Upskilling and Reskilling in the Post-Covid Era: Fostering New Services and Jobs Creation – Three scenarios for 2030

Written by Tobias Hüsing, Werner B. Korte, Carola Schulz, Alexander Cuartas-Acosta (empirica), Jim Spohrer, Yassi Moghaddam (ISSIP), Laurent Probst (PwC)

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Skills for Industry

Upskilling and Reskilling in the Post-Covid Era:
Fostering New Services and Jobs Creation

Three Scenarios for 2030

FINAL REPORT

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TABLE OF CONTENTS

Written by:
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EXECUTIVE SUMMARY

Policymakers at EU, national and regional levels need to work efficiently with all relevant stakeholders (industry, social partners, education and training providers, researchers etc.) to **equip Europe with the skills for the future by 2030**. Europe has set ambitious targets for this in the European Skills Agenda, the Digital Decade and the EU Industrial Strategy, making available unprecedented funding to achieve these goals through in particular the Multi-Financial Framework and NextGenerationEU. Upskilling and reskilling the workforce is a topic of crucial importance, which had been looming large due to societal and technological changes. The COVID-19 pandemic made it extremely visible recently. People need to be equipped to enhance their lives and increase their competences in the digital and green era.

Europe has set itself very ambitious targets, such as increasing the number of ICT specialists from currently 7.8 million in the EU27 to 20 million ICT specialists with a convergence between women and men by 2030 or increasing the take up of digital technologies with 75% of European enterprises having taken up cloud computing services, big data and artificial intelligence[1]. To reach these, Europe will probably need to accomplish both formulation and execution of compelling, innovative and long-term national EU Member State visions and strategies.

Scaling up to 20 million
ICT specialists
with a convergence between women and men in the **EU27**
by **2030**

Source: European Commission Communication: 2030 Digital Compass (9 March 2021)

75% of
European enterprises
to take up cloud computing services, big data and artificial intelligence
by **2030**

Source: European Commission Communication: 2030 Digital Compass (9 March 2021)

[1] European Commission Communication (COM2021) 118 final: 2030 Digital Compass: the European way for the Digital Decade. Brussels, 9 March 2021: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en

Moreover, at the Social Summit in Porto on 7 May 2021 the President of the European Commission, the President of the European Parliament, the Portuguese Prime Minister currently holding the Presidency of the Council of the EU, the European social partners and civil society organisations have signed up to the three 2030 headline targets set in the Commission's European Pillar of Social Rights Action Plan in a joint Porto Social Commitment:

At least
78% of people aged 20 to 64
should be in **employment** by **2030**

Source: European Commission: Porto Social Summit, 7 May 2021

At least
60% of all adults should
participate **in training** every year by **2030**

Source: European Commission: Porto Social Summit, 7 May 2021

The World Economic Forum (WEF) also started a Reskilling Revolution initiative[2] which includes a strong call for action and collaboration for change in upskilling. Their report on 'Upskilling for shared prosperity' identifies key areas for action for new approaches to upskilling by different stakeholders.

50%
of all employees will need **reskilling**
by **2025**

Source: World Economic Forum: "The Future of Jobs Report 2020"

At the same time, McKinsey estimates[3] that up to 25% of workers will need to switch occupations in the aftermath of the COVID-19 pandemic.

According to a recent World Economic Forum-PwC report: "Upskilling for Shared Prosperity" (25th January 2021), upskilling has the potential to boost GDP by $6.5 trillion by 2030 globally[4].

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2 World Economic Forum: Reskilling Revolution: https://www.weforum.org/press/2020/01/the-reskilling-revolution-better-skills-better-jobs-better-education-for-a-billion-people-by-2030/

3 https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19

4 World Economic Forum and PwC: Upskilling for Shared Prosperity. 2021: https://www.weforum.org/agenda/2021/01/calling-global-upskilling-movement/

Upskilling
to boost GDP by **$6.5 trillion** by **2030** globally

Source: World Economic Forum-PwC report: "Upskilling for Shared Prosperity" (2021)

To make this happen will require massive investment, efficient coordination and strong commitment towards upskilling investment by each and all stakeholders around shared values.

