European Software
Skills Alliance.

# Decoding Europe's Software Skills Strategy: Expert-Driven Highlights

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The European Software Skills Alliance (ESSA) is a four-year transnational project funded under the EU's Erasmus+ programme. Its mission is to skill, upskill, and reskill individuals into in-demand software roles.

On 26 September 2023, ESSA held a Focus Group meeting with 12 European experts with longstanding experience in the software services and education sectors. The experts came from different countries including Estonia, France, Germany, Hungary, Ireland, Italy, Poland, Slovenia, and Spain. This diversity reflects the European added value of jointly working for the betterment of, emphasising skills development and the transition to a green and digital economy.

The meeting also connects to the overarching ESSA strategy, "A Software Skills Strategy for Europe." It responds to the skills gap among software professionals, providing a structured approach aligned with ESSA's findings and the five CEN European ICT Professional Role Profiles. This integrated strategy is relevant to diverse stakeholders, aligning the Focus Group discussions with the broader European context.

**THIS SOFTWARE SKILLS STRATEGY DEFINES AN APPROACH WITH CLEAR STEPS, MECHANISMS, AND TOOLS TO OVERCOME THIS SKILLS GAP IN EUROPE.**

*Please note that the results in this highlight report provide only a glimpse of the extensive work undertaken as part of the comprehensive review process and strategy update.*

## What the European experts told us

The workshop revolved around a set of questions to capture expert views and vision on the future of **roles, skills, and training** in the software services domain and the technology and business trends that may influence the sector. The moderator encouraged the experts to actively participate, giving them freedom and openness. The overall discussion was aligned with the European Year of Skills, focusing on skills development in light of the green and digital transitions.

## What will the demand for software roles be...

### ... in 1-2 years from now

The experts predicted that in **the short term**, there will be **no major differences from the roles that are currently present** like developers (backend, frontend, database), security experts, low code programmers, scrum masters, cloud experts; continuing with the

experts we typically find in the AI field: machine learning specialists, AI frontend programmers; experts who are more business oriented like product owners, business analysts, software supply chain managers. However, **a big emphasis was on Open-Source Software** and the roles connected with it.

Open Source plays a crucial role in easing access to the market for many companies. But Open Source-related positions can be challenging because they require specific skills that differ from those of application engineers or traditional developers. Hence **all software professionals should have some basic skills on how to run Open-Source projects** and how to contribute to Open-Source Software.

### *...in 3-5 years from now*

The roles that will be in-demand in **the medium term** are predicted to be those from the **AI sector** such as prompt engineers and Machine Learning specialists. But **more "traditional" software roles will still be sought after** such as DevOps engineers, Full stack developers, yet developing solutions in a trustworthy way, taking into account security and regulations. And roles at the intersection with Software and AI, i.e., AI-assisted software developments.

### *...in the longer term*

When the discission turned to **the longer term** demand the emphasis was on **quantum computer developers** and **quantum cryptography experts**. And on **AI teachers and architects.**

> *"We are sure that in 5 or 10 years the quantum computing will be present in information system of big companies for the cryptography, for cyber security and maybe for the big calculations."* - European expert group participant

No matter whether experts touched upon the short, medium, or longer term, the topic of **sustainability** was a common denominator — the roles spanned from those needed for the low carbon development, GreenOps, to climate cost optimisers. Here again, the **Open-source solutions** were presented as key to contributing to sustainability by enabling cost-effective and adaptable technology solutions.

The need for the software to be developed in a way to provide trust, be secure and apply the regulation will be important also in the long run.

