

D2.4 Strategic Space Skills Framework

Building Future-Ready Space Innovation Through
Education-Enterprise Synergies

 **Space
Vantage**



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Abbreviations

Abbreviation	Description
AI	Artificial Intelligence
DigComp	Digital Competencies
Dx.y	Deliverable
ENT	Entrepreneurship
EO	Earth Observation
EQF	European Qualifications Framework
ESCO	European Skills, Competences, Qualifications and Occupations
GNSS	Global Navigation Satellite Systems
GreenComp	Green Competencies
HE	Higher Education
LO	Learning Outcome
ML	Machine Learning
SatCom	Satellite Communications
SC	Skill Clusters
VET	Vocational Education Training
WP	Work Package

Executive Summary

The downstream sector, encompassing Earth Observation (EO), Satellite Communications (SatCom), and Global Navigation Satellite Systems (GNSS), represents the largest and most commercially dynamic segment of the Space economy. Rapid technological evolution, increasing digitalisation, and the transition toward data-driven service models have significantly transformed workforce requirements. While the sector continues to grow, companies increasingly report difficulties in recruiting and retaining highly qualified professionals.

Deliverable 2.4 presents the Strategic Space Skills Framework, developed within the framework of Work Package 2 of the SpaceVantage project. The framework translates skills intelligence into actionable guidelines for the design and delivery of education and training programmes. It specifies the required learning outcomes, appropriate education and training formats and assessment methodologies. The aim is to design a skills intelligence framework that provides a solid foundation for ongoing alignment between education and industry needs.

A five-step methodological approach was employed to develop the Strategic Space Skills Framework. The five sequential phases range from identifying the required skill clusters to defining learning outcomes, delivery methods, assessment methodologies, and industry validation processes. For each educational modality, detailed specifications are provided for content development, delivery methodologies, and quality assurance. This holistic approach addresses both immediate skills needs and establishes a sustainable foundation for continuous skills development in the rapidly evolving space sector. Overall, the Strategic Space Skills Framework serves as a shared reference for curriculum design, training implementation, and assessment.

1. Introduction

1.1 Objectives of Work Package 2

The overarching objective of the Work Package (WP) 2 is to develop an Evidence-based Skills Intelligence and anticipation framework through the structured and systemic collection of current and emerging skills needs in the Space sector with a focus on the downstream pillar, aligned with European standards. The Skills Intelligence framework will create a solid foundation for subsequent design, development and implementation of comprehensive and modular curriculum tailored to the needs of the downstream Space sector.¹

Specifically, WP2 includes six (6) complementary objectives:

- Conduct strategic skills assessment for the Space downstream sector
- Map occupational profiles against European frameworks
- Develop predictive models for Space sector workforce evolution
- Create a strategic framework for education-industry alignment
- Establish mechanisms for continuous industry feedback
- Align with European policy priorities and frameworks

1.2 Purpose of the deliverable 2.4

The purpose of this deliverable is to develop a strategic framework that translates skills intelligence into actionable guidelines for education and training provision. The framework will define the required learning outcomes, appropriate education and training formats, as well as assessment methodologies. It will focus on three education and training modalities:

- 1) Higher education (HE) curricula, emphasizing the integration of emerging competencies into existing degree programmes.

¹ SpaceVantage Grant Agreement No 101246589

- 2) Vocational education and training (VET) programmes, focusing on practical skills acquisition and certification.
- 3) Entrepreneurial (ENT) capacity building, aimed at developing innovation capabilities for the Space economy.

For each modality, the framework will provide detailed specifications for content development, delivery methodologies, and quality assurance mechanisms.

Deliverable D2.4 will build upon the findings of **D2.1 Space Downstream Sector Skills Needs Analysis** and **D2.2 Space Sector Occupational Profiles and Competency Frameworks**. The resulting Strategic Space Skills Framework will provide essential guidance for **WP3 – Curriculum and Learning Material Development**, supporting the design of curricula and learning materials that address advanced skills requirements in Space-related fields. Furthermore, it will facilitate the development of education and training activities for Higher Education (HE) and Vocational Education and Training (VET), contributing to the upskilling and reskilling of professionals, graduates, and students.