Amidst the "new normal" brought about by the pandemic and the acceleration of the digital and green transformations, there is a widened gap between already disadvantaged low-skilled and better-off, highly educated and skilled workers. This phenomenon urges governments and key stakeholders to intensify and scale-up their efforts towards massive upskilling and reskilling of the workforce. In this context, we see at least three possible scenarios that will significantly influence the success of Europe by 2030.

These scenarios constitute three main paths that might affect societal outcomes and economic performance, based on different approaches to upskilling and reskilling by governments, industries and academia. Of these, the **Vision** scenario would bring the most advantageous outcomes. Here, we propose that responsible stakeholders make use of Service Innovation Roadmaps (SIR) for upskilling and reskilling to tackle these challenges. This concept is the basis for this scenario, which describes a desirable path regarding the upskilling and reskilling goals. In this scenario, Europe has managed to recover economic growth faster than predicted while taking the crisis as an opportunity to establish upskilling and reskilling as an imperative at all levels. Apart from massive funding and strong incentives, governments have developed new training schemes and tools, such as individual learning accounts (ILAs), micro-credentials, upskilling reskilling programmes through entire

The **Vision scenario**

- **Highest impact and ROI**
- **Private investments outrival public funding**
- **Rapidly recovering to pre-crisis GDP trajectory**
- **Upskilling and reskilling as a default, especially for new business processes and smart services**
- **Innovative, attractive, fast and adaptive just-in-time personalised training systems**
- **Stakeholders aligned & balanced, demand-led approach and shared leadership**
- **All enablers (funding, guidance, ILAs, Micro creds, QA etc.) smoothly operational**
- **Lifelong-learning culture**
- **Strictly demand based innovation**
- **Empowered learners making mindful & responsible investments**
- **Utmost focus on inclusion, gender balance and diversity, bridging gender gap in digital skills and ICT specialists**
- **SME focus**
- **Sectoral & regional ecosystem and cluster adapted approaches**
- **Leaps in skills and training foresight and intelligence to manage change**

The **Middle ground** scenario

- Moderate growth at rates around 1.5%
- Private investments triggered by European funds
- Keeping employment rate above 70%
- Mostly fragmented approach
- Scattered successes, with many failures and duplication
- Scalability and sustainability remain elusive in many cases
- Focused on pandemic's hardest-hit sectors to implement rapid upskilling and reskilling schemes for low-skilled populations to help reallocate them in thriving sectors.
- Subsidies of training for in-demand skills as a prerequisite for lifelong learning.
- Steep increase in university interdisciplinary projects based on STEM areas to foster tech-based service innovation
- In general: somewhere in-between the Vision and Muddling-Through
- Potential for improvement if serious evaluation is undertaken

industrial ecosystems and value chains as well as skills intelligence and knowledge transfer schemes. Businesses, including SMEs, are actively using policy incentives, increasing their training investments and embracing corporate social responsibility; while workers are aware of training opportunities and increasingly use their training rights. Likewise, universities have taken up their role in professional training, while training providers have boosted the relevance and the quality of their trainings to offer "just for me, just in time, just enough" solutions. These new training formats are being developed in multi-stakeholder partnerships, with strong involvement of industry and sectoral associations, to ensure relevance and fitness for purpose.

With this vision as a benchmark, we also consider two alternative scenarios in which the advancements described above would be reached to a lesser extent. In the **Middle Ground** scenario, the significant policy efforts will be partially successful, but a considerable skills gap remains and is partly explained by training schemes skewed towards large corporations and high-skilled workers.

