

From the Association of Nordic Engineers

Submission to the European Commission's Skills Portability Initiative

ANE and the importance of STEM for Europe's Competitiveness

The Association of Nordic Engineers (ANE) is a cooperation between the trade unions and represents more than 500,000 engineers, technologists, and STEM professionals across the Nordic region. Our member organisations are:

- The Swedish Association of Graduate Engineers (Sveriges Ingenjörer)
- The Danish Society of Engineers (IDA)
- The Norwegian Society of Engineers and Technologists (NITO)
- The Association of Chartered Engineers in Iceland (VFÍ)
- Engineers Finland representing the Finnish organisations: the Academic Engineers and Architects in Finland (TEK), the Technical Association in Finland (TFiF), the Union of Professional Engineers in Finland (ILRY) and the Engineers in Finland (DIFF)

As a cross-border organisation working at the intersection of labour markets, higher education, and industrial policy, ANE has long contributed evidence-based insights on the skills and capabilities needed for Europe's competitiveness and its green and digital transitions.

The upcoming **Skills Portability Initiative** provides a timely opportunity to strengthen the visibility, recognition, and mobility of technical competences across the Single Market. However, the current use of the broad "STEM" category masks essential differences between disciplines and obscures the specialised capabilities needed in strategic sectors such as semiconductors, AI, advanced manufacturing, green technologies, cybersecurity, and life sciences.

To support a skills system that is responsive, future-proof, and aligned with Europe's industrial priorities, ANE calls for a more differentiated and capability-oriented approach to STEM within the Skills Portability Initiative.

Association of Nordic Engineers

Tlf.: +45 29 74 39 60: www.nordicengineers.org: nordicengineers@ida.dk

Summary of ANE's Key Recommendations

ANE recommends that the European Commission:

- **Establish STEM as a dedicated pillar of the Skills Portability Initiative**, with a clearer EU-wide understanding of STEM sub-disciplines and strategic technical capabilities.
- **Accelerate interoperability and recognition of STEM micro-credentials**, including employer-provided and workplace-based learning.
- **Strengthen the role of higher education institutions in lifelong learning for STEM professionals**, including modular pathways and mid-career upskilling.
- **Improve the visibility and recognition of workplace learning**, ensuring that experience-based competence is fully portable across borders.
- **Develop timelier, sector-specific STEM skills intelligence**, aligned with industrial strategies.
- **Support continuous upskilling pathways**, enabling workers to update competencies throughout their careers as technologies evolve.
- **Establish an EU-level mechanism to track STEM mobility patterns**, supporting targeted attraction and retention strategies.
- **Promote closer cooperation with industry and social partners**, ensuring that portability tools reflect actual labour market needs and strengthen Europe's competitiveness.

Why STEM Needs Differentiation

The STEM label has become too broad to guide effective European policymaking. While it has been useful for drawing attention to science and engineering needs in general, it obscures the diverse and highly specialised technical capabilities required in Europe’s strategic sectors. The competencies needed for battery production, semiconductor fabrication, quantum engineering, AI deployment, advanced manufacturing, or cybersecurity are not interchangeable — yet most European skills recognition and mobility instruments still treat STEM as a single, uniform category.

What Europe lacks is not only “more STEM talent,” but the specific technical capabilities needed to ensure leadership in strategic value chains. However, Europe currently lacks a coherent, EU-wide overview of which specific STEM competencies are in shortage, how these needs differ across sectors and value chains, in relation to political and strategic priorities at both European and national levels, and how political steering can be aligned with more precise, comparable intelligence on skills demands. Without this clarity, education providers, employers, and policymakers struggle to coordinate investment, plan capacity, and align learning pathways with actual labour-market needs.

A more differentiated approach to STEM would directly support the objectives of the Skills Portability Initiative. Increasing transparency and comparability requires a clearer, shared understanding of which competencies matter in which sectors, and how they should be defined, assessed, and documented. Modernising recognition procedures likewise depends on capturing the hybrid and rapidly evolving skill profiles that characterise today’s technical professions. Finally, clearer competency definitions would support faster and more consistent recognition of specialised skills acquired outside the EU.

