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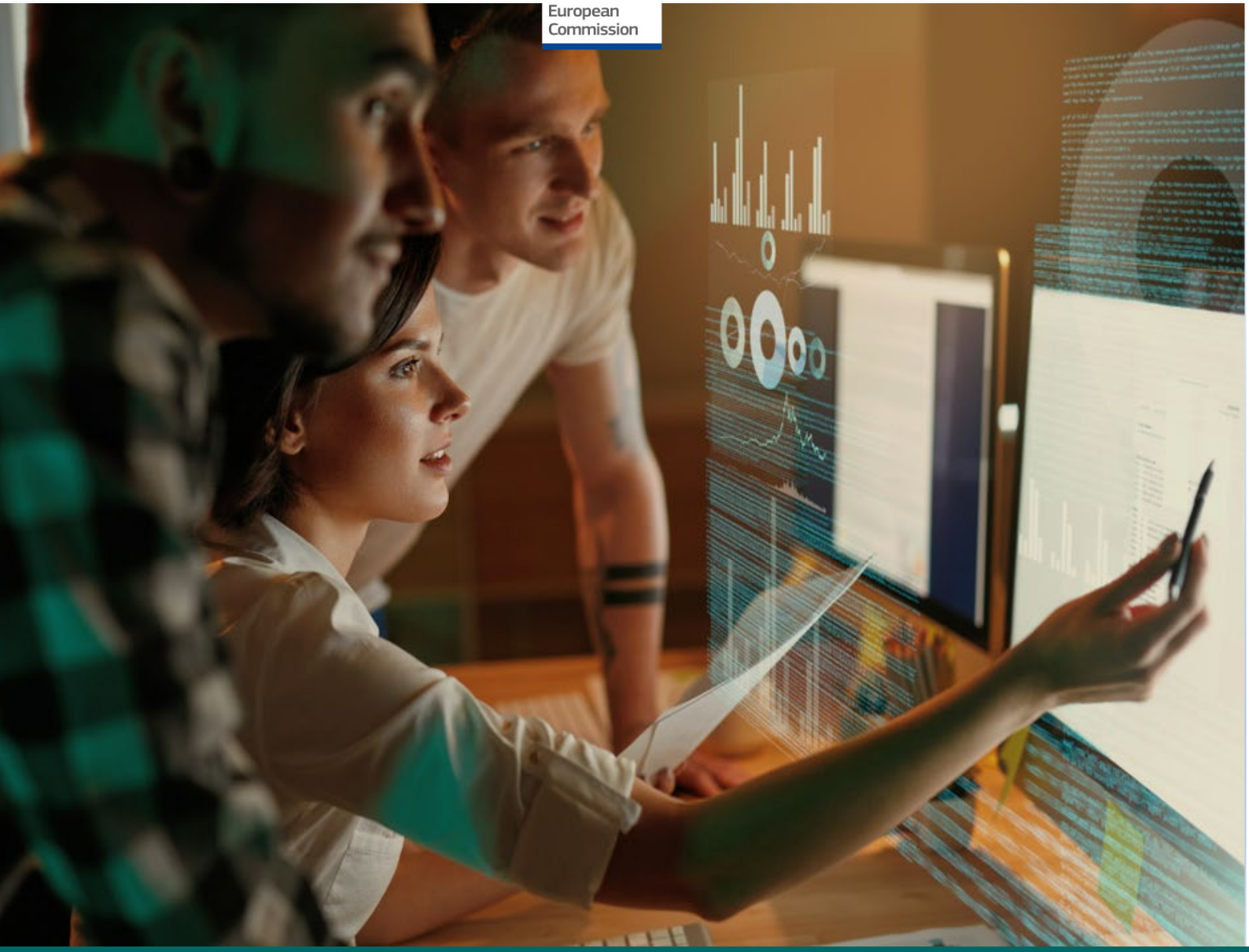

Skills for Industry

Scaling-up Best practices and re-Focusing Programmes and Incentives

October 2019

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Editors

Editors: Werner B. Korte, Tobias Hüsing, empirica GmbH

Introduction

The competitiveness of industry in Europe is dependent on the effective use of new technologies and the knowledge, skills, competences and creativity of its workforce. Shortages, gaps and mismatches in high-tech skills negatively affect innovation, productivity growth, job creation and social cohesion. Estimates of the number of jobs that will be lost to automation over the next decades have been alerting policy makers and the public. Although the numbers differ by author and scenario, there is a broad consensus that many of the tasks carried out by workers today are likely to be automated in the not too distant future.

As jobs change in their task content at an accelerating pace, and as new jobs emerge, policy makers must help industry and workers to keep pace with fast-changing skills requirements. This calls also for large-scale multi-stakeholder partnerships and re- and upskilling initiatives, as well as a clear view of the way lifelong learning should be funded, managed and incentivised to become a reality for all.

Empirica and PwC analysed the funding models of education and training programmes targeting the workforce at national and EU levels and the synergies between the different instruments with a view to identify best practices. Hopes are that these could be scaled up to become more successful and impactful and serve as an inspiration for improving funding programmes and incentives in the future. In the scope of this work, the definition of high-tech skills encompassed the skills needs related to digital and a group of six key enabling technologies including micro and nano-electronics, nanotechnology, industrial biotechnology, advanced materials, photonics, and advanced manufacturing technologies.

There are several shining examples of promising practice in pilot and model initiatives. Many of these are, however, often limited in their reach and the scalability of their operation. If the impending challenge of re- and upskilling of the European workforce is taken seriously, massive efforts will be needed in order to support the workforce. The findings and recommendations were discussed at a European conference[1] on 19-20 June 2019 in Brussels.

This brochure is the companion of several other publications under the Skills for Industry series: Increasing EU's high-tech skills talent pool; Skills for smart industrial specialisation and digital transformation; Online training promoting opportunities for the workforce; and Curriculum guidelines 4.0.

[1] See: http://skills4industry.eu

Re- and upskilling initiatives for the workforce

The digitisation of the economy and advanced technologies are fundamentally disrupting the way enterprises operate. This poses new demands for knowledge, skills and competences in the workforce. As the demand for high-tech skills rises, it reveals severe skills shortages, gaps and mismatches at professional, management and leadership level.

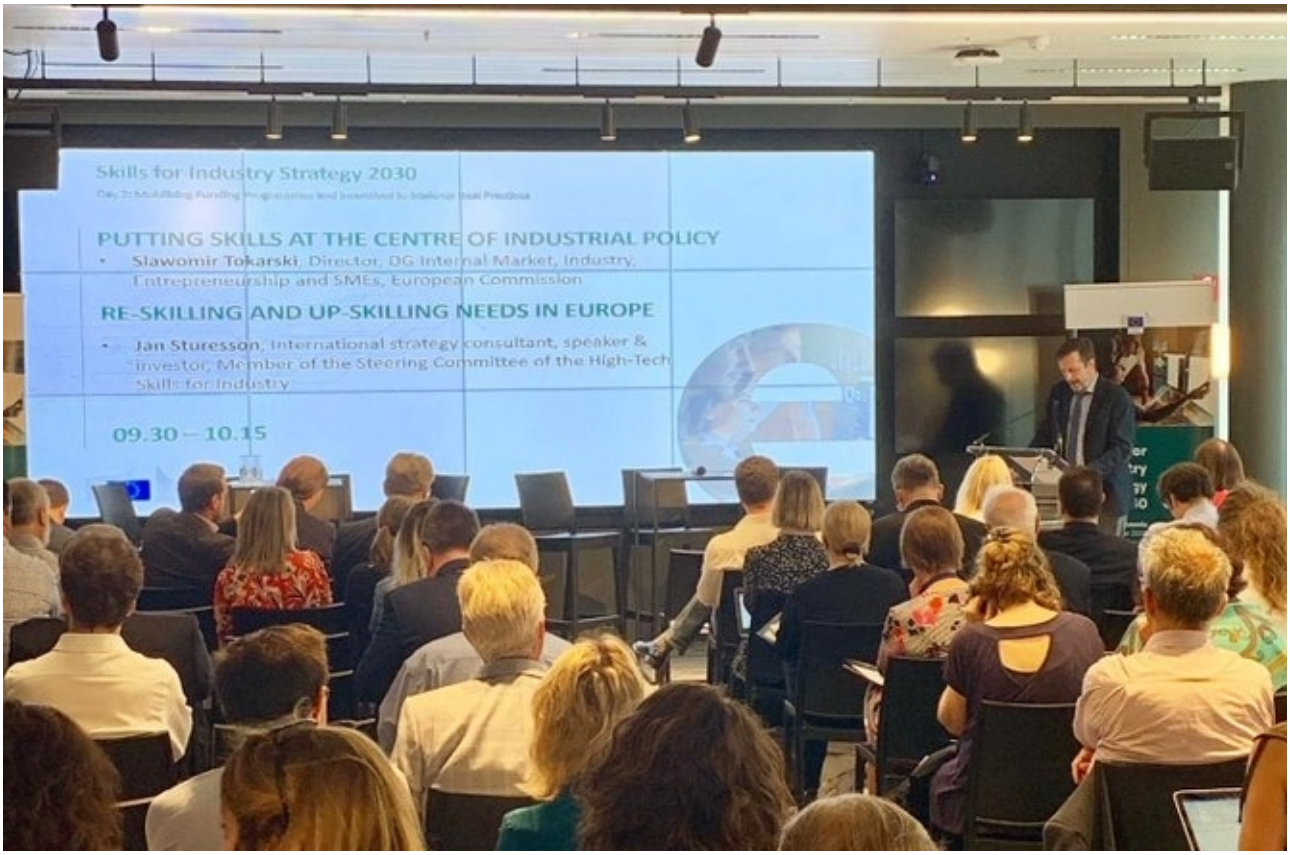
Funding to address new skills requirements

The European Union and Member States need to adapt their programmes and incentives to better anticipate and cope with change, to allow individuals and organisations to acquire and/or update new specialised skills, and to expand the talent pool and the high-tech skills and competences needed for the economy. Education and training systems in Europe need to respond to these new demands and develop appropriate and agile training offers and lifelong learning opportunities.