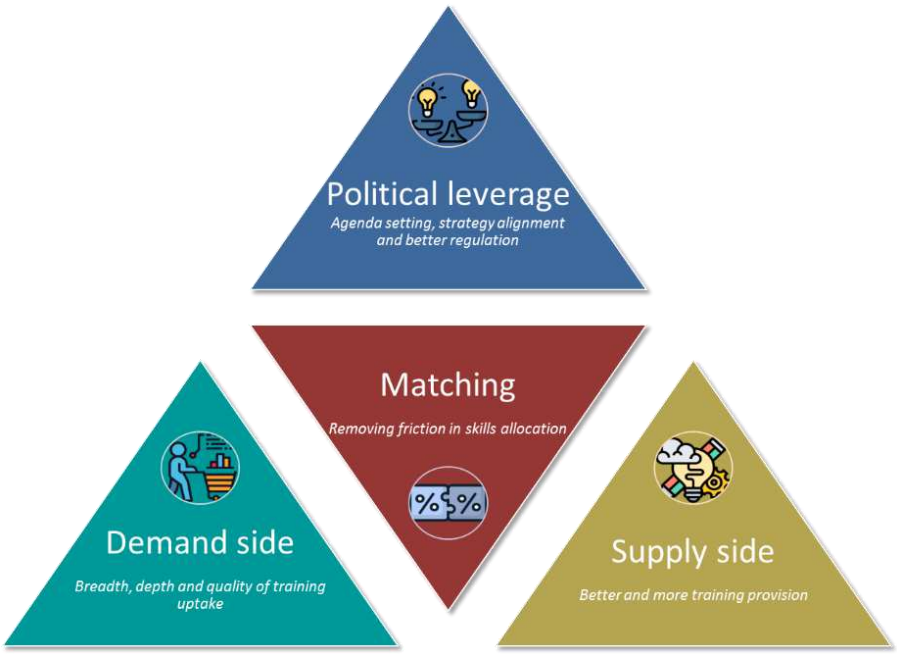
Likewise, the scenario considers a conflicting

The **Muddling through** scenario

- Pre-pandemic growth trajectory reached by the end of 2022, taking longer than expected
- Low impact despite high spending efforts, weak ROI
- Public investments fail to effect sustained private sector efforts
- Partly failed upskilling and reskilling efforts
- Two tier workforce & training systems, considerable gap between low- and high-skilled workers
- Benefits accrue to the already better-off
- Focus remains mostly supply side targeting mostly VET incumbents: More of the same
- Lack of sustainability and scaling
- Patchwork instead of orchestration
- Insufficient industry focus
- Increasing skills gulf and polarisation within the economy
- Tech industry invests in and skims scarce talent at the expense of other industries

environment between workers and businesses when clarifying roles and setting resources (e.g., time availability as part of the workload) to boost training within organisations. Lastly, an even larger skills gap, and leading to a greater polarisation and unevenly qualified workforce, is the **Muddling Through** scenario. An incomplete post-COVID recovery, lack of orchestration of efforts among social partners to speed up upskilling and reskilling, and inadequate skills foresight at all levels will hamper a good return on investment of the EU policy measures in this scenario.

To achieve the vision scenario, we present ten recommended actions in four dimensions: ***political leverage, demand side, supply side and matching*** to promote upskilling and reskilling as means to increase social and economic welfare. We encourage stakeholders to set ambitious key performance indicators (KPIs) that allow them to thrive by embracing the opportunities of training for a future-proof world.



The first area, **political leverage**, relates to stakeholders' agenda-setting capacity and the coordination they need to pursue with different government tiers to pave the road for developing large-scale and impactful upskilling and reskilling initiatives in the various industrial ecosystems (especially the most affected by the pandemic and the digital and green transitions). Additionally, strategy alignment across geographies and endeavours for more precise regulation of disruptive technologies and markets plays a significant role. The European Commission and EU Member States should create and align upskilling and reskilling initiatives and service innovation roadmaps with a 2030 time horizon. Policymakers are challenged to be visionary and to act fast, given the pressing challenges exacerbated by the pandemic, and orchestrate actions at different levels, including skills intelligence to rapidly identify changes in occupations and tasks and act accordingly through concrete actions supported by a policy toolbox.

1. Skills and training intelligence

Create a strong evidence base through excellent skills and training analytics and intelligence and set-up a platform for transparent diagnosis on the needs and solutions for upskilling and reskilling.

- Fine-grained data and forecasting at sectoral level
- Regional/national/EU
- Continuous monitoring
- Evaluation of existing measures.

Skills intelligence is under development at Cedefop. Training intelligence is needed as well.

2. Policy roadmaps

Enable and facilitate the development and use of system-level analytics-based frameworks for change (service innovation roadmaps) for national and regional policy makers.

One goal is the clear discernment and wise partitioning of "Increase, Transform, and Innovate" types of investment and systemic changes – knowing what to do more, where to copy and where to stir invention.

Road mapping should be overseen by a single entity coordinating efforts.