The figure below compares the experts' views on the demand for software roles in short, medium and longer term.
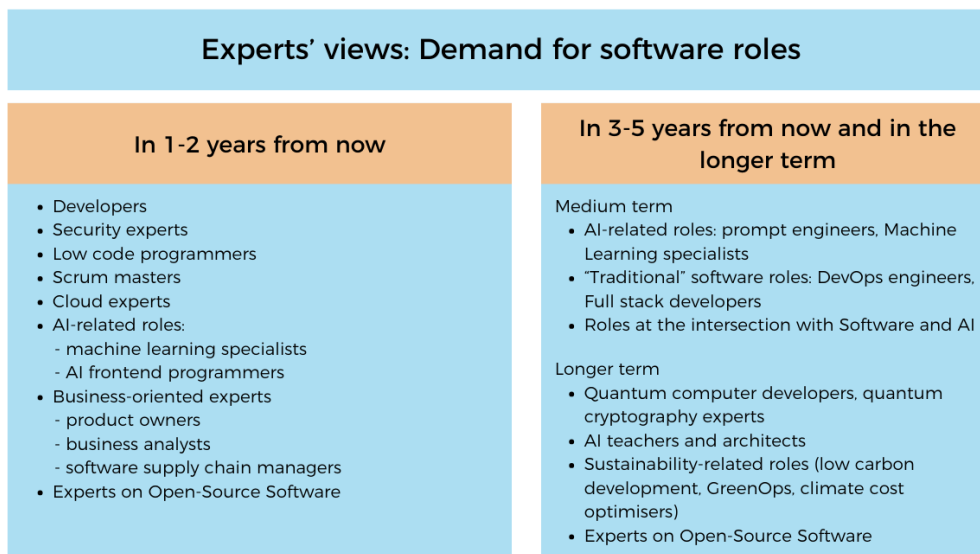
**Experts' views: Demand for software roles**

| In 1-2 years from now | In 3-5 years from now and in the longer term |
|---|---|
| • Developers<br>• Security experts<br>• Low code programmers<br>• Scrum masters<br>• Cloud experts<br>• AI-related roles:<br>  - machine learning specialists<br>  - AI frontend programmers<br>• Business-oriented experts<br>  - product owners<br>  - business analysts<br>  - software supply chain managers<br>• Experts on Open-Source Software | **Medium term**<br>• AI-related roles: prompt engineers, Machine Learning specialists<br>• "Traditional" software roles: DevOps engineers, Full stack developers<br>• Roles at the intersection with Software and AI<br><br>**Longer term**<br>• Quantum computer developers, quantum cryptography experts<br>• AI teachers and architects<br>• Sustainability-related roles (low carbon development, GreenOps, climate cost optimisers)<br>• Experts on Open-Source Software |

*Figure 1: Experts' views: Demand for software roles*

## What skills (technical, professional, soft) will be important for software professionals?

### *… in 1-2 years from now*

In the next 1-2 years, software professionals will require a multifaceted skill set to thrive in the evolving industry landscape. **Problem-solving, analytical, and strategic thinking skills** will continue to be essential. Psychology, **emotional intelligence, and effective communication** will foster better collaboration and user understanding, while **leadership and teamwork** abilities are crucial for cohesive development teams. **Adaptability, agility**, and the capability to excel in remote work environments will be in high demand.

Furthermore, professionals must engage in **multi/trans-disciplinary collaborations**, advocating for innovation and inclusivity. Mentoring skills for rapid knowledge sharing are crucial, and **expertise in regulations and understanding business needs** is indispensable. A **customer-centric** approach and a commitment to **trustworthy computing** are essential. **Continuous learning** is the norm, and proficiency in **green and sustainable development** aligns with environmental concerns. Additionally**, legal and ethical knowledge** is vital for ensuring **data privacy and security** within the ever-evolving legal landscape, as emphasized by a European expert group participant. A holistic skill set will be the hallmark of successful software professionals in the near future.

> *"Even if we say a developer is just a developer, it would be really useful to get some legal and ethics studies, that they are aware of the basic fundamentals of data privacy, security and the legal environment where we operate."* - European expert group participant

Understanding **evolving regulations**, such as the Cyber Resilience Act in Europe, is becoming increasingly important. This is a result of the growing **need for diverse skills beyond technical expertise** (e.g., the way software is developed and delivered) and the need to adapt to the changes to ensure trustworthy software service provision and to **master enhanced security requirements**.