Challenges for policy design

In their report[2] on "Education on the Digital Era: Challenges, Opportunities and Lessons for EU Policy Design" (2018), the European Parliament Committee on Culture and Education supports the increased funding for digital skills across the next generation of Multiannual Financial Framework programmes. It insists on the need to deliver synergies across programmes to maximise the effectiveness of funding for the development of digital skills and to deliver lasting results.

The Committee also stresses the importance of setting up stronger cooperation between industry and training providers, as well as greater re- and upskilling programmes and activities.



"Putting skills at the centre of industrial policy" – Slawomir Tokarski giving the key note speech to the European Conference on Mobilising Funding Programmes and Incentives to Scale-up Best Practices in Brussels on 20th June 2019. Photo: Industry4Europe

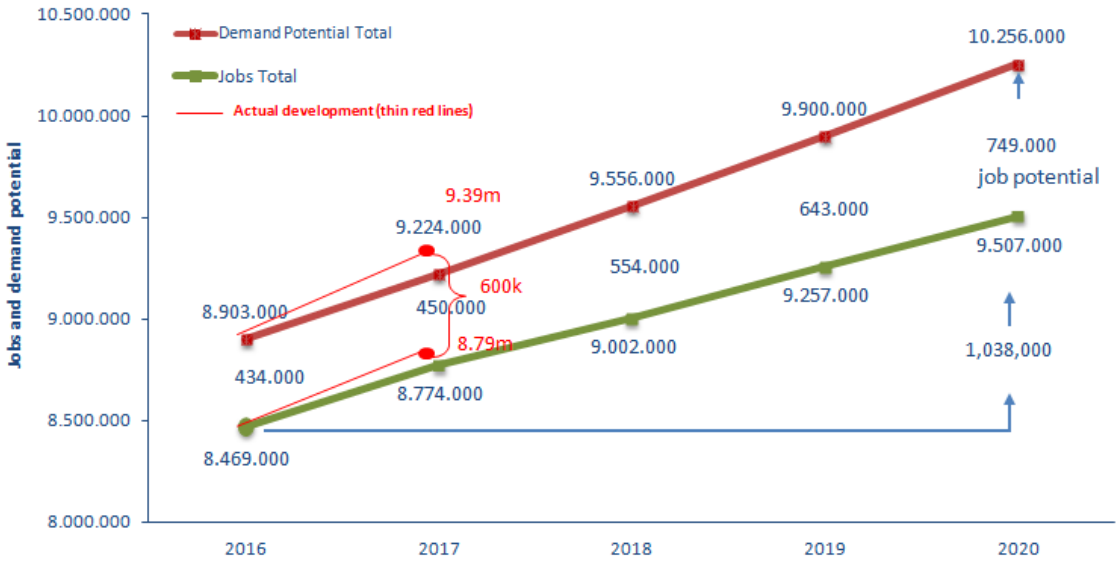
It calls for a shift towards more on-the-job learning and insists on the need to have the right education and training frameworks in place, along with properly resourced vocational education systems; it also believes that opportunities for re- and upskilling are essential, with relevant digital skills components mainstreamed in workplace training programmes.

2 European Parliament Committee on Culture and Education draft report on education on the digital era: challenges, opportunities and lessons for EU policy design (2018/2090(INI), 4th September 2018)

The growing skills gap calls for innovative action in skills development training, and in funding programmes for re- and up-skilling.

These requests are to be seen against the background of a demand for high-tech skills, which is on a solid growth track compared to an insufficient supply of information technology (IT) professionals in Europe. Based on the most likely growth scenario developed by empirica and IDC, it is estimated that the shortage of IT professionals will reach 749,000 in 2020.

Forecast Supply and Demand of IT professionals in Europe (2016-2020)



Source: *empirica and IDC, 2018*[3]

Digital transformation offers multiple opportunities for the improvement of existing business models and development of new ones. However, in contrast to larger corporations, SMEs do not often make a priority of related investments in human capital and new work processes, leaving the economic systems prone to growing imbalances. It is a crucial task for public authorities to support SMEs to allow them to reconsider current strategies and develop new mind-sets.

Dr. Sebastian-Tim Schmitz-Hertzberg,
Project Manager Go-Digital, EuroNorm GmbH

Employers, especially small and medium-sized enterprises (SMEs), have great difficulties to find employees with relevant high-tech skills. A survey[4] from empirica revealed that 92% of experts agree that there are difficulties for employers in their country to find employees with new relevant high-tech skills. In addition, a report[5] authored by the Institute for the Future and a panel of 20 experts from around the world indicates that 85% of the jobs that will exist in 2030 have not been invented yet. A McKinsey survey[6] also highlighted that business executives increasingly see investing in retraining and up-skilling of existing workers as an urgent business priority.

Addressing skills gaps is seen as the top or one of the top priorities in large enterprises both in the United States and in Europe. For almost 30% of enterprises this is among the top five priorities, and for a further 50% it is among the top ten priorities. Over 80% of corporate executives believe retraining and re-skilling must be at least half of the answer to addressing their skills gap.

3 European Commission (2019): High-Tech Skills: Increasing EU's talent pool and promoting the highest quality standards in support of digital transformation
4 empirica: High-Tech Skills for Europe -Scaling up Best Practices and Re-focusing Funding Programmes and Incentive, Online Survey Results, November 2017
5 Institute for the Future (2017): "The next era of human machine partnerships - Emerging Technologies' Impact on Society & Work in 2030"
6 Pablo Illanes, Susan Lund, Mona Mourshed, Scott Rutherford, and Magnus Tyreman, McKinsey Global Institute: Retraining and reskilling workers in the age of automation, January 2018

Fragmented and dispersed funding landscape

The analysis of 70 of the most promising high-tech re-/up-skilling initiatives out of 270 identified in ten leading Member States highlighted that the funding landscape is very fragmented, leading to inefficiencies and significant duplication of effort. Scalability and long-term viability is often lacking.

Lack of vision, leadership and commitment

Consultations with stakeholders through expert workshops, interviews and surveys revealed that there is an important need for a long-term vision and strategy (4.3 on a scale from 1 to 5), as well as strong leadership and commitment (4.2).

Scaling of proven success cases needed

Experts demand evidence-based initiatives, with strong industry engagement. Scaling is a crucial factor since the vast majority of funding is merely supporting initiatives to reach piloting or demonstration phases with no or little capability for larger-scale take-up and rollout plans.

Good practices examples exist on how to make Universities (e.g. Expertkompetens in Sweden) and vocational education and training (VET) providers (e.g. Katapult in the Netherlands) efficient re-/up-skilling players. They need to be scaled up, widely promoted and adopted.

> People are key to unlock the (full) potential of the digital transformations in companies. Therefore, European partners need to collaborate on high tech skill upgrading of people leveraging on and learning from existing high impact initiatives.
>
> ***Dirk Torfs***
> ***CEO, Flanders Make***

Need for new business and funding models

Major barriers include the lack of appropriate business and funding models to enable a greater number of universities and VET providers to become large-scale players in cooperation with industry. Many universities lack entrepreneurial spirit and seem reluctant to take on an additional role in professional further education and training.

Need to make life-long-learning a reality for all

The motivation for continuous education and training is not prevalent among the workforce. In 2018, adult participation in company-provided training was at a mere 11% on average in the EU.

The same holds true for businesses whose willingness to pay employees for re-/up-skilling remains at a low level. Moreover, only 23% of companies provide training to their staff.[7]

Several types of incentives – whether financial or tax-related – have already proven their success. However, they are not available in all EU Member States and not easily accessible, which makes them invisible to a significant number of European employees.

For example, individual learning accounts offer the opportunity to empower working-age adults to equip themselves with the skills needed to support their employability. They provide a new vehicle for funding continuous learning. This kind of solution has been implemented in 2016 in Singapore, where the SkillsFuture Credit aims to encourage individuals to take ownership of their skills development and lifelong learning.

7 Eurostat: https://ec.europa.eu/eurostat/statistics-explained/index.php/Adult_learning_statistics and http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=isoc_ske_ittn2&lang=en

Need to address underserved and untapped groups

SMEs constitute an 'underserved' training and education market in need of a low threshold skills transfer to improve operation and remain competitive. Scaling up good practice funding programmes based on vouchers could help to address this demand.

Innovative initiatives such as Code in Germany, Generation in Spain, École 42 and La Grande École du Numérique in France show how these groups can be addressed. Examples like these need viable financing business models and scaling up plans to become significant training pathways.

The digital world is a tremendous career enhancer and companies must open up to the ever-growing diversity of profiles to ensure performance and prosperity. Many efforts have yet to be made in Europe, and the Grande École du Numérique is entirely committed to them.

Samia Ghozlane
Director, Grande École du Numérique

The digital skills gap and resulting unemployment represent too great an issue for any organization or body to tackle alone. Our shared success will depend upon forging public, private, and civil partnerships; collecting, analysing, and sharing relevant data; and shaping policies and directing funds that support the attainment and retention of technology careers for those currently left behind.

