



# **Skills for SMEs**

## **Supporting specialised skills development: Big Data, Internet of Things and Cybersecurity for SMEs**

### Executive Summary

Written by Capgemini Invent, European DIGITAL SME Alliance, Technopolis Group  
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and SMEs



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## EXECUTIVE SUMMARY

### Rationale for an SME-centred skills development strategy

The digital revolution is not only about large tech companies but also essentially about start-ups and SMEs that provide or use digital solutions. **SMEs are vital to the European economy**, making up 99% of Europe's businesses<sup>1</sup> and accounting for two-thirds of total employment. The variety is huge, from innovative and fast-growing companies that provide or use digital solutions, to those that face significant challenges such as acquiring the necessary skills to benefit from digital technologies.

Whereas improving basic digital skills is already a challenge, the emergence of technologies such as big data, IoT and cybersecurity is creating significant new specialised skills gaps, shortages and mismatches, especially for SMEs, who cannot afford to compete with large enterprises to attract and retain the scarce digital talents. There are **serious skills shortages at every level in the hierarchy of SMEs**: from e-Leadership skills to ICT-professionals to users' digital skills. This is an issue, as European SMEs run the risk of missing out on the huge market potential. German association Bitkom estimates economic damage for German companies to be around 10-billion-euro of revenues as a result of shortage of IT specialists<sup>2</sup>. Strategies such as up- or re-skilling via offering training to employees in SMEs is far from common practice. Less than 10% of SMEs provide training to ICT specialists and less than one in five SMEs offers training to other employees. Currently, more than 90% of European SMEs consider themselves lagging behind in digital innovation.<sup>3</sup>

The Commission has identified IoT, big data and cybersecurity as areas where European SMEs would benefit from an increase in the skills level. Both IoT and big data hold enormous potential to maximise customer intelligence, optimise internal processes, renew business models and develop innovative services and solutions. In times where SMEs are increasingly targeted by cyber-attacks, cybersecurity is essential to ensure business continuity and protect the value chain that SMEs are part of.

### A strategy that enables technology adoption and skills development

**Ambitious skills policies and well-targeted supporting measures are thus needed** to facilitate the access of SMEs to Europe's digital talent pool. After thorough stakeholder consultation, **this initiative brought forward a strategy** for supporting SMEs with skills development to adopt new technologies such as cybersecurity, big data and internet of things (IoT).

Designing solutions to solve this skills gap at all levels requires an understanding of both why and how an organisation adopts technology as business opportunity, and the required human capital to deliver on that investment. A study for the European Commission<sup>4</sup> showed that digital transformation is enabled by strong IT competences and professionalism at the individual and team level, and digital organisational capabilities at enterprise level. It is about investing in building a capability at the organisational level, and consequently finding the right people to build competences necessary for that capability. Employees fulfil roles associated with those competences, using methods and tools to add specific value. The

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<sup>1</sup> European Commission (2018), Entrepreneurship and small and medium-sized enterprises (SMEs). Available at: [https://ec.europa.eu/growth/smes\\_nl](https://ec.europa.eu/growth/smes_nl)

<sup>2</sup> <https://nos.nl/nieuwsuur/artikel/2315072-duitsland-past-immigratiewet-aan-om-honderdduizenden-vacatures-te-kunnen-vullen.html>

<sup>3</sup> European Commission (2018), Capitalising on the benefits of the Fourth Industrial Revolution. Available at: <https://publications.europa.eu/en/publication-detail/-/publication/cf1793da-184c-11e8-ac73-01aa75ed71a1/language-en/format-PDF/source-66408543>

<sup>4</sup> Digital organisational frameworks and IT Professionalism, by Capgemini Invent with empirica and IDC, for EC/EASME. Published here: <https://op.europa.eu/en/publication-detail/-/publication/58563e8f-3e30-11e9-8d04-01aa75ed71a1/language-en>.

developed **digital capability reference framework** could help SMEs to better understand—when deciding to invest in certain capabilities—what they need in terms of competences development and provides an overview of the relevant frameworks (and related certification) for selection.