3. Policy toolbox

Provide a toolbox with tools and solutions on emerging and promising measures including a library of scalable best practices, e.g.:

- Policy and strategy
- Practical labour market tools, skills intelligence, taxonomies, and certification
- Demand-side (learners and employers) measures and incentives
- Supply side, especially large-scale multi-stakeholder skills partnerships in sectors and ecosystems
- Training solutions, best practices and incentives for end-users

Political Leverage

Beyond these recommendations, a **single-entry point** (one-stop-shop) with skills and market intelligence would be a valuable resource, ideally benefitting from the envisioned European (skills) data spaces. Installing national upskilling and reskilling agencies with far-reaching decision-making powers would avoid dispersion of responsibility and clearly allocate it to one instance. Agencies should also monitor the quality and labour market fit of upskilling and reskilling offers. These activities will be supported by the policy toolbox with the necessary tools, solutions, guidance and advice (in liaison with the **support services** to be offered early 2022 for the **Pact for Skills** by the European Commission. Of further importance are scalable best practices to showcase and educate stakeholders and to foster large scale implementation.

On the other hand, the **demand side** recommendations focus on enhancing the breadth, depth and quality of training uptake, especially among workers.

4. Upskilling roadmaps for everyone

Enable and facilitate the development and use of analytics-based frameworks for change (i.e., Service Innovation Roadmaps), at firm level and worker level

Focus on career counselling and use it in drafting these.

5. Electronic Skills Records

Develop a framework for individual Electronic Skills Records, especially regarding the European Skills Data Space

Build on Europass

Align and supplement with micro-credential framework and skills ontologies

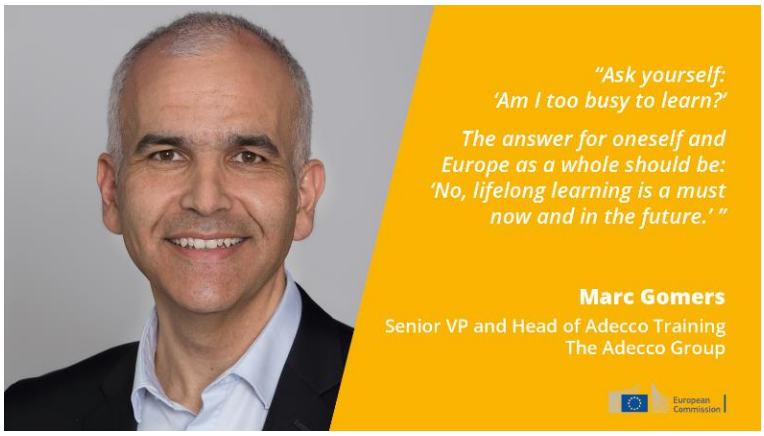
6. European skills platform for citizens

Further strengthen platform-based services for citizens and businesses regarding skills information, funding options, career support and recruitment.

All stakeholders to fully support the Digital Skills and Jobs Platform.

Demand Side

Service Innovation Roadmaps are especially promising in this regard since they might help to find tailored upskilling and reskilling offerings according to learners' needs and markets conditions. Cloud computing and other digital technologies have the potential to bring together anonymised data from electronic skills records to foster skills intelligence in Europe. Similarly, one-stop-shop platforms providing citizens with simple, straightforward and clear information on training offerings, funding and career development become efficient tools that concentrate information in a single place and guide individuals on relevant training needs and opportunities.



As for the balance between demand and supply side measures, comparably more focus should be placed on subsidising the demand side with real upskilling and reskilling goals, independent of current employment status. This funding priority for upskilling and reskilling should involve the provision of strong incentives for and entitlement to lifelong learning, involving instruments like individual learning accounts (ILAs) (worker level) and corporate upskilling responsibility (company level). Also, workers and companies need to be supported in developing their own Service Innovation Roadmap for upskilling, benefitting from new methods like knowledge exchange twin projects ("Twinnings") or Design Thinking. A minimum level of common skills terminology, especially in form of Electronic Skills Records (ESR) would facilitate showcasing of credentials.

The **supply side** dimension incorporates measures to scale up the training initiatives based on timely, precise and context-relevant, and well-targeted contents, that is, just-in-time, just-enough and just-for-me upskilling and reskilling interventions. Additionally, sectoral ecosystem solutions building upon previous multi-stakeholder efforts are pivotal to expand the scope of successful training measures and serve as referents for future initiatives.

7. Develop in-workplace system for "Just enough, just in time, just for me" learning

Fund multi-stakeholder partnerships for the development of "just enough, just in time, just for me" learning systems.