### *…in 3-5 years from now and the longer term*

The change of the skills needed by software professionals is not perceived as radically different in the **medium and long term**.

| Medium-term skill requirements | Long-term skill requirements |
|---|---|
| <ul><li>Artificial intelligence: advanced AI, deep learning, AI ethics, trustworthy computing by design.</li><li>Domain-specific tech skills, business-IT, copyright, legal, ethics, customer orientation.</li><li>The emphasis in the soft skills was on versatility, innovation, creativity, curiosity, influence, leadership, ability to plan, building relations.</li></ul> | <ul><li>Artificial intelligence: AI coordinator, evaluation of AI outcomes, AI to AI relationship counsellor</li><li>Fast coding with high quality, trustworthy computing by design</li><li>A solution-oriented person to overcome huge environmental challenges.</li><li>Ability to work in teams, understanding business needs, emotional intelligence</li></ul> |

> *"[…] there will be a new branch of software developers, not classic front- and back-end, but someone who will be developing frontend and have some knowledge how to efficiently communicate with AI."*
> - European expert group participant

The figure below compares the experts' views on important skills for software professionals in short, medium and longer term.
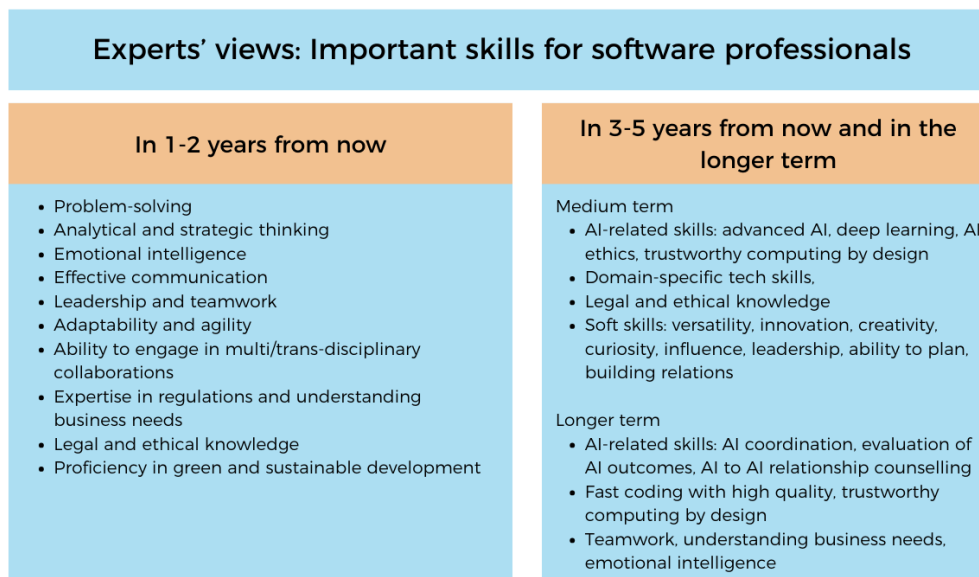
## Experts' views: Important skills for software professionals

| In 1-2 years from now | In 3-5 years from now and in the longer term |
|---|---|
| • Problem-solving<br>• Analytical and strategic thinking<br>• Emotional intelligence<br>• Effective communication<br>• Leadership and teamwork<br>• Adaptability and agility<br>• Ability to engage in multi/trans-disciplinary collaborations<br>• Expertise in regulations and understanding business needs<br>• Legal and ethical knowledge<br>• Proficiency in green and sustainable development | Medium term<br>• AI-related skills: advanced AI, deep learning, AI ethics, trustworthy computing by design<br>• Domain-specific tech skills,<br>• Legal and ethical knowledge<br>• Soft skills: versatility, innovation, creativity, curiosity, influence, leadership, ability to plan, building relations<br><br>Longer term<br>• AI-related skills: AI coordination, evaluation of AI outcomes, AI to AI relationship counselling<br>• Fast coding with high quality, trustworthy computing by design<br>• Teamwork, understanding business needs, emotional intelligence |

*Figure 2: Experts' views: Important skills for software professionals*

## What kind of education and training (approaches, methods, contents) is needed now and in the coming years, and what do you envision for the longer term?