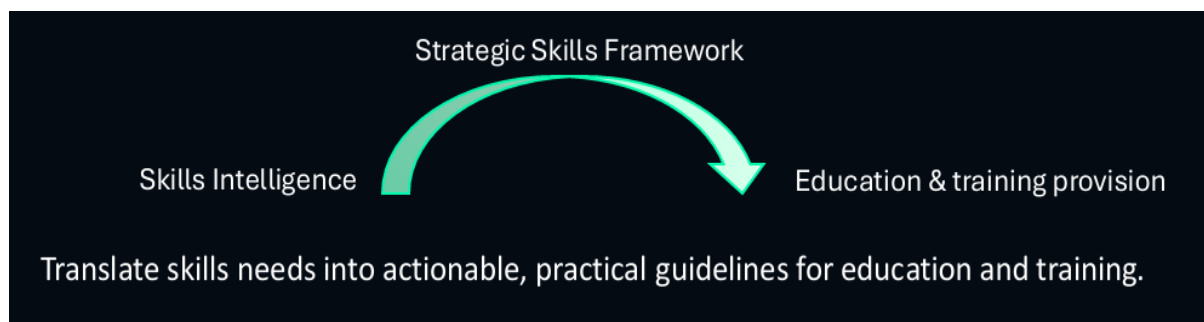


Figure 1 Overview of the scope of Deliverable D2.4 - Strategic Space Skills Framework.

1.3 Structure of the Deliverable 2.4

This deliverable is structured as follows:

- Section 1 – Introduction: Presents the overarching objective of the WP2, as well as the purpose and scope of the deliverable 2.4.
- Section 2 – Development of the Strategic Space Skills Framework: This section describes the methodological approach followed for the development of the Strategic Space Skills Framework and outlines the results of the framework development, including the identified skill clusters, the corresponding learning outcomes for the

three educational modalities, the quality assurance criteria that underpin the framework, as well as the foreseen validation process.

- Section 3 – Conclusions: Summarizes the main findings of the study.

2. Development of the Strategic Space Skills Framework

2.1 Methodological Approach

Section 2.1 outlines the methodological approach used to develop the Strategic Space Skills Framework, that translates skills intelligence into actionable guidelines for education and training provision. The framework components presented in this Deliverable underwent technical review by FORTH, pedagogical review by VILNIUSTECH, and market relevance assessment by TechTour, implementing this way a multi-perspective quality validation.

The Framework was designed to implement the constructive alignment principles advanced by Biggs and Tang (2011)², ensuring coherence between identified labor market needs and educational responses. Specifically, the aligning of the learning outcomes established in the SpaceVantage project with professional Space Sector standards, should lead to learners that possess the functional knowledge demanded by today's demanding job market.

Figure 2 presents the SpaceVantage five-step methodological approach for the development of the Strategic Space Skills Framework. The five sequential phases, range from identifying the required skill clusters to defining learning outcomes, delivery methods, assessment methodologies and industry validation processes. For each education modality, detailed specifications are provided for content development, delivery methodologies, and quality assurance. Together, these phases ensure that the framework aligns with the needs of the European Space sector and supports the delivery of high-quality education and training programmes across Higher Education (HE), Vocational Education and Training (VET), and entrepreneurial (ENT) capacity-building initiatives. Overall, the proposed framework methodological approach aims to bridge the identified critical gap in Space sector education: the translation of labor market intelligence into actionable educational programs that maintain academic rigor while addressing industry needs. Moreover, the proposed framework contribution extends beyond direct benefits to participants—its methodology and collaborative mechanisms that can be adopted across Europe's Space education ecosystem, creating lasting impact on the sector's competitiveness and innovation capacity. Finally, the

² Biggs, J., & Tang, C. (2011). Teaching for quality learning at university. McGraw-Hill Education (UK)

modular framework for skills development is documented in standardized formats that enable adaptation to different national contexts, educational and qualification systems. This approach ensures that innovations developed in one region can be effectively implemented across Europe, maximizing the return on investment in curriculum development and training methodologies.