Alexandra Hay-Plumb
Global Director of Partnerships, Generation

There is little knowledge about available funding to the untapped groups for the creation of digital talent, including women and youngsters struggling with today's education and training systems.

Good practices and funding initiatives at a glance

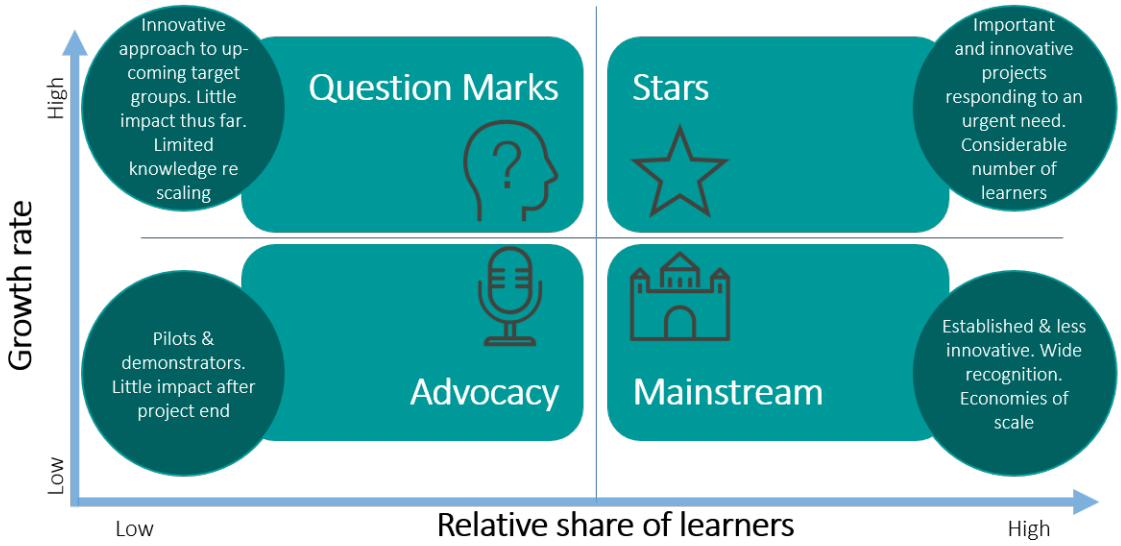
Positioning good practice initiatives in a matrix makes it possible to distinguish four basic types according to their impact in the labour market and along two axes related to their (x) "relative share of learners" and (y) "growth rate".

In analogy to a sound management of investment, one can derive recommendations for decision taking for scaling regarding the performance and growth potential of projects and initiatives in each of the four quadrants. Recommendations derived from this approach are the following:

- To fund an initial portfolio of a large number of (small-scale) **advocacy** initiatives (based on calls for proposals) to pilot and demonstrate new approaches and test if they might generate promising results when scaling them up. Conceptually being a risk sharing approach where results cannot be predicted but success of some is the result of testing many, one should expect a portion of these to become "question marks" and a smaller portion eventually success stories;
- To sustain **question marks** initiatives for some time for experimentation with the hope for at least some of them - supported through relevant investments - would evolve into the "star" quadrant. Spotting the future stars among question marks involves some risk and requires solid judgment and clear evidence;
- To nurture leading **star** initiatives to keep their edge. They are to be developed to transitioning to larger scale mainstream offerings to address the re- and upskilling needs of the workforce. This may require further selection and ongoing investment.
- To further support **mainstream** offerings to be integrated in the broader education and training systems to meet the goals of re- and upskilling a large proportion of the workforce before being complemented (and eventually replaced) by better and more efficient offerings coming from "stars" and "question marks" quadrants.

In the analysis, it became apparent that a large number of funding programmes are supporting initiatives to be classified as **advocacy**. Several of these serve the purpose of advocating the topic of re- and upskilling for specific target groups. They are initiatives with small or moderate levels of funding. Training is carried out for a limited number of individuals, and scaling is not the main objective since their focus is on research, awareness raising and promotion.

Matrix for classifying re- and upskilling initiatives



Source: *empirica, 2019*

'Disruptive' initiatives such as École 42, which are following completely new education and training approaches, are for the time being to be found in this category.

It is still too early to judge their success and potential impact since their current funding is based on investment by a donor.

Our education system was designed for the previous industrial revolution. The digital era needs a deep change of paradigm to develop the expected labour skills. At École 42, we choose an innovative and inclusive pedagogical model to bring agile minds to the digital market.

Olivier Crouzet
Director of Pedagogy, École 42

However, it could have the potential to be developed into a scheme to serve groups of people some distance away from education and training, e.g. socially under privileged, school dropouts, and in this way close a gap.

The knowledge-intensive industry needs employees who are updated with new relevant research results to prevail at the forefront. This can be obtained by producing advanced academic courses co-created with industry. A sustainable way of producing such courses is letting the courses be a new channel of a knowledge exchange and development system between academy and industry.

Olle Vogel, Programme Manager, Knowledge Foundation

The initiatives in the **question marks** quadrant have come up with good results but show no or very limited scaling ambition or impact. Again, funding and investments per case are moderate. It is in this category where some change is needed.

These could best be implemented through so-called "complementary or growth funding programmes". This has been confirmed by numerous experts.

Advocacy good examples: École 42 and IT for She

École 42 (France) Peer-to-peer IT training: innovate pedagogy and alternative entry point to IT	
Innovation	Innovative pedagogical model and peer-to-peer learning approach; students solve given tasks / challenges themselves without teachers and instructors
Funding	Donor funding: 70 million € for 10 years (2013-2023) – Paris campus
Target groups	Young people regardless of school or social background including many who failed in the formal education system
Costs / learner	2000 € / year
Impact	Approx. 3000 graduates who all got a job in the IT labour market; currently 2300 enrolments
Lessons learned	Disruptive, innovative peer-to-peer learning approach seems to be attractive for the target groups and for initial training and re-skilling unemployed people.
Scale-up level and ambition	Continuation and expansion of operation in France. École 42 franchise model for scaling-up currently applied in several European and African countries. Ambition is to train 12,000 new individuals over the next five years across all campuses.
Sustainability	Donor investment guaranteed for 10 years. Indication of successful use of franchise model in further countries.

IT for She (Poland) Increasing the participation of women in the technology industry	
Innovation	Approach with a strong 'volunteering' part with three different action lines: (1) 'Women in Tech Camp' where the 130 best IT female students in Poland take part in a hackathon, workshops and mentoring. (2) 'Kids in IT', 50 volunteer female students from IT departments teach 1,000 kids in rural areas basic coding, how to use 3D printers, Arduino programming and robot building. (3) 'Mentoring Programme' with real work experiences for female IT students, run by representatives from technology companies in Poland.
Funding	Initial funding: 100,000 € through donor: Perspektywy Education Foundation; activities are strongly based on volunteers
Target groups	Women and children
Costs / learner	Very low
Impact	Successful organisation of first steps towards ICT jobs in industry for women. Familiarisation of children with IT.
Lessons learned	Initiatives of this type can be successful only with the strong involvement of volunteers in campaigns and volunteer mentors from IT industry. The annual 'Women in Tech' summit and career fair have become the most popular activities with a positive impact on further activities.
Scale-up level and ambition	Limited. Slow increase of the number of mentors, women learners and children addressed from 2016 to 2019. Strong focus on 'Women in Tech' summit. Increase the number of the currently almost 10 partners from industry.
Sustainability	Dependency on donor funding and support from partnering companies from industry.

Only very few **stars** could be identified. These are of very different types. For example, Katapult in the Netherlands was set up as a cooperation initiative of formerly disconnected actors under a shared goal and innovation ambition pushed by a small team of experts.

The additional costs for this team are small, but through this cooperation Katapult managed to leverage large sums coming from all the actors involved and scale up its operation nationwide, with around 150 training centres throughout the Netherlands in less than ten years.

Learner voucher schemes - which exist in Germany, France and elsewhere - appear worthwhile and a functioning instrument addressed to individuals and paid for by governments. The investment level per individual is low but the impact can be large. In order to further spread the use of this instrument among a larger number of beneficiaries, further awareness raising and promotion efforts are needed. It should help persuade employees that further training is necessary.

We need to stop talking about how difficult it is to co-operate, and show more entrepreneurial spirit. In education, government and in companies, there is a need to look beyond current business models and start working together to realize impact. The most important lesson is that top-down actions in combination with bottom-up actions are generally the most effective.