By treating STEM not as a single category but as an overarching framework composed of distinct and strategically important capability areas, the Skills Portability Initiative can better support Europe’s competitiveness, resilience, and technological leadership. This approach would make specialised skills more visible, verifiable, and portable across borders — ensuring that Europe can deploy its technical talent where it is most needed. ([Beyond STEM: A New North Star for European Competitiveness](#))

Technological Acceleration drives demand for ongoing skills renewal

In AI-intensive occupations, skill obsolescence is far more rapid, and the skills sought in the workforce change “66% faster in occupations most exposed to AI” ([The Fearless Future: 2025 Global AI Jobs Barometer](#)). The accelerating pace at which skills become outdated fundamentally challenges traditional education and lifelong learning models. Competencies that were once sufficient for an entire career now require regular renewal.

Although lifelong learning has long been emphasised at the European level, education systems in practice still prioritise early-life credentials over continuous, career-long development. At the same time, **no education system can realistically match labour-market needs with perfect precision.** Employers, therefore, play a critical role in providing upskilling and reskilling opportunities, especially in fast-moving technological fields where workplace learning evolves more quickly than formal curricula.

To make continuous and modular learning effective in helping professionals update their skills as technologies and value chains evolve, three elements are essential:

- **flexible credentialing**, enabling recognition of shorter learning modules
- **strong partnerships** between employers and education providers, ensuring relevant content
- **sustained financing across working life**, supporting regular competence renewal

These pathways must connect higher education, VET systems, and workplace-based learning, allowing mobility between academic and vocational routes and enabling professionals to combine formal study with experiential learning. Learning that occurs in firms builds tacit knowledge, practical problem-solving capability, and domain-specific insight—forms of competence that formal education alone cannot deliver. As highlighted in [Beyond STEM: A New North Star for European Competitiveness](#), such workplace-acquired capabilities should be **systematically recognised and valued** alongside traditional qualifications.

Strengthening Lifelong Learning Pathways in STEM: Examples of Effective Models

Cross-border higher education collaboration models

Europe's existing cross-border higher education alliances and networks, such as the [European Universities Alliances \(EUA\)](#) provide an existing infrastructure for cross-border cooperation, joint programmes, and interoperable learning pathways. Their work on common micro-credential formats, shared quality assurance approaches, and digitally supported mobility can serve as a foundation for aligning STEM-related learning across Member States. Through their integrated campuses and cross-institutional curriculum design, the alliances are well-positioned to support the development of modular, stackable learning opportunities and to strengthen the interoperability of credentials across borders.

RISE Research Institutes' Kompetenspasset (Competency Passport)

An example of how both informal and formal learning can be documented is Sweden's [Kompetenspasset \(Competency Passport\)](#), developed by RISE Research Institute in collaboration with the Swedish Agency for Higher Vocational Education and the Swedish Public Employment Service.

It includes the creation of a micro credentials model, documenting informal and formal learning, making competencies transparent, as well as portable. This especially benefits individuals whose education is shorter or whose formal credentials are incomplete, while ensuring "transparency in validation" that helps employers evaluate documented skills ([Beyond STEM: A New North Star for European Competitiveness](#)).

Singapore's SkillsFuture model

Additionally, Singapore's [SkillsFuture](#) also provides a useful reference point for Europe, focusing, among other things, on how different learning pathways such as academic, vocational and workplace credentials can be combined. It offers strong support for transitions into growth sectors, mid-career, offering workers over 40 increased subsidies for training that leads to roles in growth areas with proven labour-market demand.

Crucially, its career-conversion pathways combine classroom instruction with work placements and employer partnerships, recognising "that mid-career capability development requires different support than initial education, particularly integration into new workplace contexts" ([Beyond STEM: A New North Star for European Competitiveness](#)).

Towards More Timely and Strategic STEM Skills Intelligence

Europe's competitiveness, strategic autonomy, and ability to deliver the green and digital transitions all rely on a well-functioning ecosystem for STEM competence. Yet today, the EU struggles to build a clear and comparable overview of emerging STEM skill needs. Existing data sources often operate with broad categories, uneven national definitions, and limited connection to specific industrial value chains.

To support effective policy development, the Skills Portability Initiative should promote **timelier, sector-specific skills intelligence at an aggregated level**. What is needed is **regular, structured, high-quality intelligence** that identifies trends, highlights emerging capability needs, and aligns with Europe's strategic priorities.