SMEs using technologies tend to perceive cybersecurity as 'some operational IT function' rather than as a core part of their digital strategy. Other SMEs find it difficult to grasp the potential that big data and IoT offer to their business. For these SMEs, awareness of business opportunities and the translation of this awareness into a clear business case could be a start to their digital transformation journey. This journey could subsequently lead them to accurately plan and implement digitalisation measures as well as facilitating a proper understanding of what concrete skills are needed to deliver on that promise. Digital SMEs might be more advanced and already have a clear understanding of which skills they require and how these skills contribute to the functioning of their business model. They still compete with large enterprises on a tight job market, which hinders growth. SMEs need a strategy on developing those digital skills in their organisation.

### **Joint leadership to strengthen Europe's digital sovereignty**

To keep Europe competitive on a global stage, and to create a strong and vital SME landscape, there is a clear need for leadership to guide European SMEs in their progressive acquisition of strategic digital skills. This endeavour will strengthen Europe's digital sovereignty and stimulate triple-helix collaboration to achieve better tailoring of education and training.

Such leadership should enable an increased adoption of cybersecurity, big data, and IoT by European SMEs via supporting measures that strengthen ecosystems and structurally enhance the supply of necessary skills and facilitate organisational development. We envision a "**European Skills for SMEs Partnership**" consisting of private and public stakeholders to provide the necessary strategic leadership. The aim of the **European Skills for SMEs Partnership** is to focus on measures, which can be put into **action at EU level**, while taking into account the wider digital strategy of the EU. This way, the partnership could go beyond the focus on IoT, Big Data and Cybersecurity skills that was present in this initiative.

### **An evidence-based roadmap to deliver the ambition**

The vision is operationalised in a roadmap<sup>5</sup> with supporting measures targeting both the European as well as national, regional and local levels. This plan builds on good practices identified across Europe (see an overview of these in chapter 5) and rests on **three evidence-based principles**:

- **Industry-led**: effective workforce development requires a good understanding of the needs of those it addresses: the small- and medium-sized enterprises. Via collaboration and participation, intelligence can be gathered on the actual needs of the companies to feed into and accelerate policy and education initiatives. A closer connection to enterprises and their owners will contribute to increased awareness since information and skills on new technologies can also travel along the supply chains and via B2B relationships.
- **Tailored and innovative education and training**: offerings need to be tailored to make them useful for SMEs. This requires innovation of current approaches:

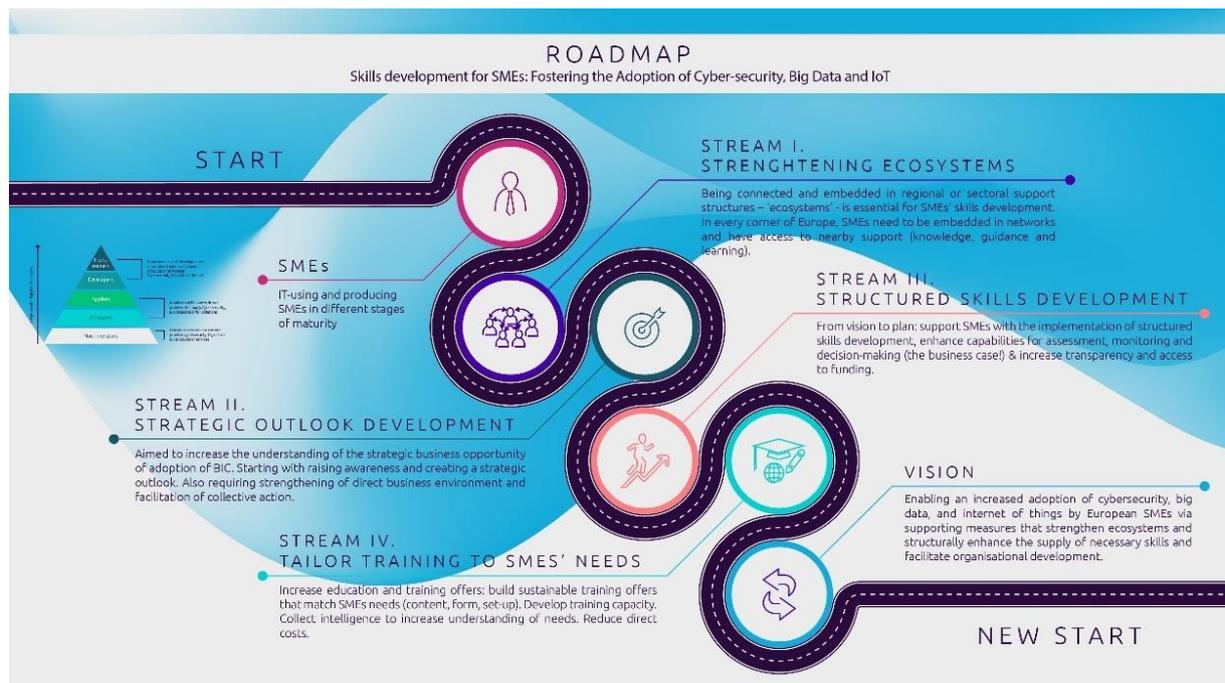
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<sup>5</sup> The project developed four streams to support the vision of enhancing SME skills in IoT, Big Data and Cybersecurity: (I) Strengthening ecosystems, (II) Strategic outlook development, (III) Structured skills development, (IV) Tailoring training to SMEs' needs. The measures are derived at different levels of governance and actors: SMEs/business owners, ecosystems (including education providers, chambers etc.) vs. regional & local governments as well as national and EU level. Skills4SMEs Partnerships extracts those measures and actions developed as part of the project, which can be applied on the European level.