Pieter Moerman
Domain Leader Vocational Education, PBT network

Question marks good examples: Expertkompetens, Go digital, Demola and Generation

Expertkompetens (Sweden) Professional Master training programme: industry demand, professional learners	
Innovation	Co-design and delivery together with industry
Funding	Foundation and industry: investment for course development and implementation: 1.8 – 2.4 million €/course Costs for course delivery are shared between government and industry (costs: see below)
Target groups	Professionals in IT and other areas of importance for the business sector
Costs / learner	20,000 € / 2 year professional Master programme
Impact	Successful career advancement for >2.000 professionals from around 330 companies; programme has become part of the company's learning systems; Industrial PhD projects
Lessons learned	Still some industry reluctance to pay for training/up-skilling. Programme operation without funding does not fit standard university funding model. Need for specific business model for university up-skilling training and government / EC incentives for professional lifelong learning
Scale-up level and ambition	Annual application rounds stepwise increasing the number of graduates. Increasing number of universities offering up-skilling courses. Ambition is to train about 10,000 individuals over the next five years. Online training and MOOCs are under development to further increase the number of professional students.
Sustainability	Knowledge Foundation continuing funding for development and implementation. Government and industry cost sharing for course delivery. Universities including the up-skilling into regular programme / course portfolio

Go digital (Germany) Low threshold skills transfer into SMEs	
Innovation	Skills transfer on digital transformation etc. into SMEs
Funding	Phase 1 (2015-2016): 2,275,324 € Phase 2 (2017 - ongoing): 5,000,000 € 50% funding by Federal government 'go digital' programme; 50% own SME investment; funding is received by consultants, who advise SMEs and help with the implementation; consultants do all the administrative work for SMEs
Target groups	Small SME (< 100 employees); funding is received by consultants who advise SMEs and are thus able to offer their services at reduced rates
Costs / learner	Average: 10,000 €
Impact	Since 04/2018 (actual opening of programme) 847 applications granted which is beyond expectations and likely to require additional funding to be made available by the ministry.
Lessons learned	Attractive for SMEs. Online programme with low level of bureaucracy and application effort.
Scale-up level and ambition	Go digital started in 07/2017 only and is at present scheduled to end in 2021; increasing number of applications per month; further decisions after evaluation (2019/2020)
Sustainability	Federal Ministry of Economics continuing funding to meet current and future demand

DEMOLA (Finland et al.) University and industry innovation ecosystem: real world challenges for students, example of scaling well	
Innovation	Innovation ecosystem combining the talent of students with company R&D with student teams solving a real world company problem
Funding	Initially started as an ERDF project but is today sustainably funded through universities and industry financing.
Target groups	Universities (and their IT students), companies and their research departments
Costs / learner	20,000 – 30,000 € per university / ecosystem set up
Impact	Alliance and engagement of 50 universities, more than 1,000 business partners, 750,000+ students, creation of new jobs and companies.
Lessons learned	Demola is creating a new culture of cooperation between universities and industry/business cooperation. Several corporate partners have developed internal innovation processes based on their learning experiences in the Demola cooperation.
Scale-up level and ambition	Successfully 'exported' and in operation in many countries (2019: 16 countries); growing scale of ambition to train, involve universities and business partners globally over the next five years.
Sustainability	Fully sustainable in its present model

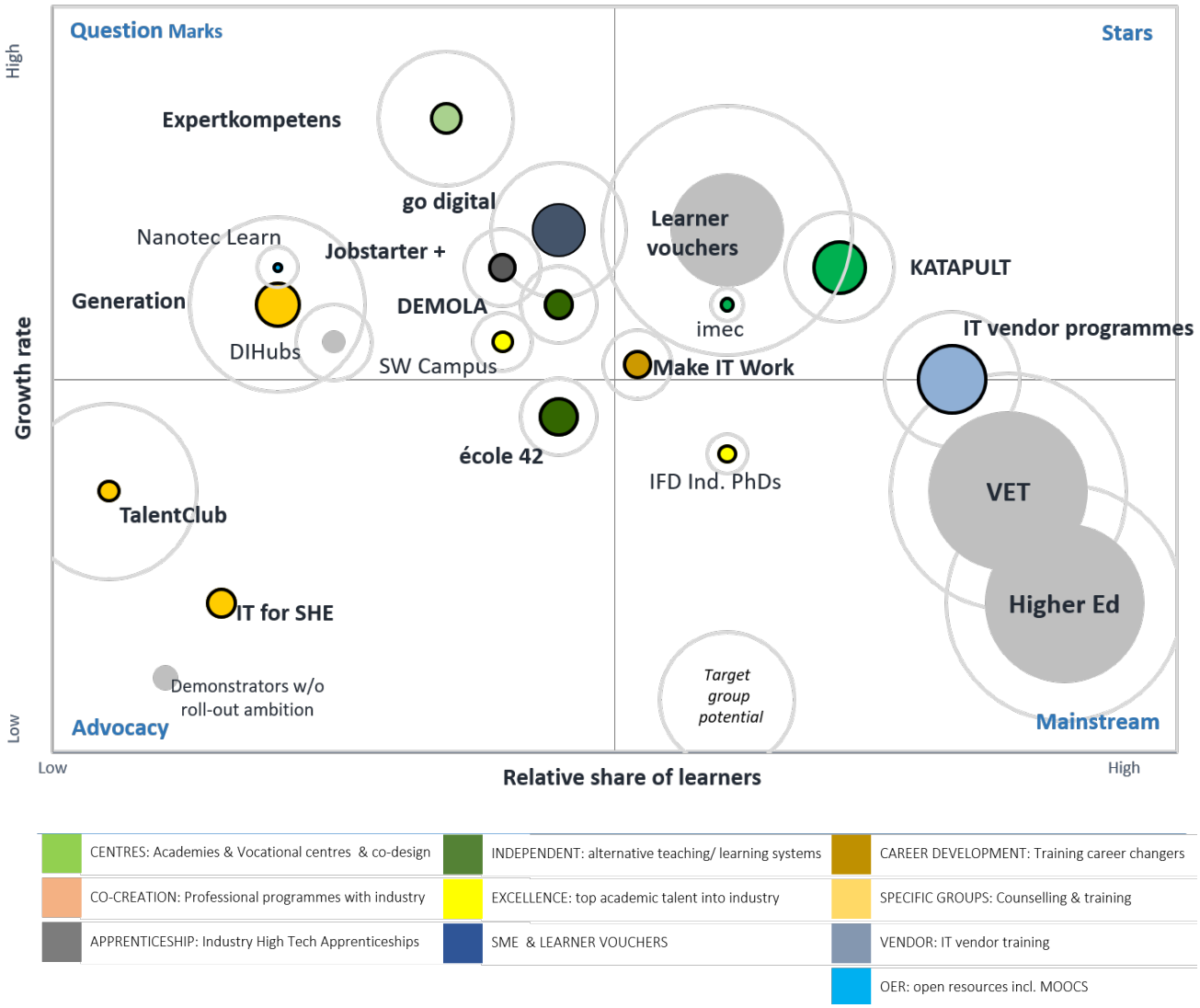
Generation (Spain) Inclusive ICT training programme addressed to unemployed young people	
Innovation	Curricula based on skills mapping process with industry. Technical skills, behavioural skills, and mind-sets. Tracking ROI.
Funding	ESF and national government funding supplemented by funding from McKinsey and Company (remaining 8%). UK, FR, IT: Private launch funding with employer contributions from first cohorts
Target groups	Unemployed young people and employers
Costs / learner	From 2,400 € for 6 week boot camp to 3,200 € for 12 week
Impact	1,800 graduates; 80% placed in employment; 83% placed remain employed 1 year out; 830 partner employers. 84% of Generation employers say graduates "outperform their peers" in similar roles.
Lessons learned	1. Training is only the start 2. Proving business ROI is necessary, but not sufficient, to convince employers to change 3. Measure value, not just cost
Scale-up level and ambition	In 2019, Generation aims to graduate ~3,000 young people. By 2021, target is to increase annual number by 2-3X. Generation is live in 9 cities across Europe, 5 of which are in Spain. Experimenting with expansion into re-skilling programs for workers at risk of displacement.
Sustainability	Moving towards self-sustaining model entirely funded by employers and government.

Stars good examples: Katapult and Make IT Work

Katapult (Netherlands) Driving the knowledge of tomorrow: Drive VET across industries	
Innovation	Government, education and training institutions and private corporations investing in conversion of the workforce through Centres of Expertise
Funding	Government investment: > 200 million € plus > 200 million € from businesses and regional governments
Target groups	Apprentices and students in VET and Higher Education
Costs / learner	8,000 € / 9 – 12 months training
Impact	150 partnerships (so-called Centres of Expertise) between education and business with 50,000 students, 4,500 companies and 4,000 teachers participating; constantly growing.
Lessons learned	A policy environment that allows for innovation, experimentation and collaboration, not merely on paper, but also in real world scenarios. Smart use of regional approaches to jointly develop innovation in education and support the labour market Measures to embed innovations in education.
Scale-up level and ambition	The network is constantly growing since it was established several years ago. Ambition is to establish an even tighter network of Centres of Expertise and Centres of vocational individuals throughout the Netherlands and train 250,000 individuals over the next five years. Katapult – the community of Centres - is a dynamic network that intends to explore & launch new methods to include relevant stakeholders in the Centres, in order increase the outreach of the program, and to ensure sustainable impact. By 2025 Katapult aims to: - Include 90% of all Dutch Vocational Educational Institutes and Universities of Applied Sciences in the network (already achieved) - Achieve a 25% student involvement - Expand business involvement to 20,000 companies - Enhance teacher involvement to adapt and create new curricula
Sustainability	- Secured funding for the future through existing funding partners, depending on whether the PPP proved to be a success (PPPs achieve a success rate between 66-75%).
Innovation	Government, education and training institutions and private corporations investing in conversion of the workforce through Centres of Expertise

Make IT Work (Netherlands) Career changer programme: change careers to IT	
Innovation	Co-design and cost sharing with industry
Funding	Initial government funding for 2 years; Today: funding through industry and trainees
Target groups	Employees of different background and occupations facing redundancy or wanting a career in IT
Costs / learner	7,000 € (6.000 € from employer, 1.000 € from student) for 5 months course, 6 months' work experience. After the retraining, monthly networking and knowledge sharing meet-up with all graduates.
Impact	91% completion rate; 97% continue to work in IT; 105 companies participate, 400 graduates (1/3 women); the 20th course will start on 2nd of September 2019.
Lessons learned	Initial funding helped in quick starting the initiative, which is now self-financed
Scale-up level and ambition	Straightforward and successful scaling up with offerings in several Dutch universities. At this moment (May 2019) 4 Dutch Universities of Applied Sciences offer the program in 8 locations throughout the Netherlands Ambition is to train 5,000 individuals over the next five years in the Netherlands. The model is easy to replicate at any university with some entrepreneurial ambitions.
Sustainability	Sustainable business model with funding from industry and trainees
Innovation	Co-design and cost sharing with industry

Indicative distribution of good practice examples in the matrix



***Source**: empirica 2019*

The formal education and training systems in the EU28 Member States and IT vendor programmes can be described as mainstream, operating in a well-established environment with moderate competitive pressure and benefiting from economies of scale. Several large IT vendor programmes (e.g. Cisco Networking Academies) are part of or adjacent to this quadrant. Interestingly, many of the programmes and initiatives from earlier life cycle stages can be seen and used as modules for injection into the formal education and training systems to bring innovation and make them fit for purpose in an increasingly rapidly evolving environment.