8. Sectoral ecosystem solutions

Further foster large scale and impactful sectoral approaches and especially expand the Blueprints for sectoral cooperation on skills.

Supply side

The European Commission and EU Member States together with industry and other stakeholders should prioritise strong industry involvement and commitment as well as scalable sectoral ecosystem training solutions. Industry-led multi-stakeholder partnerships should develop "just enough, just in time, just for me" training formats, meeting the requirements of modern workflows and adapted to the respective target groups. Providing strong incentives and sufficient funding to scale-up promising initiatives to become mainstream is crucial, as many fitting formats already exist. To guarantee market relevance of training contents, more focus should be on the co-creation and operation of large-scale industry-university programmes, as well as equivalent VET formats.

Lastly, recommendations on **matching** emphasise the need for removing frictions in skills allocation. Fostering regional match-making initiatives enable partners to rely on data from within their territories to fine-tune labour according to skills requirements. The former invites us to rethink the current jobs and skills ontologies, to enhance their scope and make classifications more precise. Further research based on big data and artificial intelligence bears a huge potential towards achieving this goal and data-driven, science-based service innovations are key to success.

Europe needs the large-scale operation of skills demand and supply brokerage platforms which help in skills assessment, matching candidates with suitable jobs and identifying most appropriate upskilling offers on worker and company level. A clear definition and further uptake of micro-credentials plays an important role in this context, since short and tailored learning units are increasingly demanded by both workers and industry, thereby helping to match the demand and supply side. A European, if not global, taxonomy of the skills is required to provide a framework for aligning around a universal language for skills. This would need to synthesise and build on existing taxonomies by integrating definitions and categorisations of skills that we know to be of growing relevance in a fast-changing labour market.

9. Boost skills efficiency and regional development through smart and regional brokerage

Scale up smart brokerage, match-making initiatives mechanisms and platforms

10. Sectoral skills ontologies

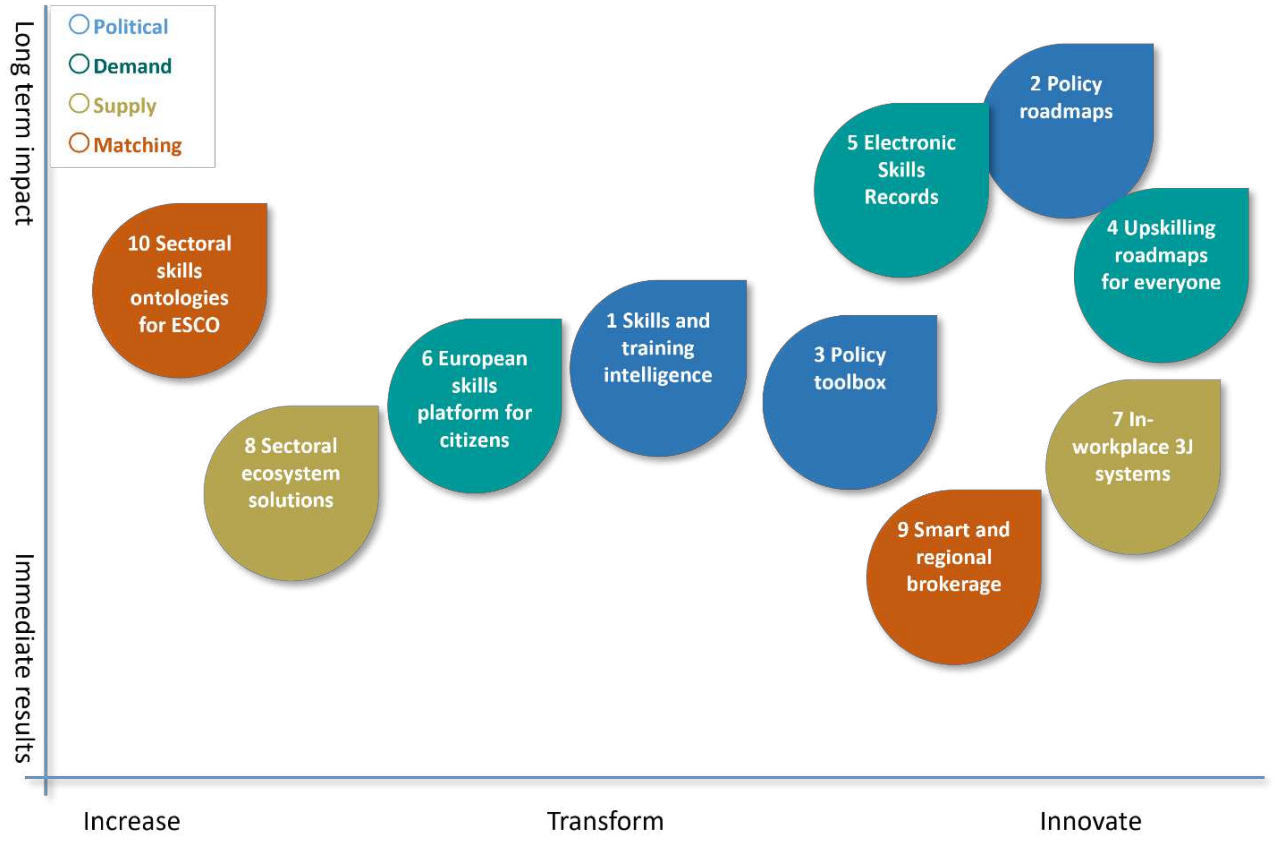
Build further sectoral skills ontologies imitating the development of the e-CF, based on industry needs for use in recruitment, career counselling, training provision, curricula design, and skills assessment. Base these taxonomies on stakeholder input, data-based skills intelligence and feed them into ESCO.