SpaceVantage Strategic Space Skills Framework

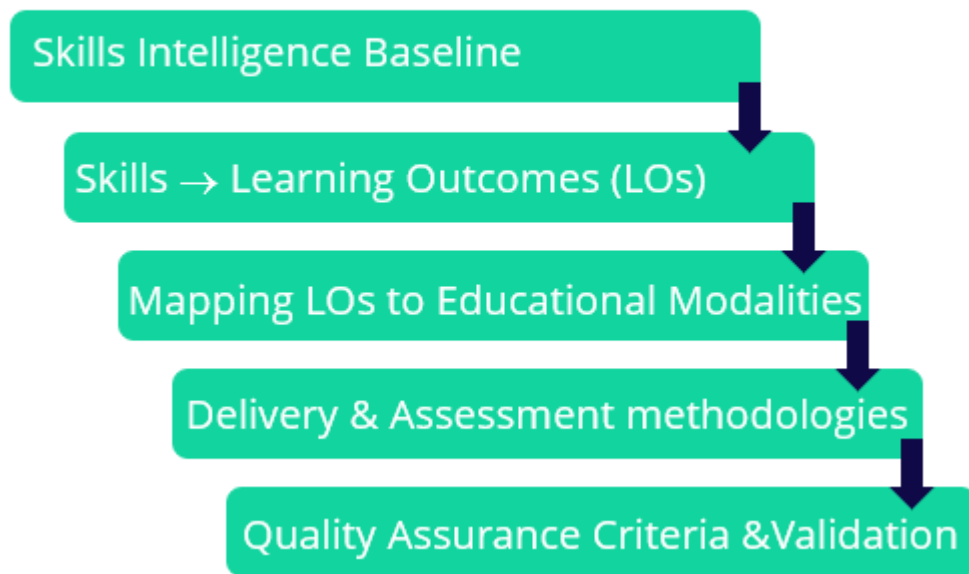


Figure 2 SpaceVantage overall methodology for the development of the Strategic Space Skills Framework.

Phase 1: Establishing the Skills Intelligence Baseline

The first phase focuses on laying the foundation for the Strategic Space Skills Framework by drawing on the findings of Deliverables D2.1 and D2.2. It identifies the key skill clusters and competency requirements that the framework should include in order to address critical skill gaps within the Space sector. This baseline draws on the six critical skill areas identified through desk research and the SpaceVantage stakeholder survey (D2.1), together with the six occupational profiles – spanning technical and business-oriented roles across Earth Observation, Satellite Communications, and GNSS – developed in D2.2.

Phase 2: Translating Skills and Competencies into Learning Outcomes

The second phase converts the identified skill clusters and competencies into clear, measurable, and learner-centred learning outcomes. The goal here is to connect industry requirements with curriculum design and training provision by offering a shared educational framework. Well-defined learning outcomes ensure that education and training programmes prepare learners with the knowledge, skills, and competencies required to perform effectively

in Space-related occupations. Consistent with the competency mapping methodology established in D2.2, the learning outcomes are anchored to European reference frameworks – the European Qualifications Framework (EQF), ESCO, DigComp, EntreComp, and GreenComp – ensuring comparability, transparency, and transferability of the resulting learning outcomes across the HE, VET, and ENT modalities.

Phase 3: Mapping Learning Outcomes to Educational Modalities

Once the learning outcomes are defined, they are mapped to the three educational modalities covered by the framework: Higher Education (HE), Vocational Education and Training (VET), and entrepreneurial capacity building. This mapping recognises that different target groups need varied learning approaches, levels of depth, and delivery formats.

Phase 4: Defining Delivery and Assessment Methodologies

The most suitable teaching, learning, and assessment methods for each educational modality are being determined in the fourth phase of the Skills Framework. These methods are chosen to align with the specific competencies being developed, maintaining a balance between theoretical understanding, practical application, and entrepreneurial learning. Furthermore, assessment methods are identified to verify the achievement of intended learning outcomes and to support consistent evaluation of learner performance and overall learning quality. This multi-modal approach is consistent with the European Commission's vision of flexible, learner-centred and interconnected learning pathways that enable higher education institutions to respond to diverse learner profiles and evolving labour-market needs (European Commission, 2022)³.