modular, blended courses, targeted at SMEs in their specific sector and geography, delivered with flexible timing, with practical content to enable direct action of the SME. Since technology adoption is a strategic choice, training should be tuned towards the ICT professional in an SME as well as the leadership/management. Co-creation is another element of this principle.

- **Government (co-)funded and data-driven:** upskilling and reskilling of the workforce requires a strong commitment of the public sector to invest in new initiatives and to ensure the continuity of existing successful initiatives. Good practices have shown that SMEs need to contribute on the operational level (e.g. when taking courses, via cost-sharing models), but the overall strategy will require substantial public investment. A proper monitoring of how the money spent yields results, combined with research to monitor trends in industry needs, should allow to efficiently and effectively invest and feed into education and training offerings.

Figure 1 Visualisation of the roadmap's main streams of action



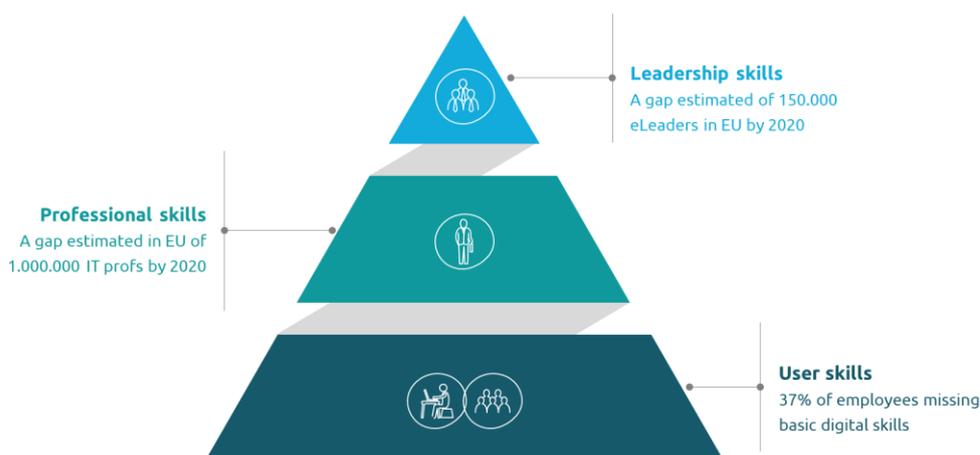
## The need to look beyond IoT, Big Data and Cybersecurity

SMEs encounter skills gaps at every layer of their organisation and are increasingly under pressure as they compete with large companies on a tense job market short of digital talent.

In line with the overall rationale to enhance 'digital sovereignty'<sup>6</sup>, i.e. to reach a certain level of autonomy in ICT related technologies which would allow the EU to independently pursue its own interests, there is a need to enhance the uptake of skills that allow SMEs to autonomously handle technology. Consequently, this would require the development of specialist skills in the identified areas (cybersecurity, IoT and big data) and beyond (e.g. AI, quantum computing, blockchain, critical chip technologies). To develop this capacity in a sustainable manner, it is necessary to strengthen monitoring and foresight (see Pillar II of the Partnership), and to build EU skills leadership in areas that are considered vital to the economy.