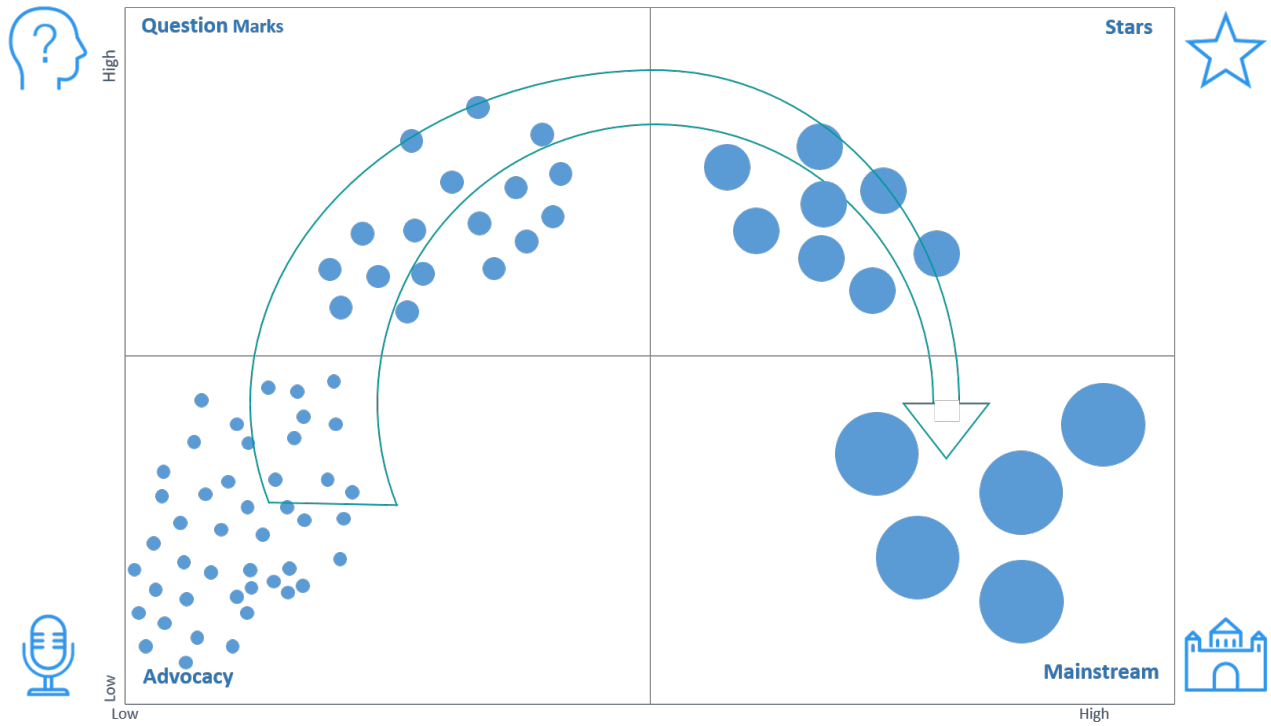
Funding life cycle and stages

Funding and investment should be able to support initiatives through the different stages of growth, which are those of a life cycle model.

The matrix analysis exercise is helping to:

- Reveal the most promising and successful initiatives;
- Highlight the funding needs at different stages to scaling up good practices;
- Recommend how to push them forward and support good practices throughout their life cycle depicted in the following figure (see figure 'funding life cycle').

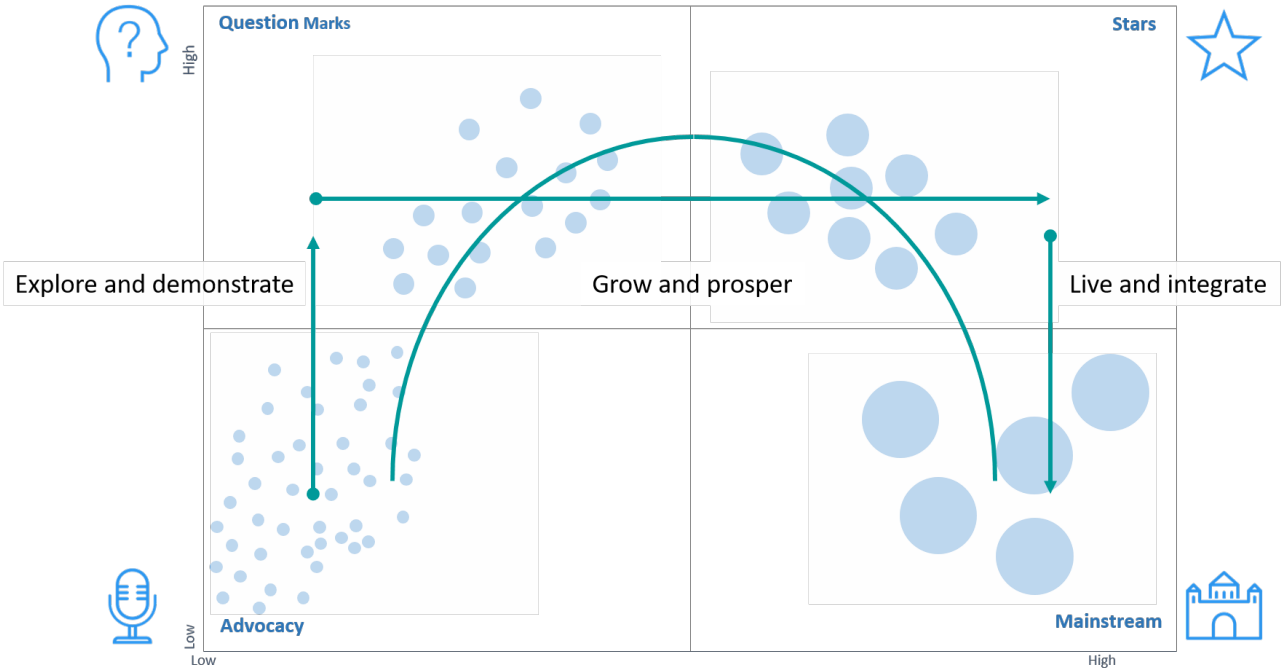
The stages of growth: funding life cycle for scaling-up initiatives



***Source**: empirica / PwC 2019*

As mentioned before, there are numerous funding programmes at EU, national, regional and local levels. With current funding programmes, many (promising) initiatives do not reach beyond the two initial **advocacy** and **question marks** stages. Funding intervention at multiple stages with greater complementarity and coordination mechanisms at all levels would be necessary to make successful and promising initiatives move into **stars** and **mainstream** stages with a view to scaling them up and achieving big impacts. These mechanisms are not in place in the current funding programme landscape, resulting in many promising projects entering a **valley of death** similar to that of many start-ups missing scaling-up funds.

Funding programme initiatives life cycle stages



***Source**: empirica / PwC 2019*

In order to stay upfront, European education and training systems depend on the capability for regular and continuous innovation. These typically need to be nurtured and integrated into the **mainstream** with a view to supporting large-scale re- and up-skilling initiatives and progressively making lifelong learning a reality for all.

Good practices by funding programme life cycle

Different types of funding programmes and incentives for high-tech skills re- and up-skilling were identified. They offer a wide range of funding approaches as well as public and private instruments.

> European companies increasingly need highly skilled people, such as those with advanced digital, science, technology, engineering, mathematics and research skills. To apply these skills in a way that enhances companies' competitiveness through research, development and innovation, workers also need transversal skills encompassing systemic, critical and entrepreneurial thinking, creativity and curiosity.
>
> ***Maxime Cerutti***
> ***Director Social Affairs Department, BUSINESSEUROPE***

These include in particular:

- Centre-based VET (vocational education and training) co-design and delivery together with industry. It includes government, education and training institutions as well as private corporations investing in training of the workforce through centres of expertise in VET;
- Programmes offered by universities and co-created with industry in a new role of professional training providers (professional Master programmes);
- Programmes funding the development and delivery of new high-tech skills apprenticeship modules added to traditional apprenticeships to generate VET graduates with high demand in the market;
- Excellence schemes addressing new demand for digital leadership skills, career change and development programmes offering attractive re- and upskilling courses jointly financed by companies and learners after initial funding;
- Voucher-type funding programmes aimed at low threshold high-tech skills for SMEs;
- Disruptive peer-to-peer high-tech skills training following new and innovative pedagogical models and offering an alternative entry point to new jobs;
- Inclusive digital training schemes addressed to unemployed young people;
- Activities aimed at the innovation ecosystem creation combining the talent of students with company R&D and with student teams solving a real-world company problem.

It became apparent that from the EU countries studied, the Netherlands, Sweden, Germany, Denmark and France are most active, followed by Finland, Belgium and Spain.