Phase 5: Establishing Quality Assurance Criteria

The final phase sets out the quality assurance principles that will guide the implementation and ongoing improvement of the Strategic Space Skills Framework. The framework is evaluated against criteria such as relevance to industry needs, internal coherence, flexibility, accessibility, sustainability, and alignment with European competence and qualification frameworks. These quality assurance principles ensure that the framework remains strong, forward-looking, and capable of supporting the changing skills demands of the European Space sector. Moreover, this phase defines the validation processes to be carried out internally by the consortium partners, externally through industry stakeholders, and through

³ Council of the European Union (2022). Council Recommendation on building bridges for effective European higher education cooperation

pilot implementations in real-world university environments, ensuring that the Strategic Space Skills Framework is comprehensively assessed and validated.

2.2. Skills Intelligence Baseline

Section 2.2 outlines the main findings derived from applying the First phase of methodological approach described earlier, together with the results of *Deliverables D2.1, Space Downstream Sector Skills Needs Analysis*, and *D2.2, Space Sector Occupational Profiles and Competency Frameworks*. These findings provide the foundation for the Strategic Space Skills Framework for turning skills intelligence into practical guidance for developing and implementing education and training curricula.

As depicted in Table 1, the following six strategic skills clusters have been identified as the most critical areas for supporting the future labour market of the European downstream space sector. By focusing mainly on downstream applications (Earth observation, navigation, and integrated services), SpaceVantage targets the area with the greatest economic growth potential and societal impact.

The skills clusters selection is directly grounded in the D2.1 findings: 40% of surveyed stakeholders ranked technical and digital skills as the most important hiring criterion, while systems engineering, AI/ML, data modelling, and secure communications were identified as the most difficult competences to source. Industry interviews also consistently emphasised that the sector increasingly requires hybrid profiles combining deep technical expertise with entrepreneurial and business-development competences, a finding echoed in D2.2's cross-profile analysis, which found that technical and business-oriented roles across all three segments (EO, SatCom, GNSS) share common demand for data literacy, systems understanding, and stakeholder communication. The six clusters below reflect this dual technical/entrepreneurial emphasis and map directly onto the six occupational profiles developed in D2.2.

#	Skill Cluster (SC)	D2.1 Evidence	D2.2 Profile	Indicative ESCO/EQF
1	EO Data analytics & Geospatial Intelligence	Ranked among top-3 hardest-to-find technical skills	EO Data Analyst	- ESCO 2511.4 Data Scientist - EQF 6-7

2	AI & ML for EO data analytics	Ranked among top-3 hardest-to-find technical skills	EO Data Analyst	- ESCO 2511.3 Data Analyst - EQF 6-7
3	EO for Green & Sustainable Development	Ranked among top-3 hardest-to-find technical skills	EO Data Analyst	- ESCO 2165.3 Geographic Information Systems Specialist - EQF 6-7
4	Intelligent Space Technologies: Satellite Navigation and Autonomous Systems	Critical skills shortage in current workforce	Applications Engineer	- ESCO 2152.1.9 Satellite Engineer - EQF 6-7
5	Space Systems Engineering & Mission Integration	Critical skills shortage in current workforce	Systems Engineer	- ESCO 2152.1.14 Satellite Engineer - EQF 6-7
6	Secure Space Communications & Cybersecurity	Critical skills shortage in current workforce	Systems Engineer	- ESCO 2153.1 Telecommunications Engineer - EQF 6-7

Table 1 The identified six strategic skills clusters of the SpaceVantage project.