<sup>6</sup> Von der Leyen does not speak about 'digital sovereignty', but used the term "**mastery and ownership of key technologies in Europe**" in a speech at the European Parliament (27 November 2019),

Figure 2 Skills gaps related to roles in a SME<sup>7</sup>



It seems reasonable to build on areas where Europe already has a competitive advantage and which would, at the same time, advance the goal of greater “digital autonomy/sovereignty”, e.g. in Open Source software development or distributed ledger technologies/blockchain. Education and training schemes developed to that end need to be of high quality (meet conditions for a quality label, see Pillar I) and make sure that they do not only help SMEs gain skills in using certain ICT tools, but enhance their digital autonomy by increasing ICT specialist skills.<sup>8</sup> The aim is to not just train a wide range of SME employees, but to digitise the economy via a highly skilled workforce in SMEs.

### A European Skills for SMEs strategy to focus on growth

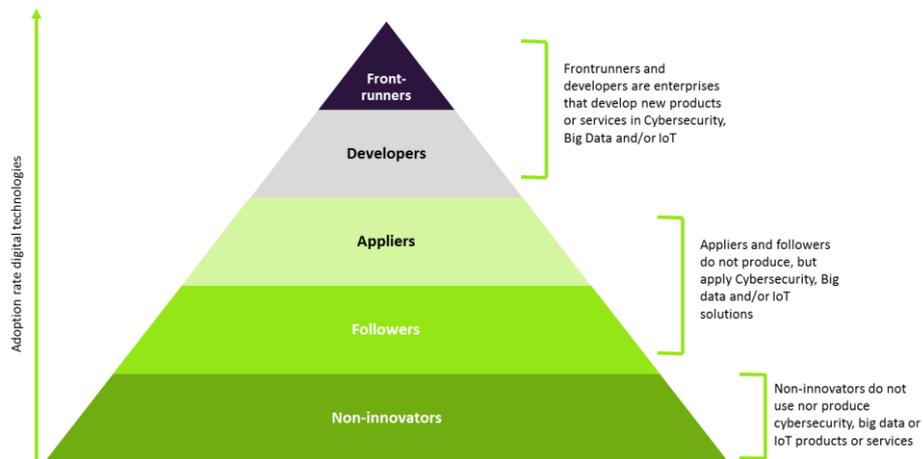
At the same time, policymakers need to be aware that measures need to be tailored to the different types of SMEs, which can be roughly categorised according to maturity and size. Maturity (as displayed in figure below): frontrunners and developers, appliers and followers, non-innovators (in terms of maturity). Regarding size it is important to distinct between micro SMEs (up to 10 employees), small enterprises (up to 50 employees), and medium-sized companies (50-250 employees)<sup>9</sup>. While it will be pivotal for nearly all businesses to digitise in the short to medium term (at least to a certain degree), an EU-driven strategy needs to focus on those aforementioned SMEs, where it will be most beneficial, effective, and have the greatest impact on driving competitiveness and growth. It should also contribute to the development of EU technological/digital sovereignty. Therefore, the European Skills for SMEs Partnership should focus on those SMEs in all sectors, not only the ICT sector, that have a propensity to grow, to digitise and internationalise their business to make use of the EU internal market. The main targets are thus “**followers & appliers**” and “**frontrunner & developer**” SMEs.

<sup>7</sup> The EU lacks around 1 million ICT specialists and this figure could grow to 2 million by 2030. Source: DG CONNECT, VICTORY (Vacancies for ICT- Online Repository: Data Collection)

<sup>8</sup> In general, digital skills encompass a range of basic to highly advanced skills that enable the use of digital technologies (digital knowledge) on the one hand, and basic cognitive, emotional or social skills necessary for the use of digital technologies on the other hand. In its background report on skills for a digital world, the Organisation for Economic Cooperation and Development (OECD) distinguishes four types of ICT-related skills necessary at the workplace. See: [http://www.europarl.europa.eu/RegData/etudes/IDAN/2017/595889/EPRS\\_IDA\(2017\)595889\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/IDAN/2017/595889/EPRS_IDA(2017)595889_EN.pdf)

<sup>9</sup> See: [https://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition\\_en](https://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en)