Matching

Recommendations will have different levels of impact, that is some can be expected to have an immediate, and some a more long-term time-to-impact. Along the dimensions of the service innovation roadmap scheme, some can be achieved by scaling up what is already existing and done (Increase), some are transforming or copying from good practices (Transform), and some would require new, bold and innovative action (Innovate). This is tentatively plotted in the following chart.

It must be noted that it is hard to assess ex ante, and therefore must be taken with a grain of salt. As examples, sectoral ontologies are already well developed and understood and can be scaled up, but it might take longer for the impact, because it is a very complex, multi-stakeholder process. Smart and regional brokerage, as another example, is relatively innovative, yet it might have immediate results. In the upper right corner, implementing service innovation roadmaps for policy making might take long to have an impact because policy making is a slow system and because several transmissions need to take effect first, but it could be a very innovative way of thinking about policymaking with a long-lasting positive effect on all citizens.

Recommendations for action – Time to impact and level of innovativeness



Several actors already implement valuable initiatives. However, many upskilling and reskilling efforts across Europe are scattered and require stronger and better coordination among stakeholders and public authorities. Therefore, these recommendations aim to find common grounds and offer inspiration for the way towards a thriving European workforce by 2030. The level of achievement of the optimal scenario will depend on the specific choice of policy tools, as well as methods for stakeholder engagement. These measures will serve as a basis to develop concrete action plans for upskilling and reskilling in the post-COVID era that aim to reduce the skills gap and boost Europe's competitiveness.

Finally, the European Commission organised a high-level **online conference on "Skills for Industry -Upskilling and Reskilling in the Post-Covid Era. Fostering New Services and Jobs Creation"** which took place on 29 - 30 June 2021[5].

The event also took place against the background of the Covid-19 pandemic. Resulting from the impact of this crisis combined with the digital and green transitions, industry will undergo fundamental transformations. The Updated

[5] https://skills4industry.eu/skills-industry

Industrial Strategy for Europe made clear that the pathways to the recovery are forcing governments and businesses to adapt the skills of the workforce to cope with a fast-changing labour market. New technologies are transforming the way people work and acquire new skills. They offer a great potential for the development of smart services as well as new and better jobs. In this context, there is a strong need to foster skills acquisition and promote the right to training for all. It is also crucial to launch large-scale demand-led upskilling and reskilling initiatives. Launched under the European Skills Agenda on 10 November 2020, the Pact for Skills is aiming at mobilising all stakeholders - industry, social partners, education and training providers, public authorities at all levels and the workers themselves - to take decisive action.