2.3. Learning Outcomes and Recommendations for Content Development

Section 2.3 outlines the main findings derived in the second phase of the framework development process, where the six identified SCs are turned into clearly defined and measurable learning outcomes (LOs). Each skill cluster includes three outcomes: the first establishes the theoretical foundation, while the second focuses on practical applications of the selected topic. The third LO is associated with Entrepreneurship and Innovation Management for Space Applications Activities, since Business Development was ranked high among the hardest-to-find skill in the survey of D2.1. These learning outcomes together serve as a shared reference for curriculum design, training implementation, and assessment. Learning outcomes are calibrated to different levels of autonomy and complexity depending on the target modality, in line with the EQF levels identified for the corresponding occupational profiles in D2.2. Higher Education pathways typically target EQF levels 6–7 (Bachelor's/Master's), Vocational Education and Training targets EQF levels 4–5, and Entrepreneurial capacity-building is cross-cutting, applicable across EQF levels depending on the learner's starting profile. In addition, each learning outcome is mapped to the relevant

European Recognition competence framework that includes ESCO skills classification as well as the horizontal competence frameworks such as DigComp, EntreComp and GreenComp. Finally, an indicative learning topic is presented for each identified skill cluster, accompanied by four representative content items that illustrate its scope and thematic coverage. By adopting these three differently- oriented learning components, the SpaceVantage framework aims to establish reliable and sustainable relations between academia and industry, ensuring that educational outputs remain closely aligned with workforce needs.

SC #1: EO Data Analytics & Geospatial Intelligence

LO #	Title	EQF	EU Framework
1.1	Fundamentals of EO Data Analytics and Geospatial Intelligence.	6-7	ESCO, DigComp, GreenComp
1.2	Apply EO Data Analytics and Geospatial Intelligence techniques for image interpretation and the explanation of results.	4-5	ESCO, DigComp, EntreComp, GreenComp
1.3	Foundamental principles of entrepreneurship and innovation management. Apply these principles to various entrepreneurship activities, specifically within the Space sector.	Depending on learner's profile	EntreComp, DigComp, GreenComp

Indicative topic: EO Fundamentals & Remote Sensing

- Satellite Image types, Visual Interpretation
- Copernicus and open EO data sources
- Spectral indices and NDVI interpretation
- Practical EO image interpretation and result explanation

SC #2: AI & ML for EO data analytics

LO #	Title	EQF	EU Framework
2.1	Fundamentals of using AI and ML tools for analyzing data.	6-7	ESCO, DigComp, GreenComp
2.2	Apply AI/ML tools to process and analyze EO data.	4-5	ESCO, DigComp, EntreComp, GreenComp

2.3	Fundamentals of entrepreneurship and innovation management. Apply these principles to various entrepreneurship activities specifically within the Space sector.	Depending on learner's profile	EntreComp, DigComp, GreenComp
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Indicative content: AI & ML for EO Data

- Role of AI & ML in EO data analysis
- From pixels to features: bands, indices and labelled samples
- Accuracy assessment & confusion matrix interpretation
- Basic supervised classification workflow

SC #3: EO for Green & Sustainable Development

LO #	Title	EQF	EU Framework
3.1	Fundamentals of EO for Green and Sustainable Development (e.g., urban, agriculture, forestry).	6-7	ESCO, DigComp, GreenComp
3.2	Apply the EO-based approaches through relevant mini case studies on environmental monitoring.	4-5	ESCO, DigComp, EntreComp, GreenComp
3.3	Fundamentals of entrepreneurship and innovation management. Apply these principles to various entrepreneurship activities specifically within the Space sector.	Depending on learner's profile	EntreComp, DigComp, GreenComp

Indicative topic: EO for Sustainable development and Smart Cities

- Urban land-cover and land-use indicators
- Agricultural monitoring using satellite indicators
- Decision support map preparation for stakeholders
- Urban heat and environment risk

SC #4: Intelligent Space Technologies: Satellite Navigation and Autonomous Systems

LO #	Title	EQF	EU Framework
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4.1	Fundamentals of satellite positioning and autonomous systems.	6-7	ESCO, DigComp, GreenComp
4.2	Apply these principles to process and interpret GNSS positioning datasets.	4-5	ESCO, DigComp, EntreComp, GreenComp
4.3	Fundamentals of entrepreneurship and innovation management. Apply these principles to various entrepreneurship activities specifically within the Space sector.	Depending on learner's profile	EntreComp, DigComp, GreenComp