### *… in 1-2 years from now*

The education practices **will not be much different from the ones that are commonly used now**, but the experts emphasised why these are important for the software community:

- **Self-guided learning** allows developers to take ownership of their learning and pursue topics of interest at their own pace.
- **On the job learning** with the emphasis to learn and gain experience while working on real-world projects.
- **Mentoring** as a way of transferring knowledge from experienced developers to junior ones. Mentors can guide newcomers and help them navigate the complexities of the profession.
- **Classroom type of training**.

Yet, given the changing nature of work and remote collaboration, **remote learning** options with **practical components** were considered also essential (e.g., solving specific technical problems, with hands-on experience).

A practice which needs to be taken into consideration from now on and should gain momentum and become widely practiced in the future is **the skills concierge**. A skills concierge or a guide could help developers navigate the vast landscape of skills and technologies. This person could provide guidance on what skills are most relevant to a developer's career goals.

The experts gave a bigger importance to **the communities of practice**. When communities of practice within the organizations are created this becomes an important way for developers to collaborate, share knowledge, and learn from each other. These communities foster continuous learning and skill development — one relevant example is the ESSA community.

This is why it is essential to consider another aspect of brainstorming. **Integrating external experts** who are not necessarily from academic backgrounds but have practical industry knowledge can provide fresh insights and real-world perspectives to educational programs. This **cross-domain knowledge** will enrich the education and training of developers, especially in areas like ethics, user experience, and soft skills.

With such broad knowledge it will be easy to work in the **multidisciplinary teams** which were also emphasized, as it is here where developers work alongside professionals from other fields and gain a broader perspective and understand how their work fits into the larger context.

> *"The soft skills that people have to learn is how to learn and how to learn with each other and from each other — how you learn in that collaborative environment."*- European expert group participant

### *…in 3-5 years from now and the longer term*

Once the experts touched on the topic of education **in the long term** the brainstorming focused on the contents of the trainings. These were heavily related to the abovementioned roles in the software sector – **robotics, quantum computing, AI low code development, quantum science and product development in quantum computing**. **Micro credentials** were also a topic which will play an important role in the future.

The figure below compares the experts' views on software education and training in short, medium and longer term.
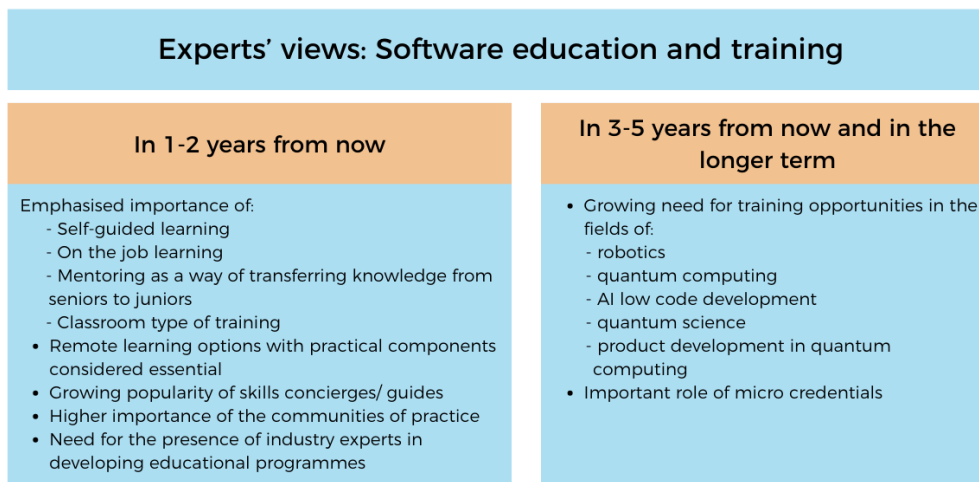
**Experts' views: Software education and training**