Dynamic multi-stage funding intervention

A new dynamic, multi-stage funding intervention model could help to overcome the **valley of death**. The various funding programmes existing at EU, national and regional levels would need to be more complementary in their intervention (in line with the subsidiarity principle) and contribute to scale-up of successful initiatives and rollout of wider uptake and adoption of best practices.

This idea was presented in the Skills Agenda for Europe (June 2016) in the Blueprint for Sectoral Co-operation on Skills, which is piloted in several sectors since 2018 through sectoral skills alliances at EU-level. Each partnership develops a skills strategy for the sector and matches the demand and supply of skills.

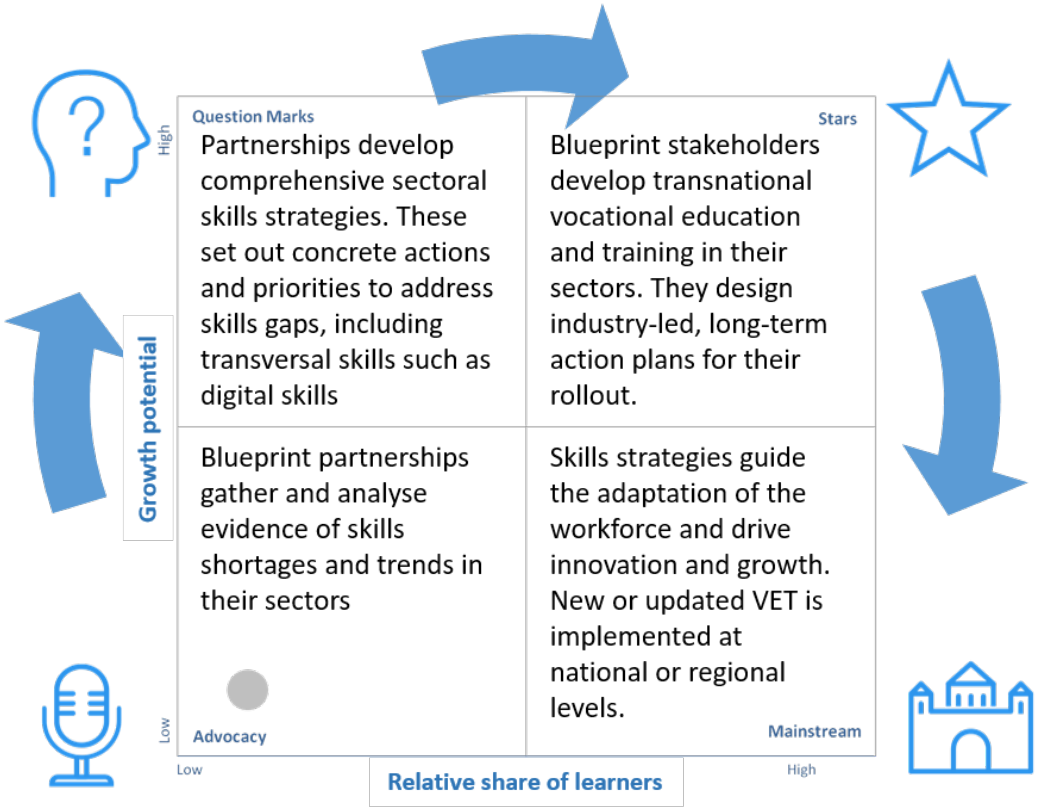
> While society and industry adapted to technical progress, education did not, and stuck to traditional teaching in terms of topics and methods. In Tech & Industry, we know that robots are not stealing our jobs, bad education is. In our sector a broad and diverse range of initiatives exist to attract and (re)train workers, but it requires each partner to do its fair share.
>
> ***Diego Andreis***
> ***President of Ceemet – European Tech & Industry Employers***

Partners identify priorities and milestones for action and develop solutions, such as creating and updating curricula and qualifications based on updated and new occupational profiles.

Building on the results achieved at EU level, the Blueprint will be **progressively rolled out at national and regional level**, in cooperation with national and regional authorities, and key stakeholders, and with relevant exploiting synergies with regional smart specialisation strategies.

By further improving and refining this approach one could leverage the testing and validating of a large number of small-scale projects before enabling the allocation of more substantial and complementary funding, ensuring critical mass to initiatives with proven results to scale them up.

Positioning the concept of the Blueprint for Sectoral Cooperation on Skills in the matrix



New ideas for initiatives are usually found in interactions between demand (clients) and supply (providers) facilitated by a supporting infrastructure. Acknowledging this, one must ensure sufficient resources for the cooperation of networks of all relevant stakeholders, associations and forums in the high-tech skills field. Overall funding would be modest and would foster long-term engagement.

During the **explore and demonstrate** phase funding should be addressed to many small experiments to find out what already works, what requires more work and what should be discontinued. The aim should be to generate and identify good ideas with as little effort as possible: start small, fail or grow fast. Funding should be provided to prove potential for scale, by obtaining results based on concrete key performance indicators (KPIs).

Experts believe strongly that funding should be available for scalable longer-term public-private-partnerships with scaling potential to create substantial impact.

A competitive model with large-scale funding for fewer promising initiatives is preferred to the *watering can* model. Those who deliver successful scalable results should be further supported while those failing the test should be terminated as soon as possible. Increased funding for successful scalable initiatives is seen as a way to overcome the valley of death and to create greater impact.

There is clearly a need for demand-driven and industry-led initiatives including elements of co-creation and delivery.

During the **grow-and-prosper** phase, the main goal should be to foster growth among a set of a selected number of good practices with proven records of strong potential for scale. Funding for each initiative needs to be more substantial to reach critical mass. In this phase, direct funding could also be result-based (payment on delivery). In addition, indirect funding through user incentives (student vouchers/ loans, tax levy, etc.) could also facilitate and accelerate adoption

Human capital is the most important asset any nation can possess. Our workers are intrinsic to everything we do to grow our economy, at both Member State and EU level. New horizons for workforce development are about facilitating new productive collaborations between industry, Higher Education and Government as we look to equip the European workforce with 21st Century Skills.

Brendan McGinty
Chairman, Skillnet Ireland and Managing Partner, Stratis Consulting

While in the initial exploration phase, modest funding is allocated to a large number of selected proposals, few good practices with proven results and scaling ambitions deserve to receive substantial funding in the next phase.

Initiatives in the final phase already have reached a critical mass to become mainstream and/or to become integrated into well-established institutions contributing to bring a new wave of disruptive/transformative innovation. They are key to bringing reform and innovation based on market demand to existing education and training systems (unless institutional sclerosis becomes prohibitive of their mission).

Incentives for innovation may be set such as for traditional education providers to compete for indirect funding through client incentives (i.e. a demand-side subsidy), such as student vouchers / loans, tax levy, etc. Education and training institutions need to remain attractive to students and employers through continuous improvement and genuine demand-side responsiveness.

Building a joint approach to tackle the disconnection between education and workforce is critical today. The sector of machine tools and related manufacturing technologies is a clear example of this need. Skills are in short supply, as producers shift from supplying machinery only to providing integrated, data-driven production solutions. Governments, industry and educators across Europe will need to work together to make sure the right skills are there to support emerging business models in our sector.

Filip Geerts
Director General, CECIMO

Disruption of the mainstream segment will be most likely to originate from highly innovative third parties (e.g. new players coming from the digital world).

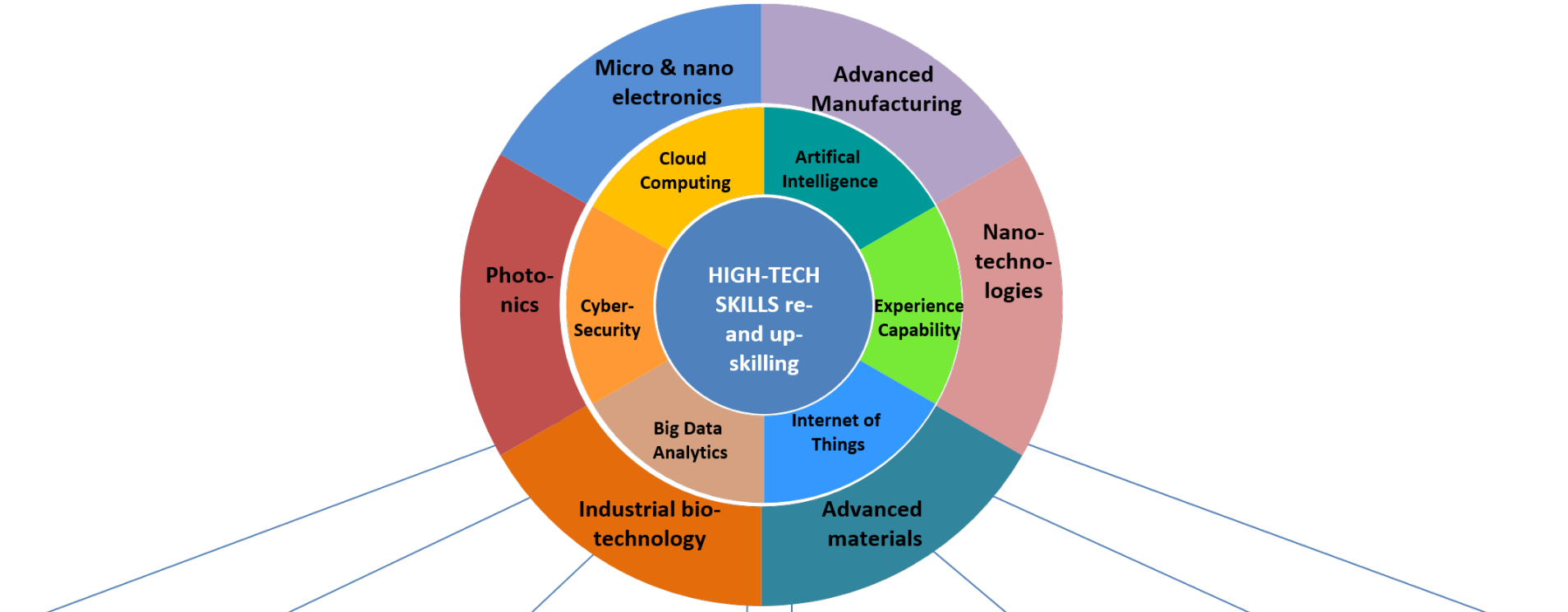
Education and training institutions are likely to stay important actors in the new lifelong learning ecosystem in the future, if they manage to adapt in a timely manner to the changing requirements facing them from the need for re/up-skilling large portions of the workforce. Currently one out of ten working adults is involved in training each year. They will remain important for research, academic and scientific knowledge and experience sharing. Policy makers need to ensure that their major role in building Europe's workforce knowledge, skills and competences becomes even more relevant and effective while not hindering the development and success of new initiatives to bring greater innovation and flexibility (especially for online and on the job training).