Indicative topic: High-Precision GNSS & Autonomous Systems

- Positioning Requirements: accuracy, integrity, availability, continuity
- RTK positioning concept and correction workflow
- GNSS integration with IMU visual navigation, LIDAR or other sensors
- Fallback positioning logic

SC #5: Space Systems Engineering & Mission Integration

LO #	Title	EQF	EU Framework
5.1	Fundamentals of a Satellite system and orbit design engineering principles.	6-7	ESCO, DigComp, GreenComp
5.2	Apply these principles to calculate critical satellite system parameters, (such as power, mass, thermal requirements, communication link performance), and perform practical evaluations of satellite orbits.	4-5	ESCO, DigComp, EntreComp, GreenComp
5.3	Fundamentals of entrepreneurship and innovation management. Apply these principles to various entrepreneurship activities	Depending on learner's profile	EntreComp, DigComp, GreenComp

	specifically within the Space sector.		
Indicative topic: Satellite Power Budget & Energy Balance Analysis - Satellite electrical power system structure - Power consumers, duty cycles - Solar cell selection and generated power calculation - Worst-case eclipse scenario analysis			

SC #6: Secure Space Communications & Cybersecurity

LO #	Title	EQF	EU Framework
6.1	Fundamentals of secure Space communications and cybersecurity.	6-7	ESCO, DigComp, GreenComp
6.2	Apply cybersecurity methods to identify, analyse, and mitigate risks affecting Space systems and communication networks.	4-5	ESCO, DigComp, EntreComp, GreenComp
6.3	Fundamentals of entrepreneurship and innovation management. Apply these principles to various entrepreneurship activities specifically within the Space sector.	Depending on learner's profile	EntreComp, DigComp, GreenComp

Indicative topic: Satellite Communications

- Satellite communication subsystem architecture
- Transmitter, receiver and antenna selection
- Link budget calculation
- Bit Error Rate estimation

2.4 Mapping Learning Outcomes to Educational Modalities

In the third phase of the framework development process, the identified learning outcomes are linked to the three educational modalities targeted by the project. This phase ensures that the framework supports education and training activities aligned with the needs of

different learner groups and the changing demands of the downstream Space sector. As shown in Figure 3 below, for Higher Education, each skill cluster emphasises theoretical foundations and analytical/algorithmic depth (e.g., EO data analytics theory, AI/ML model design, engineering principles for systems and orbit design). For Vocational Education and Training, the same clusters are delivered through applied, hands-on tool use (e.g., GIS and cloud platform operation, GNSS device and dataset handling, component-level integration and testing). For Entrepreneurial capacity-building, the emphasis shifts to translating each technical area into market opportunity, service concepts, and commercialisation pathways (e.g., EO-based service design, navigation application development, security-by-design as a market differentiator), converging with all six clusters through the Entrepreneurship and Innovation Management LO.

LOs for HE		LOs for VET		LOs for ENT	
✓	1.1, 1.2	✓	1.2, 1.3	✓	1.3
✓	2.1, 2.2	✓	2.2, 2.3	✓	2.3
✓	3.1, 3.2	✓	3.2, 3.3	✓	3.3
✓	4.1, 4.2	✓	4.2, 4.3	✓	4.3
✓	5.1, 5.2	✓	5.2, 5.3	✓	5.3
✓	6.1, 6.2	✓	6.2, 6.3	✓	6.3
 Theoretical foundations Analytical problem solving Technical competencies		 Applied technical skills Hands-on training Practical use of tools		 Entrepreneurship capabilities Technical application for the Space Economy	

Figure 3 Mapping of the Framework Learning Outcomes to the Three Educational Modalities

2.5 Delivery and Assessment Methodologies

The Strategic Space Skills Framework outlines suitable delivery methods and assessment methodologies for each educational modality to ensure effective development and evaluation of the identified learning outcomes. The suggested approaches are adjusted to match the distinct characteristics and goals of Higher Education (HE), Vocational Education and Training (VET), and entrepreneurial capacity-building programmes. Table 2 depicts the related delivery methods and assessment approaches for each modality. The project's diverse educational outputs (new courses, updated modules, workshops) will serve multiple target groups – not only university students but also young professionals and mid-career workers seeking to upskill. These delivery and assessment methods reflect the operational realities captured in the D2.2 occupational profiles – for example, HE and VET assessment through practical projects mirrors tasks such as satellite link-budget calculations or GNSS dataset processing, while ENT assessment through pitching and business-plan development reflects the market-opportunity-identification and partnership-building tasks central to the Business Development Manager profiles.