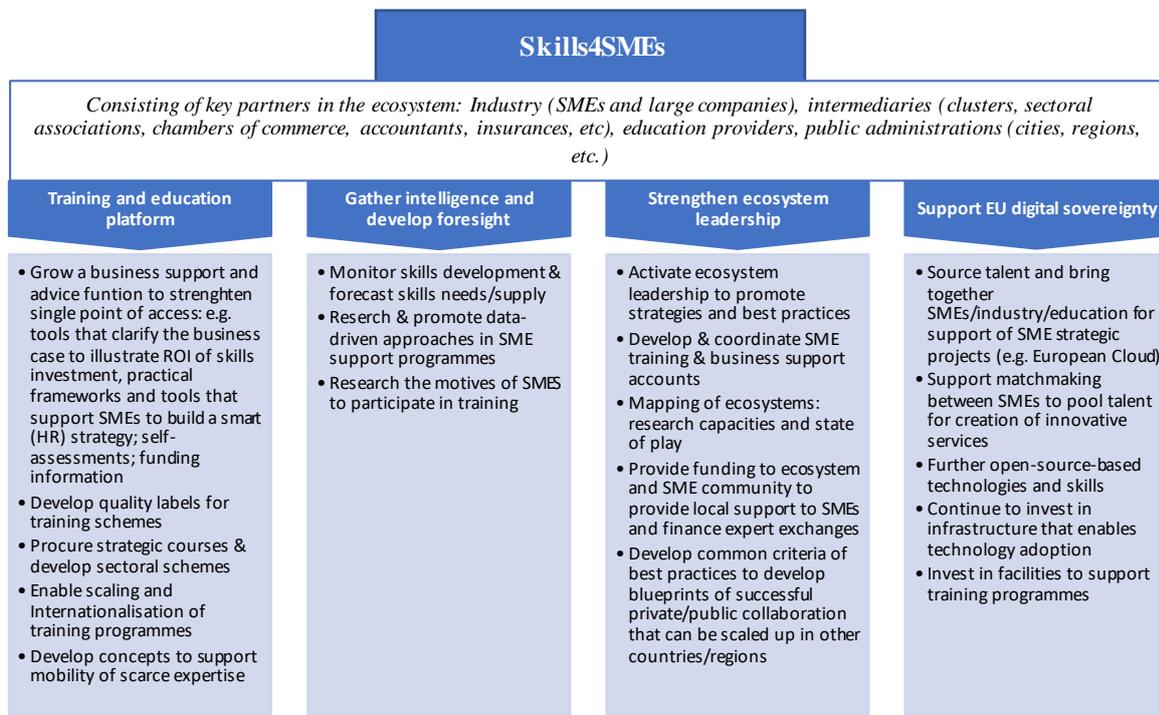
Figure 3 Segmentation of SMEs based on maturity in the uptake of big data, IoT and cybersecurity



### The European Skills for SMEs (Skills4SMEs) Partnership

This proposal sets out the different recommended actions of the Skills4SMEs Partnership by grouping them into four pillars. The actions build on the principles set out above, i.e. the Partnership needs to be industry-led, data-driven and provide a knowledge-sharing platform on how to develop tailored, innovative education and training to SMEs.

Figure 4 Skills4SMEs Partnership



We propose to develop a **European Skills4SMEs Partnership** that is dedicated to building a stronger alliance between the public and the private sector to offer leadership and a vision for skills development for SMEs in Europe. The Partnership should be accompanied with dedicated investments that enable a **long-term, strategic approach** and reduce uncertainties by allowing for long-term commitments.

The platform should drive and coordinate the following pivotal measures aimed at achieving the projected vision in the period up to 2030:

1. **Training & education platform.** This platform will be the **single access point to information** about SME skills development at EU level. It targets the intermediaries that are engaged to support SMEs directly. The platform will provide and promote

quality labels on selected training schemes and give SMEs and individuals throughout Europe access to those courses. The platform also needs to develop a proactive business support function where **intermediaries** can find tools, practical frameworks, assessments, funding schemes etc. that they can bring to their local SME communities—and which will also be promoted across Europe by a dissemination campaign. It will support the scaling and internationalisation of selected courses by providing translations and promoting them on a European level.