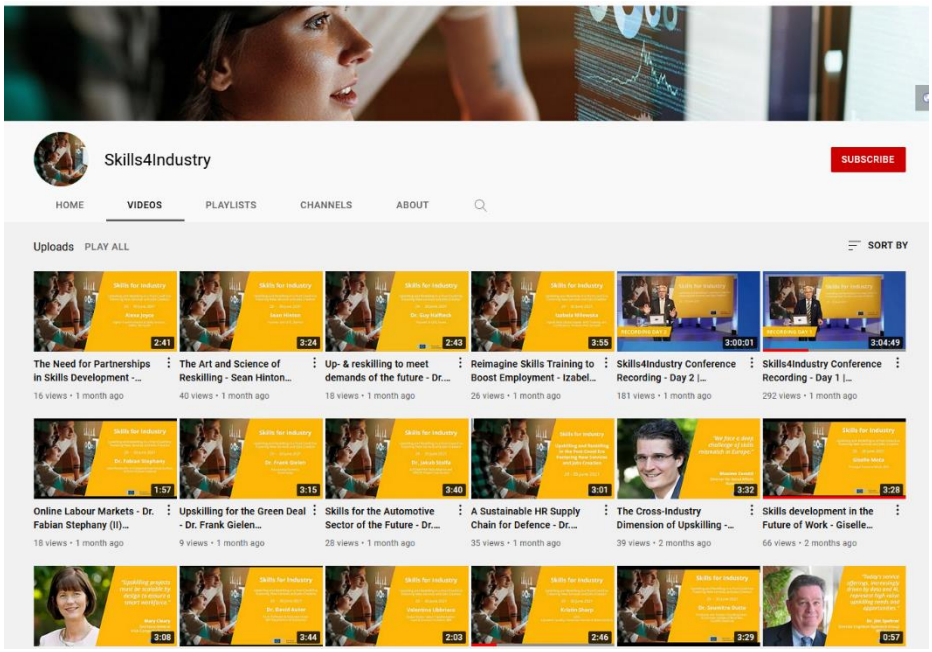
This event focussed on the upskilling and reskilling challenges that the EU is facing, presented good practice cases, scenarios and recommendations for creating new training and jobs opportunities. New innovative and just-in-time training offers need to offer attractive solutions to the workforce. Active industrial and labour market policies, lifelong learning, increased public and private investment, individual learning accounts, micro-credentials, demand side incentives, sectoral and regional brokerage and foresight platforms, as well as demand and supply matching tools are examples of how to move forward and ensure nobody is left behind.

More than 800 experts and stakeholders registered to this event which dived into the current efforts that public and private organisations are deploying to address the challenge of enhancing the workforce's skill set.

Day 1 kicked off by a lively discussion on the European Skills Agenda and the Pact for Skills launched in November 2020. The panel aimed to mobilise all stakeholders - industry, social partners, education and training providers, public authorities at all levels and the workers themselves – to take decisive action on their future.

Day 2 was dedicated to AI and the digital transformation of industry with a focus on platform economy and innovation, including business responses and strategies. It included good practice cases illustrating a strategic vision of the way forward, integrating potential upskilling and reskilling scenarios on the path towards 2030.

By presenting different views and good practices of reskilling and upskilling initiatives, and the recommended actions to foster these processes in Europe, the Skills4Industry conference provided insightful discussions on the elements that must be considered to thrive in the future of work.



The experts provided several contributions to facilitate upskilling and reskilling, among which the following stand out: developing tailored, context-relevant approaches; providing workers with the motivation, resources and time to improve their skills; involving middle and top management in upskilling and reskilling; and including feedback mechanisms with companies' stakeholders to assess the training initiatives' effect.

Important and relevant quotes from opinion leaders and key stakeholders at this conference have been included as quote cards at several places in the present document.

The conference website can be found at: https://skills4industry.eu/skills-industry and the YouTube channel with the recordings of all keynote speeches, presentations and sessions can be accessed at: https://www.youtube.com/channel/UCKfAFdelRvEe9Cc5-kBUfww/videos.

On this YouTube channel the interested visitor can also find a series of around 25 top-level expert and stakeholder video statements related to the topic at stake.

INTRODUCTION

Europe has taken up the challenge for a new skills paradigm and is eager to respond with a sense of urgency. The question now is how best to shape this response and how to orchestrate stakeholders to act collectively. This report is trying to provide thoughts as to how policymakers and stakeholders could work together to equip Europe with the "skills of the future" for the time up until 2030.