Educational Modality	Delivery Methods	Assessment	Indicative EQF	Indicative ECTS/ECVET
Higher Education (HE)	Lectures, analytical thinking problems, hands-on training	Exams, Practical project presentation/evaluation	6-7	1-2
Vocational Education & Training (VET)	Short-courses, Workshops, work-based learning problems, hands-on training	Practical project presentation/evaluation	4-5	1-2
Entrepreneurial capacity-building (ENT)	Short courses, Mentoring/coaching: hackathons, startup incubators and industry projects	Lean startup / business model validation methodology, structured mentor-matching, investor-readiness or demo-day formats, and work-based learning tracks with start-ups	Depending on learner's profile	Depending on learner's profile

Table 2 Overview of the Delivery methods & Assessment Methodologies for the developed Strategic Space Skills Framework

2.6 Quality Assurance Criteria & Validation Processes

The Strategic Space Skills Framework aims to support the creation of high-quality, forward-looking education and training programs that respond to the fast technological changes in the Space sector. To accomplish this goal, the framework relies on six Quality Assurance Criteria that emphasize relevance, coherence, adaptability, consistency with European standards, accessibility, and lasting sustainability.

The proposed Quality Assurance Criteria are the following:

- Relevance: Does the educational/ training content respond to identified Space-sector skills needs? The relevance criteria will be validated by learners, educators, employers, professional bodies and policy stakeholders.
- Alignment: Are learning outcomes measurable and assessed through authentic space-sector tasks?
- Flexibility and adaptability: Can the program be continuously updated through a systematic feedback mechanism to incorporate newly emerging skills? Is the program suitable for transnational education?
- Alignment with European frameworks: Are the framework's learning outcomes and competences mapped to ESCO, EQF, DigComp, EntreComp, and GreenComp?
- Accessibility: Does the program ensure equitable access, flexible participation and appropriate support for diverse target groups, while monitoring gender and inclusion measures?
- Sustainability: Are ownership, maintenance responsibilities, resources, review cycles and institutional commitments defined beyond the project lifetime?