- Enable scaling up of successful training programmes, from basic translation to providing methods or blueprints for developing successful training programmes
  - Grow a business support and advice function on the platform: e.g. offer tools that clarify the business case to illustrate ROI of skills investment, publish (links to) practical frameworks and tools that support SMEs to build a smart (HR) strategy; offer self-assessments for SMEs in specific technology domains; provide information on funding for trainings. It should be accessible for and promoted/pushed towards intermediaries
  - Develop quality labels of European training schemes based on quality criteria and standards (e.g. e-CF) and mapping according to strategic skills priorities from Pillar II “Intelligence” to increase transparency and trust as well as overall quality
  - Develop concepts and practical examples to support the mobility of scarce expertise (within education & training systems and between industry and education & training systems)
  - Procure strategic courses and/or develop sectoral schemes that can benefit SMEs across Europe; ideally courses or schemes tailored to the needs of a specific sector (building on the Blueprint projects) or technology
2. **Intelligence & monitoring.** This task of the partnership aims to gather insights that establish a coherent, clear picture of the needs of SMEs and the supply of training and skills on the market. It should apply the methodology to forecast future developments around supply and demand of skills for SMEs. It should also take stock and research data-driven approaches at the national level to increase insights into demand/supply at aggregated level.
- Monitor SMEs’ skills development and develop foresight on skills needs and supply
  - Promote data-driven approaches in SME support programmes
  - Research the motives of SMEs to participate in training
3. **Ecosystem<sup>10</sup> leadership.** Measures consisting of strengthening and facilitating the ecosystem and aimed at involving all relevant stakeholders in the partnership. This would include developing a joint approach with triple helix actors (policy, education, and industry associations) but also with accountants and insurance providers. It would require building strong partnerships at the European and national level. Develop SME training & business support accounts in collaboration with national administrations and the ecosystem, considering the national contexts.

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<sup>10</sup> The ecosystem (consisting of clusters, associations or chambers and the supply chain and business environment of SMEs) needs to be aware of skills needs – they are the intermediaries that can raise awareness among SMEs or develop collective action to bridge a skills gap, e.g. by offering VET training in collaboration with SMEs or by establishing stronger partnerships with universities or research communities, or by designing training programmes according to SMEs’ needs. At the same time, they need to work towards developing the capacity for strategic outlook in SMEs. SMEs need to be aware of their skills needs and develop strategies to fulfil them. These insights and actual training schemes need to be developed at the local level – the EU level will only be responsible for sharing best practices and developing “blueprints” based on successful cases.

- Activate ecosystem leadership to promote strategies and best practices to raise awareness of SMEs for technology adoption, e.g. via their B2B environment and supply chains
  - Research the potential of SME training & business support schemes that would allow SMEs to invest in training
  - Mapping of ecosystems: research capacities and state of play, and connect to parallel initiatives at EU level to create synergies
  - Provide funding to ecosystem and SME community to provide local support to SMEs and finance expert exchanges
  - Develop common criteria of best practices to develop blueprints of successful private/public collaboration that can be scaled up in other countries/regions
4. **Support EU Digital Sovereignty.** Build on ICT industry frontrunners to strengthen SME skills and develop leadership in strategic areas by bringing together larger companies, SMEs, and research and education. Based on the strategic priorities at Pillar II ("Intelligence"), stimulate the collaboration of innovative SMEs with industry and academia to engage in consortia for innovation projects. Build on the strong open source community to further skills in developing an ecosystem of non-proprietary software and related skills.
- Source talent and bring together SMEs/industry/education to support strategic projects (e.g. European Cloud, blockchain, AI, open source software)
  - Support matchmaking between SMEs to pool talent for the creation of innovative services<sup>11</sup>
  - Promote open source-based technologies and skills
  - Continue to invest in infrastructure that enables technology adoption
  - Invest in facilities to support training programmes

### Required investments at national and EU level

The actions at EU level refer to initiating and intensifying collaboration, knowledge sharing, and providing tools at EU level that support the creation of a common European language and will require funding to initiate this development. The countries, and various stakeholders in those countries, can benefit from the actions deployed here. However, they will have to deploy their own national and/or regional skills strategies, and especially start to plan for investing in skills development schemes that are pivotal to support SMEs in their digital transformation. This requires a long-term and dedicated investment.

An essential element in advancing skills development in SMEs is the **scaling of existing good practices in learning programmes**. A recent study<sup>12</sup> for the European Commission analysed the funding models of education and training programmes targeting the workforce at national and EU level to understand how successful initiatives can be scaled up to increase impact. Practices that have proven their value and address a strong stakeholder demand need – deserve! – scaling to increase impact. The study comes forward with recommendations in five areas: vision & long-term strategy, scalable multi-stage funding intervention, massive investments & new ways of funding, means to guide future policy development, and high-tech skills hubs to connect key actors.

