers

Value for Society & Industry

- Provides data-driven insights for policy reform and workforce planning
- Supports industry alignment with inclusive recruitment and training practices
- Promotes STEM access for women and underrepresented groups
- Establishes a model for mentoring programmes that can scale across Europe's space sector

Key Beneficiaries

- General Public
- Academia / Universities
- Private Sector
- Industry
- Policy/Decision Makers

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Building a Sustainable Future: Environmental, Social, and Governance Practices (ESG) in Space

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Exploring ESG

WHY ESG MATTER?

Driven by climate change, digital transformation, and social and governance challenges, ESG are reshaping the European space sector.

Gathered insights from entities from diverse regions, sizes and sectors

Ran 3 Peer-To-Peer Workshops with entities across Europe

Discovered ESG challenges, good practices, skills gaps and trends across the space industry

KEY OUTPUT

The ESG Space Industry Practices Book showcasing how space industry´s best ESG practices drive positive workforce change by aligning industry needs with academic curricula.

Lessons Learned

Lead on sustainability

Company values, cross-departmental commitment, and leadership involvement drive ESG initiatives

ESG fuels innovation and attracts and retains talent

Stronger collaboration between industry and academia

Impact

1. **Companies:** Showcased how ESG can drive operational improvement and innovation
2. **Academia:** Identified interdisciplinary skills to adapt curricula to industry needs
3. **Policymakers:** Insights to improve ESG frameworks and support startups and SMEs

Key Beneficiaries

- Space companies
- Universities & ESG researchers
- Policy Makers
- Future Space Professionals

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Smart Skills for Space Careers

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What We Delivered

Soft Skills Framework

Map of critical soft skills across career stages

Space Bootcamp

Team-based, hands-on modules that boost leadership, communication, and collaboration

Cutting-edge training. Real-world impact. Future-ready talent.

MOOCs

Online, flexible, and packed with practical knowledge — designed for students & early-career pros

Podcast Series

Real EO/GNSS stories, real lessons, always accessible

Reusable & Ready

Why It Matters

- Smart training for smart missions
- Real tools, not theory
- Closing the space skills gap across Europe

Creating Change

Jobs

Boosts employability & talent mobility.

Economy

Lowers training costs. Upskills fast.

Science

Supports research & collaboration.

Society

Builds inclusive, future-ready teams.

Key Beneficiaries

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Building Skills for Copernicus & Galileo

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Education & Training Highlights

Created two open-access Massive Open Online Courses (MOOCs) focused on downstream space applications:

- Earth Observation Data & Machine Learning for Agriculture Applications developed by the University of Twente, ITC Faculty
- Global Navigation Satellite Systems (GNSS) Applications and Capabilities developed by the Technical University of Crete (TUC)

Developed 14 expert-led webinars covering Earth Observation (EO), Artificial Intelligence (AI), Machine Learning (ML), GNSS, SDGs, and space-based technologies, with real-world applications and interactive Q&A sessions.

Provide flexible, accessible, and practice-oriented learning aligned with Copernicus and Galileo services.

Addressed the training gaps between the European space sector's needs and the actual qualifications of the European workforce.

Empowering Europe's Space Talent

- Strengthens workforce readiness in EO, AI, ML, and GNSS
- Supports lifelong learning and capacity building across Europe
- Improves employability of students, early-career professionals, and researchers
- Accelerates uptake of Copernicus and Galileo in agriculture, climate monitoring, drones, and hazard detection

Key Beneficiaries

- Professionals and early-career specialists in EO, ML, agriculture, GNSS, and space-related fields
- General Public & Industry
- Researchers
- Academia/ Universities
- Educators & Teachers
- RTOs & Private Sector
- Policy/Decision Makers

Where Skills Create Impact

Skilled Workforce
Boosting employability and workforce readiness in EO, AI, ML & GNSS

Innovation in Action
Accelerating use of Copernicus & Galileo in agriculture, climate, drones & hazard monitoring

Societal Value
Supporting food security, environmental monitoring & resilience to natural hazards

Inclusive Growth
Expanding access to flexible learning and strengthening lifelong learning across Europe

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Step into Space: Explore Careers, Skills & Personal Journeys to New Frontiers

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Bridging Knowledge, Skills for the Future

Discover, Learn, Connect

- Discover education, training & job opportunities across the European space sector
- Learn from experts in academia, policy, and industry
- Get practical advice on mobility programmes, scholarships & career paths
- Gain insight into key space skills, innovation, and diversity

JOURNEYS THAT INSPIRE

- Showcasing diverse career paths into the European space sector
- Featuring personal experiences from professionals across disciplines
- Highlighting challenges, opportunities, and key turning points
- Aimed at inspiring and guiding the next generation in space

Different Beginnings, Shared Vision

Attention

Dreaming of a career in space? Meet professionals who began in completely different fields — and found their place in the space sector

Interest

Their paths weren't traditional. From engineering to education, law to design — their stories show how diverse backgrounds can thrive in space

Desire

These journeys serve as powerful reminders: space is not reserved for a select few. It is a growing, inclusive ecosystem shaped by people from all walks of life — and their voices now inspire future generations

Action

These journeys serve as powerful reminders: space is not reserved for a select few. It is a growing, inclusive ecosystem shaped by people from all walks of life — and their voices now inspire future generations

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Strengthening Europe's Space Ecosystem

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Turning Knowledge into Action

- Translated the full body of ASTRAIOS research findings into clear, actionable recommendations for the long-term success of the European space sector
- Integrated evidence on skills demand, education gaps, workforce mobility, regional disparities, and equality & inclusion, showing how these challenges are interconnected
- Delivered tailored recommendations for key stakeholder groups: policymakers, universities, industry and employers, professionals, and future entrants to the space sector
- Identified priority actions to align education with industry needs, reduce regional and economic barriers, support mobility and career development, and embed inclusion and sustainability in workforce strategies
- Provided a clear bridge from analysis to implementation, ensuring ASTRAIOS results remain impactful beyond the project's lifetime

Value for Europe

- Supports evidence-based policymaking and long-term program planning
- Help employers plan workforce development and talent pipelines
- Guides universities & training providers in updating curricula and skills provision
- Empowers individuals to make informed education and career choices in the space sector

Building Europe's Space Future

Balanced Talent
Reducing regional gaps and brain drain

Stronger Innovation
Skills aligned with industry needs

Inclusive Growth
Diversity, sustainability & long-term resilience

Knowledge Transfer
Connected education, research, and industry with interdisciplinary skills

Key Beneficiaries

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