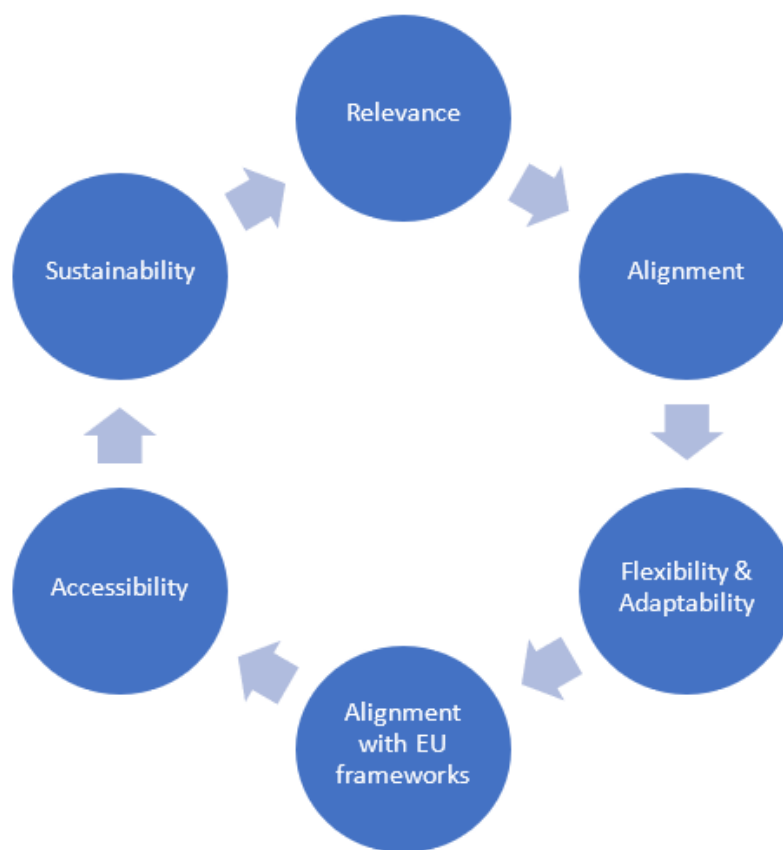


Figure 4 Schematic of the six Quality Assurance Criteria, established for the Strategic Space Skills Framework.

The **Validation Strategy** of the Strategic Space Skills Framework is structured around three complementary axes: internal validation, pilot implementation, and industry validation. This multi-dimensional approach ensures that the framework is assessed from technical, educational, and market perspectives, enabling continuous refinement and ensuring that the defined Quality Assurance Criteria are effectively met.

Pilot Validation: The six Quality Assurance Criteria will be validated through a structured review process integrated into the development and implementation of the education and training programmes. Specifically, the criteria will be assessed during the development of modular curriculum frameworks for emerging Space data applications, ensuring their effective incorporation into learning outcomes, curriculum structures, pedagogical approaches, and assessment methodologies. Their relevance, applicability, and effectiveness will be further evaluated through real-world testing environments, with pilot implementations conducted at UiT, VILNIUSTECH, AU, and Accion Laboral, involving at least 60 students. These pilot activities will generate evidence-based feedback to assess the effectiveness of the criteria and identify potential improvements before broader

implementation. Continuous monitoring and feedback mechanisms will ensure that the framework remains aligned with evolving Space-sector needs, adaptable to emerging skills requirements, consistent with European frameworks, and sustainable beyond the project lifetime.

Internal Validation: As described above, the framework components presented in this Deliverable have undergone a multi-dimensional review process, combining technical assessment by FORTH, pedagogical evaluation by VILNIUSTECH, and market relevance analysis by TechTour. This complementary approach ensures that quality assurance is addressed from technical, educational, and industry perspectives. Further validation will be achieved through curriculum development activities, pilot testing in university environments, and continuous feedback processes, ensuring the framework's relevance, effectiveness, alignment with Space-sector requirements, and long-term applicability.

Industry Validation: Within WP2 of the SpaceVantage project, structured industry validation processes for the Strategic Space Skills Framework will also be implemented. These processes include the organisation of a digital sectoral validation workshop involving Space-sector stakeholders, who will provide insights, feedback, and recommendations to further refine the framework. The validation activities will focus on ensuring alignment with current industry requirements while anticipating future technological and workforce developments. In addition, continuous feedback mechanisms, including quarterly pulse surveys and an annual in-depth review process, will be established to support the ongoing evolution of the framework and ensure its continued relevance, adaptability, and sustainability beyond the project lifetime.

3. Conclusions

The Strategic Space Skills Framework presented in this deliverable provides a structured and evidence-based foundation for aligning education and training provision with the evolving skills requirements of the European Space ecosystem. By translating identified skills needs into defined learning outcomes, suitable educational modalities, delivery approaches, and assessment methodologies, the framework supports the development of high-quality, industry-relevant learning programmes. Its methodological approach that comprises five interconnected phases, can ensure that skills intelligence is systematically integrated into curriculum design while maintaining flexibility to accommodate future technological and market developments. In particular, six strategic skill clusters have been identified as critical

areas for addressing the evolving workforce needs of the European downstream space sector. The skill clusters have subsequently been translated into measurable learning outcomes for the three educational modalities, comprising theoretical knowledge, practical application, as well as entrepreneurship and innovation management for space applications. The developed framework is underpinned by a comprehensive set of quality assurance criteria, complemented by a structured validation process designed to ensure the consistency, relevance, robustness, and practical applicability of its outcomes. Beyond its immediate application within the SpaceVantage project, the framework establishes a common reference for education providers, VET training organisations and industry stakeholders, seeking to strengthen the European Space workforce capacity.