| In 1-2 years from now | In 3-5 years from now and in the longer term |
|---|---|
| Emphasised importance of:<br>  - Self-guided learning<br>  - On the job learning<br>  - Mentoring as a way of transferring knowledge from seniors to juniors<br>  - Classroom type of training<br>• Remote learning options with practical components considered essential<br>• Growing popularity of skills concierges/ guides<br>• Higher importance of the communities of practice<br>• Need for the presence of industry experts in developing educational programmes | • Growing need for training opportunities in the fields of:<br>  - robotics<br>  - quantum computing<br>  - AI low code development<br>  - quantum science<br>  - product development in quantum computing<br>• Important role of micro credentials |

*Figure 3: Experts' views: Software education and training*

# Why we met with European experts?

The European expert group is a permanent instrument enabling the double feedback loop for the revision of the European Software Skills Strategy. The whole revision of the strategy is a stepwise approach with coherent actions, tools, mechanisms, and actors to address the software skills shortages and mismatches in a structured and comprehensive way.

The workshop offers a platform for occupational/labour market specialists, formal and non-formal learning providers, companies, and organisations' experts in the field of software development and delivery to give input on the workplace skills and roles requirements, as well as workforce training needs. To get the best feedback on the topic of skill and training needs it is important that the expert group is a balanced mix of representatives from the abovementioned groups.

The results of the workshop will be integrated into the yearly iterative development of the **ESSA European Software Skills Strategy** to give an accurate picture of the current and emerging software skills and roles needs. Moreover, to effectively tackle digital skills shortages and elevate vocational education and training in Europe through the European Software Skills Alliance, a well-structured stepwise approach is crucial. The different steps of ESSA's stepwise approach are illustrated below:
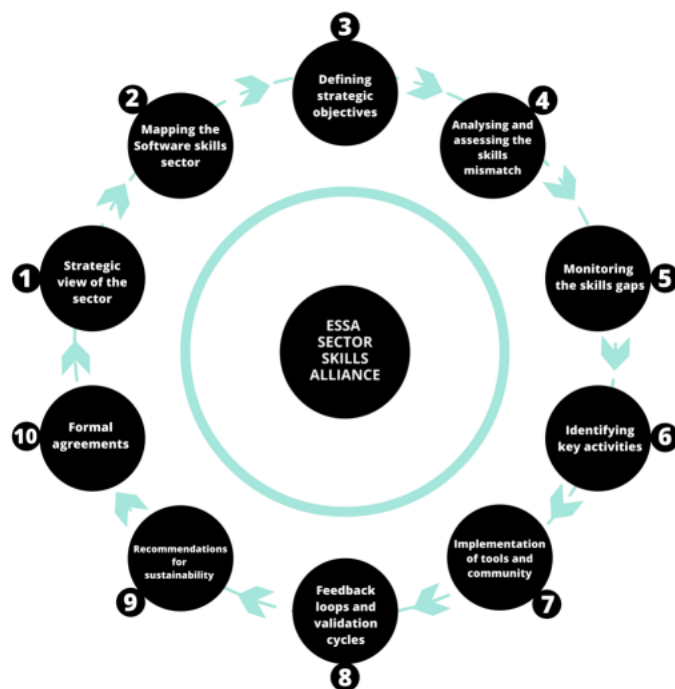
*Figure 4: The ESSA Strategy - 10 steps*

The ESSA strategy is not the only document ESSA partnership is producing throughout the project. If you want to be informed about the latest trends in software field or want to actively participate in the ESSA project choose one of the below possibilities:

- become a member of the ESSA community
- become an associated member of the ESSA project.

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