Recommendations to scale up best practices and re-focusing programmes and incentives

To mobilise efficiently funding programmes and incentives to scale-up best practices, a set of policy recommendations have been developed. Five modules will serve to guide policy makers and stakeholder groups at all level to design and implement their own strategies, programmes and initiatives in line at EU level with proposals of the European Commission in the new multiannual financial framework[8] (2021-2027).

[8] Several proposals for EU funds and programmes over that period could support actions on skills: Asylum and Migration Fund; Digital Europe; European Agricultural Fund for Rural Development; European Globalisation Adjustment Fund; European Maritime and Fisheries Fund; European Regional Development Fund; European Social Fund +; Erasmus; Horizon Europe; InvestEU; Just Transition Fund; Reform Support Programme; and Single Market Programme.

Recommendations to scale up best practices and re-focusing programmes and incentives



VISION
Vision & long-term strategy

- Best practice-based
- Scaling of proven successes
- Map onto national regulations
- World-class best practices
- Identify & include missing links & target groups

HOW
Scalable multi-stage funding intervention

- Multi-stage intervention funding model
- Differentiated life-cycle funding
- Upfront use of measureable KPIs
- Clear roll-out and business plan
- University role in re-/upskilling under new business model

FUNDING
Massive investments & new ways of funding

- EU investment exploited and leveraged at national and regional level
- Funding with new and greater focus on roll-out and growth phase funding
- One –stop-shop funding at all levels
- Strengthen ‚voucher' & ‚excellence' schemes
- Develop and pilot innovative financial instruments

WHAT
Means to guide future policy development

- Feasibility study: Integration of new learning principles
- Career path tracking
- Workforce credentialing alternatives
- Complementary integration of ‚high-tech skills' in funding programmes

NETWORKING
High-tech Skills Hubs to connect key actors

- Library of training programmes & curricula
- Best practces exchange platform
- Low threshold certification options
- Brokerage activities / platform
- Exchange platform on ‚how to motivate for lifelong-learning

Vision and long-term strategy development

- **Best practice-based**
- **Scaling of proven successes**
- **Map onto national regulations**
- **World-class best practices**
- **Identify & include missing links and target groups**

Develop a compelling vision for scaling-up re- and up-skilling programmes, and a long-term strategy to stimulate greater investments at EU and national level to create a bigger impact.

Europe is missing a compelling vision and longer-term strategy in the area of high-tech skills development and of the re- and up-skilling the workforce. The same holds true for national vision and strategy development at Member State level.

86% of experts surveyed agree to the need for a compelling vision for scaling-up re- and up-skilling funding programmes and initiatives aligned with a longer-term strategy and commitment of all stakeholders and policy levels concerned. And 72% of experts are in favour of funding based on an inclusive approach to reduce inequalities.

The demand for high-tech talent has become mainstream to all organisations and is no longer isolated to specialised businesses. Because of digitalization, AI development and automation, among other trends, companies are transforming at all levels and becoming highly data driven, innovative and talent-centric. Success depends on having a solid and agile talent acquisition strategy with the ability to attract, nurture and retain such talent.

Richard Narine
Senior Vice President Enterprise Solution Design, Randstad

It is recommended that the vision should be based on the demand of industry and labour markets, with a focus on scalability and sustainability, complementarity and close cooperation at EU, national and regional levels, and should aim at world-class performance and best practices.

It should also be inclusive and address target groups, e.g. diverse groups of people, women (who are under-represented in high-tech education and jobs) and youngsters struggling with the traditional education system. It should include better counselling and mentoring for smoothing the entry of underrepresented groups in high-tech professions.

Organisations need to think about an education strategy for their teams. Skilled and educated staff help grow the business faster, and a continuous education plan will keep employees motivated to further develop skills as they build on their career.

Kevin Kelly
Global Director of AWS Certification and Education Programs

Scalable multi-phase funding programmes and initiatives

HOW
Scalable multi-stage funding intervention

- **Multi-stage intervention funding model**
- **Differentiated life-cycle funding**
- **Upfront use of measurable KPIs**
- **Clear roll-out and business plan**
- **University role in re-/upskilling under new business model**

Multi-stage funding intervention based on the lessons learned from best practice cases allowing for differentiated funding of initiatives' life cycle with upfront-defined KPIs, scaling ambition, rollout and business plans.

Higher education and VET providers could become larger re-/up-skilling players by operating under new organisational and business models.

Funding programmes intervention targeting the operation and growth phase of training programmes and courses should be planned. This requires reconsidering the traditional scope of funding intervention and extending it beyond piloting activities as well as learning from existing best practice examples to avoid duplication and aim for excellence.

In the so-called triple-helix, the participation of companies is essential, but not easy. ACE Mobility is an example of a direct involvement of industrial partners in the development of dedicated know-how, serving the transition in the automotive industry.

Kees Slingerland
CEO, Automotive Centre of Expertise

Funding intervention will need to have a clear focus. A new project or initiative will need to have a credible work plan, business and rollout plan, commitments from key stakeholders, especially from industry to buy and use the training solutions developed. It also will require the relevant management capacity and expertise for fully-fledged operation and clear KPIs and success criteria to be reached within a given time.

Universities can play a critical role in the development of high-tech skills aligned with transversal skills. We have the knowledge and competences, are highly involved in the development of future technologies, are well connected to and trusted by the private and public sector. The question in the coming years is: will we take this role?

Sjoerd de Vries
Assistant professor at the University of Twente

Policy makers at EU and national level should put on a map the positioning of their (future) funding programmes to foster better coordination and complementary intervention allowing efficient funding of scalable re- and upskilling initiatives. For example, support of ESF+ funding to support growth and operation of successful Blueprints and relevant training initiatives is recommended.

82% of experts are in favour of a multiple-stage funding model to unlock additional funding for growth and to accelerate scalability and impact.

Universities have the unique possibility to re- and upskill the European workforce with flexible programs. It requires entrepreneurial skills and a change to demand driven curricula. The Make IT Work retraining program shows that it is possible to become an important player in the field of lifelong learning.

Ronald Kleijn
Founder and project leader of Make IT Work

Funding should address both the development and growth stages of training solutions, with a differentiated funding intervention at the various stages of the life cycle of initiatives. Funding programmes should focus on initiatives with measureable KPIs, rollout and business plans. Universities and VET institutions need to be encouraged to play a greater role in re-/up-skilling efforts under new business models.

70% of experts argue for an annual assessment and ranking of initiatives according to an agreed set of KPIs with awards and go/no-go decisions.

This would help to reallocate resources if and where necessary. 73% argue for the reallocation of funds from failing initiatives to those, which are performing well. Finally, 79% indicate that current calls for proposals do not offer sufficient time for setting-up strong partnerships. Evaluation and contracting should be processed faster.

Large-scale investments for new and innovative ways of funding

- **EU investment exploited and leveraged at national and regional level**
- **Funding with new and greater focus on roll-out and growth phase funding**
- **One-stop shop funding at all levels**
- **Strengthen 'voucher' & 'excellence' schemes**
- **Develop and pilot innovative financial instruments**

Business leaders and policy makers are to prepare for substantial investments in skills development as well as re- and up-skilling funding initiatives following a multiple stage funding intervention model with a focus on growth and scale. It should include the wider promotion of successful voucher and excellence schemes, development of a world-class curriculum and proposal of Individual Learning Accounts. New programmes and incentives also need to address underserved and untapped markets (women, diverse groups, SMEs) and enable disruptive schemes to become alternative pathways in addition to mainstream education and training systems.

Europe should be prepared for greater investments at EU and national level to create an impact. It will require EU investment for initiatives of common European interest in strategic areas, leveraged at national and regional level, and a dynamic funding approach with a special focus on growth and scale.

There is unanimous agreement among experts of the need of large-scale investments in re- and up-skilling in Europe.

84% of experts argue that high-tech skills funding should be integrated in a coherent way in the future EU financial framework (2021-2027).

81% of experts see co-creation and delivery of re- and up-skilling initiatives between industry and training providers as a must for effective funding programmes to be operated through a one-stop-shop. It is the most favoured option to counter negative effects stemming from the fragmented and dispersed funding programmes landscape.