ANE stresses the need for STEM to be included as a dedicated subsection within the Skills Portability Initiative, and for the different STEM disciplines to be treated as distinct areas within the overarching acronym.

A more differentiated understanding of STEM will allow policymakers, education providers, and employers to plan learning capacity, recognise qualifications, and design upskilling pathways based on **strategic direction**. Aggregated sectoral insights—anchored in labour-market evidence, industry input, and digital tools - can help clarify which technical competencies are scarce across value chains, support alignment between Member States, and strengthen Europe's ability to deploy STEM talent where it is most needed. ([Beyond STEM: A New North Star for European Competitiveness](#))

By focusing on **timely, sector-specific, and policy-relevant skills intelligence**, the Skills Portability Initiative can better support long-term planning, improve recognition systems, and reinforce the strategic management of STEM capabilities across the Single Market.

Understanding STEM Talent Mobility to Strengthen Attraction and Retention

STEM talent is highly mobile as it is. Individuals with strong scientific, technological, engineering, and mathematical competencies often possess qualifications and skill sets that are in global demand, giving them a high degree of flexibility to move across borders in search of better opportunities. While this mobility can be an advantage for countries and organisations aiming to attract top talent, it simultaneously creates a significant challenge when it comes to retaining that same talent over time. However, our understanding of STEM mobility patterns remains limited, both in terms of talent within Europe and of talent coming to Europe.

To build an effective ecosystem for STEM talent, it is not enough to simply identify and recognise emerging or previously overlooked skills, nor to make those skills portable across regions and sectors. It is equally important to examine which competencies are already recognised at a global level and how these influence international mobility trends.

Mapping these patterns would help Europe:

- identify what attracts or drives away STEM professionals
- target strategies to recruit and retain specialised talent
- strengthen Europe's position in global competition for STEM capabilities

ANE Recommendations for the Skills Portability Initiative:

1. Establish STEM as a dedicated pillar of the Skills Portability Initiative

STEM should be treated not as a single, uniform category but as an overarching framework composed of **distinct sub-disciplines and strategic technical capability areas**. A dedicated STEM pillar would enable clearer EU-wide definitions of specialised competences, improve comparability, and support more targeted recognition across value chains.

2. Accelerate interoperability and recognition of STEM micro-credentials

The Initiative should promote **interoperable, stackable micro-credentials** that are recognised across borders and systems. This includes micro-credentials issued by **higher education institutions, professional bodies, and employers**, ensuring that both formal and workplace-based learning are visible, verifiable, and portable.

3. Strengthen the role of higher education institutions in lifelong learning

Higher education institutions should play a central role in providing lifelong learning opportunities for STEM professionals. By expanding cross-institutional collaboration and ensuring interoperable approaches to curriculum design, micro-credentials, and quality assurance, universities can support **modular learning pathways, cross-border mobility, and mid-career upskilling**. This will help ensure that learning provision remains flexible, relevant, and aligned with rapidly evolving technological and sectoral needs.

4. Improve the visibility and recognition of workplace learning

Workplace-acquired competence, including non-formal and informal learning, should be **systematically documented and recognised**. Experience-based learning — which often provides tacit, applied knowledge — must become fully **portable across borders**, on equal footing with formal education.

5. Develop timelier, sector-specific STEM skills intelligence

The EU should build **regular, timely, sector-specific intelligence** aligned with industrial strategies. Aggregated insights can help identify emerging capability gaps and guide strategic planning across Member States.

6. Support continuous upskilling pathways throughout working life

The Initiative should embed lifelong learning into standard career trajectories by supporting **modular, flexible, and career-long learning pathways**. This enables professionals to update competencies as technologies evolve and supports mid-career transitions in fast-evolving STEM fields.

7. Establish an EU-level mechanism to track STEM mobility patterns

A coordinated mechanism is needed to monitor **intra-EU and international mobility** of STEM professionals at an aggregated level. Insights into mobility flows can support targeted policies for **attraction, retention, and recognition**, helping Europe compete for specialised talent globally.

8. Promote closer cooperation with industry and social partners

Effective portability tools must reflect **actual labour-market needs**. The Initiative should therefore deepen cooperation with industry, unions, and social partners to ensure that recognition frameworks, micro-credentials, and learning pathways support Europe's **competitiveness, green transition, and technological leadership**.