**Investments needed in skills strategies are indeed massive** but essential to advance. To give an order of magnitude of what is needed: according to Eurostat, only 32% of European SMEs had a formally defined ICT security policy in place. This means

<sup>11</sup> See [ICT Competence Center](#) initiative in Berlin

<sup>12</sup> High-tech skills for Europe – Scaling-up best practices and re-focusing funding programmes and incentives, for the EC/EASME, available via <http://skills4industry.eu>.

approximately 17 million SMEs did not and will have to acquire these skills by investing in training courses to develop that knowledge in-house or hire it externally. In similar fashion, statistics reveal that only 12% of SMEs were using some type of big data source, compared to 33% of large enterprises. Closing that gap would require to reach at least five million SMEs. From good practices, it becomes apparent that co-funding or cost-sharing models are most effective. Good practices across Europe reveal current levels of investments – at different government levels:

- **Skillnet Ireland** runs a budget of €35.9 million for 2020, with the total investment in upskilling by Skillnet Ireland likely to exceed €60 million when employers' contributions are added.<sup>13</sup> Skillnet Ireland works in partnership with 50 industry bodies and enterprise clusters, providing training and innovation support to over 16.000 businesses, and they upskill 56.000 workers throughout the country every year.
- The **German Federal Ministry for Economic Affairs and Energy**<sup>14</sup> (BMWi) launched a funding programme called 'Go-Digital' of €7.2 million (in 2 phases) which enables nearly 700 projects. The subsidy voucher system that activates skills development in SMEs via external consultants has been successful and revealed an appetite for further expansion of this scheme.
- The **JADS SME Data-lab**<sup>15</sup> is an excellent local example from Den Bosch (NL), which helps SMEs to create value with data. Over 100 SMEs entered the lab to come out with a proof-of-concept or tailor-made solution that helped them reduce costs or increase revenues. There is a standard fee of €2500 and half of the money goes to the data science students that JADS staffs on these projects.

However, more dedicated funding schemes for skills development in SMEs are needed across Europe to increase technology adoption and close current skills shortages in SMEs. Part of this could come from EU funding, but most of this amount will be an investment by national, regional and local entities aiming to boost competitiveness of SMEs and drive their economies forward.

**Further investments would be needed at EU level** to secure the development of the proposed Skills4SMEs platform and partnership, including the proposed measures to develop quality labels, concepts for scaling good practice of learning programmes and funding models, to monitor SMEs' skills development and develop foresight on skills needs and supply, to activate ecosystem leadership, and to support matchmaking between SMEs to pool talent for creation of innovative services.

The 'blueprint for sectoral cooperation on skills'<sup>16</sup> is one of the key initiatives of the skills agenda for Europe, investing €28 million of funding in 2018<sup>17</sup> and launching new sectors yearly. Recently, a new chapter was launched that addresses the cybersecurity, software and blockchain sector, among others.

Another initiative to start in 2020 is the European Digital Academy. The overall objective of the European Digital Academy is to contribute to the development, reskilling and upskilling of European citizens and SMEs on some of the key emerging technologies (AI, Blockchain, robotics, cybersecurity, IoT). It will be done by developing a new platform closely connected to the European Portal for Digital Skills and Jobs. The platform will map the online learning opportunities from different providers in an easy-to-access manner. In

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<sup>13</sup> <https://www.skillnetireland.ie/welcomes-increase-in-funding-budget-2020/>

<sup>14</sup> <https://www.bmwi.de/Redaktion/DE/Pressemitteilungen/2019/20190429-mit-einem-klick-zur-passenden-digitalisierungs-beratung-startschuss-go-digital.html>

<sup>15</sup> <https://jadsmbdatalab.nl/about-us/>

<sup>16</sup> <https://ec.europa.eu/social/main.jsp?catId=1415&langId=en>

<sup>17</sup> [https://eacea.ec.europa.eu/erasmus-plus/actions/key-action-2-cooperation-for-innovation-and-exchange-good-practices/sector-skills-alliances\\_en](https://eacea.ec.europa.eu/erasmus-plus/actions/key-action-2-cooperation-for-innovation-and-exchange-good-practices/sector-skills-alliances_en)

addition, modern and highly engaging online training modules will be developed based on the needs identified by the project.

**Further investments would be needed at the national level** (including regions and cities) to invest in skills development for all relevant digital areas (not only cybersecurity), to push for change in education and training systems to become more adaptive to new demands, and to mobilise expertise with relevant intermediaries in regions and cities to increase engagement of SMEs in digital transformation and corresponding skilling activities.

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