Collaboration between several stakeholders is key to tackle the digital talent gap. Universities that want to keep their position as knowledge providers should consider how to up-grade pedagogical methods to also fit professionals, and further improve their ways of working together with industry. Active web-based learning is a scalable model that enables professionals to gain and develop high-tech skills through access to experts in both industry and academia.

Malin Rosqvist
Program strategist, Process Industry IT and Automation, RISE SICS Västerås

Moreover, 86% of experts express a strong need for reviewing and simplifying funding rules to be more inviting for industry partners to take part.

Vouchers and excellence schemes should be further promoted when proven successful. In addition, Individual Learning Accounts (ILA) could offer opportunities to empower adults to equip themselves with the skills needed to support their employability. While not constituting a panacea, they could contribute usefully for funding continuous learning if relevant training solutions, counselling, and coaching are available.

There are no generic, one-size-fits-all solutions for lifelong learning. Self-directed, needs-based, and on-demand learning will increasingly need to become standard practice.

Luise Ortloff
Wissenschaftliche Referentin, Themenschwerpunkt Volkswirtschaft, Bildung und Arbeit, Acatech – Deutsche Akademie der Technikwissenschaften

The European Commission through its Structural and Investment Funds (e.g. ESF+) could help the

setting up of ILA schemes at national level specifically for training for priority skills or strategic sectors (e.g. high-tech and green skills)

Only 55% of experts see (student) loan systems as fit for purpose. However, there is an argument for exploring the topic of income sharing agreement loans. It could be seen as an additional incentive for the creation of a stronger solvent demand for innovative training solutions.

72% of experts argue that funding should follow an inclusive approach. Underserved and untapped groups struggling in the formal education system should be addressed and an evaluation carried out to identify ways for disruptive schemes following new pedagogical models to become an alternative pathway complementary to existing mainstream education and training systems.

Panel of Directors from five European Commission DGs discussing perspectives of funding at the European Conference on Mobilising Funding Programmes and Incentives to Scale-up Best Practices in Brussels on 20th June 2019 (from left to right): moderator Slawomir Tokarski, Director, Innovation and Advanced Manufacturing, European Commission DG GROW, Manuela Geleng, Director for Skills, European Commission, DG EMPL, Peter Dröll, Director, European Commission, DG RTD, Lucilla Sioli, Director 'Artificial Intelligence and Digital Industry' European Commission, DG CONNECT and Nicola de Michelis, Director European Commission, DG REGIO. Photo: EfVET

The upcoming EU funding period is an excellent opportunity for the EU to focus on development of high-level skills and to encourage cooperation among key actors. The IT Professionalism Europe network established by CEPIS works passionately to connect industry, education and policy makers to tackle the IT professional skills gap.

Austeja Trinkunaite
Secretary General, CEPIS and ITPE

Lifelong learning has to become the new normal. Antoine de Saint-Exupéry can inspire us to make the mind shift: 'if you want to build a ship, let people long for the endless immensity of the sea'.

Greet Heylen
HR Manager Flanders Make

Experts recommend investing a smaller level of funding budget for projects and initiatives in the advocacy stage, more substantial funding for the question mark stage (explore and demonstrate) and a greater level of funding for the small number of star initiatives reaching the star stage (grow and prosper). Funding for those described in the mainstream stage should mainly come from indirect funding schemes to be made widely available in Europe and targeting learners such as individual learning accounts, insurance schemes and further incentives such as income sharing loan agreements.

We need to promote the implementation of intelligent learning systems: The potential of digital technologies for education is still far from being fully exploited.

Thomas Lange
Head Programme Area Economics, Education and Employment, Acatech – National Academy of Science and Engineering

Future funding programmes and financial instruments at EU, national and regional levels should allow the intervention of funding at multiple stages and at different levels in a complementary and

well-coordinated way. It should move away from the 'watering can' funding of multiple projects which at best can reach a piloting or mini demonstration phase with limited sustainability of efforts and quasi-absent scalability opportunity – and, as a result, little impact on the European workforce.

We should adapt a circular economy concept to human resources. Integration of people coming from career changing programs should be a golden standard. Just as incentives for companies for employing individuals 50+, internships for "mature students" and tax deductions for individuals who invest in re-skilling.

Joanna Pruszynska-Witkowska
Vice-President and co-founder Coders Trust/Future Collars

European funding mechanisms currently available for training in high-tech skills are extremely fragmented and insufficient. Creating all-European easily accessible financing solutions, such as dedicated loans or an income sharing agreement, will definitely help scale up the most successful training programs across Europe.

Anna Stépanoff
CEO, Wild Code School

Today no satisfactory solutions exist to finance individual adult high-tech training. Some country-specific offers exist that provide individual financing (such as learning vouchers in Germany and "compte personnel de formation" in France). Further public or private financing options are specific local offers with no or little potential for portability in case of professional and geographic mobility. And the conditions for bank loans are not very attractive for individuals.

There is a need for action since many adults are in need of re- or upskilling. Potential learners often do not have the financial capacity to upfront fund a training course at costs typically between 5,000 - 15,000€, nor can they borrow from a bank easily. At the same time, SMEs that need to recruit are not ready to finance training since they run the risk of the recently trained employee leaving the company and pursuing a career elsewhere. Clearly, the topic of individual incentives (individual learning accounts and income sharing loans agreements) should be further explored.

Good practice examples of quality up-skilling initiatives have shown us what to do. We know that enterprise and demand-led actions work; we know that the SME sector must be specifically in focus; we know that universities must be challenged to adapt to new demands; we know that funding must be large-scale and dependent on results. These are the building blocks of a sustainable business model. (Photo: Rocco Defina)

Mary Cleary
Deputy Chief Executive, Irish Computer Society Foundation, and Chairperson CEN TC 428 Digital Competences and Professionalism

Means to guide future policy development

- **Feasibility study: Integration of new learning principles**
- **Career path tracking**
- **Workforce credentialing alternatives**
- **Complementary integration of 'high-tech skills' in funding programmes**

Develop policy briefs and guidance for policy makers aimed at a better integration in the future of new learning principles into education and training, career path tracking to better understand labour market, demand for skills, workforce credentialing alternatives to formal qualifications for quality assurance purposes and recognition of skills of job applicants. Guidance is also needed for practitioners for the integration of re- and upskilling initiatives co-created and co-delivered with industry and third parties.

Means to guide future policy development include the recommendation for a feasibility study on the integration of new learning principles and pedagogies, a study to develop methods for career path tracking, and further activities towards additional low-threshold workforce credentialing.

81% of experts would like to see activities started to identify ways of integrating newly developed re-/up-skilling programmes into an existing formal education and training eco system.

Career path tracking is seen as an important approach for obtaining more information on the skills background of professionals needed in the market and for best understanding developments for necessary actions to be taken by relevant stakeholders. Despite the stagnating figures of ICT graduates over recent years, industry has managed to compensate for the lack of suitable graduates through training and employing - what is commonly called 'lateral entries'.

Cultivating a skilled and educated workforce is crucial to strengthening competitiveness and achieving long-term prosperity, particularly in the current dynamic landscape where artificial intelligence, robotics and other new technologies constantly redefine the challenges that governments, businesses and society, in general, will have to face in the future.

Arturo Bris
Director of the IMD World Competitiveness Centre

Given the fact that most lateral entries gain their knowledge and expertise from more or less intensive and mostly short-term training courses, this development could become a problem in terms of IT professionalism. Nevertheless, they seem to fill a gap but very little is known about the qualification background of lateral entries.

Career path tracking of high-tech workers is seen as an urgent need to obtain more information on this issue, better understand developments and take best possible action at all levels and by all actors concerned ranging from policy to education and training.

Finally, certification fulfils the role of quality assurance and skills recognition where Europe may want to take a leading role. The European level is seen as the most appropriate level for interventions in this area by more than 60% of experts. More than 30% argue for national level actors to become active.

CompTIA's globally recognised certifications can provide at scale the quality assurance demanded by the European workforce as it is faced with the huge re- and upskilling needed to exploit new and emerging technologies and help individuals move easily from low skilled roles in decline into higher skilled and higher paying in-demand jobs.

Graham Hunter
VP Workforce Solutions at CompTIA

High-tech skills hubs to connect key actors

- **Library of training programmes & curricula**
- **Best practices exchange platform**
- **Low threshold certification options**
- **Brokerage activities / platform**
- **Exchange platform on 'how to motivate for life-long-learning'**

Relevant key stakeholders at EU, Member State and regional levels should join forces and further develop VET competence centres based on clusters and digital innovation hubs. The aim is to reach a large number of enterprises of all sizes and offer a catalogue of training solutions, curricula, certifications and best practices with a platform for exchange of resources and experience on how to train the workforce and make lifelong-learning a reality.

Companies that take advantage of digital opportunities declare being 25% more profitable and generating six times higher profit growth. However, 40% of European SMEs are having important problems to achieve digital transformation. That is why it is so important to refocus attention and efforts to make sure good practices are spread widely.

Silvia Leal, Advisor
Consultant, weekly section in the TV Program
Emprende (Canal 24 and la 1)

High-tech clusters and digital innovation hubs are valuable sources of leading edge industrial high-tech expertise. Their experience and proximity to enterprises of all sizes, and their large networks should be strengthened and closely integrated in the funding and skills policy landscape.

80% of experts recommend this as a means to enhance the scalability and ultimately the impact of the funding of high-tech skills initiatives.

It should be noted that 25% of experts see regions as the key actors for funding interventions of high-tech skills centres, clusters and hubs.

40% allocate this task predominately to the national level.

35% see the EU as the most appropriate in this area. This suggests that strong cooperation and co-ordination will be necessary.

Acknowledgements

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More information

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