Skills of the future are at the heart of new services and of changing ways of value creation. Speeding up the process of increasing the societal skill base will require comprehensive change – of mind, rules, and action – among all stakeholders. For individuals and workers to develop a mindset where lifelong learning and the ability to adapt to constantly changing contexts and situations become an inherent part of their working life. For industry and businesses to shape the future through the opportunities of smart services and service platforms, but at the same time to take responsibility for providing best possible support to their employees to learn and re-invent. For the education and training systems, universities as well as training institutions and providers to sense new demands and (co-)develop appropriate training in an unprecedented variety of types and sizes.

Scaling up to 20 million
ICT specialists
with a convergence between women and men in the **EU27**
by **2030**

Source: European Commission Communication: 2030 Digital Compass (9 March 2021)

A collective change of mindset, and an adaptation of the respective rules and incentives, will put all stakeholders in a better position to respond to economic and societal challenges and to enable Europe's workers and citizens to continuously evolve and develop along with emergent skills requirements.

To achieve this, governments and policy at European and national level should be enabled to develop and pull the relevant political levers. This also includes developing and setting the right financial and fiscal incentives, as well as innovative and new instruments such as Individual Learning Accounts (ILA) to just name one.

Europe has set itself very ambitious targets, such as increasing the number of ICT specialists from currently 7.8 million in the EU27 to 20 million ICT specialists with a convergence between women and men by 2030 or increasing the take up of digital technologies with 75% of European enterprises having taken up cloud computing services, big data and artificial intelligence[6]. To reach these, Europe will

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quickly need to accomplish both formulation and execution of compelling, innovative and long-term national EU Member State visions and strategies.

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The European Commission is in the process of further developing its European Skills Agenda and action plan[7], the Green Deal policy and strategy[8] and further relevant action plans such as the European Pillar of Social Rights[9] which sets out concrete initiatives and the Pact for Skills,[10] a shared engagement model for skills development in Europe. Moreover, with the Skills for Industry[11] initiative and the SME strategy, the European Commission acknowledges the importance of skills for the twin green and digital transitions and the fact that training, upskilling and reskilling have to be a major part of our economy.

The EU industrial strategy was adopted on 10 March 2020, just one day before the WHO declared COVID-19 a worldwide pandemic. It was updated on 5 May 2021. The update does not modify its aims to contribute to a climate-neutral Europe, to fair economic growth that leaves no one behind, and to a digitalised Europe, whilst strengthening Europe's place in the world. However, it does review the strategy in light of the coronavirus crisis. The Communication stresses that the pandemic has drastically affected the speed and scale of this transformation, to the point that the Commission proposes four new measures to support them. One of these measures specified is "Investing to upskill and reskill to support the twin transitions."[12]

These programmes and action plans accompanied by a range of different funding programmes, old and new, typically propose headline targets for the EU by 2025 or 2030. With these activities the Commission is demonstrating its vision

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7 European Skills Agenda: https://ec.europa.eu/social/main.jsp?catId=1223&langId=en

8 European Green Deal: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal

9 European Pillar of Social Rights: https://ec.europa.eu/info/european-pillar-social-rights/european-pillar-social-rights-action-plan_en

10 Pact for Skills: https://ec.europa.eu/social/main.jsp?catId=1517&langId=en

11 Skills for Industry: https://ec.europa.eu/growth/industry/policy/skills_en

12 European Commission Communication (COM2021 350 final): "Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery" (5 May 2021): https://ec.europa.eu/info/files/communication-updating-2020-new-industrial-strategy-building-stronger-single-market-europes-recovery_fr

for the future in key areas for society and economy with a special focus also on skills development. At the same time, with funding through the Multiannual Financial Framework (MFF) 2021-2027[13] it is investing heavily and on an unprecedented scale offering support and guidance to Member States. A range of EU funding instruments for upskilling and reskilling based on Commission proposals (subject to changes) have been announced or are already available. These include instruments accessible through financial intermediaries, national authorities or the European Commission.[14]

Moreover, at the Social Summit in Porto on 7 May 2021 the President of the European Commission, the President of the European Parliament, the Portuguese Prime Minister currently holding the Presidency of the Council of the EU, the European social partners and civil society organisations have signed up to the three 2030 headline targets set in the Commission's European Pillar of Social Rights Action Plan in a joint Porto Social Commitment:

At least
78% of people aged 20 to 64
should be in **employment** by **2030**

Source: European Commission: Porto Social Summit, 7 May 2021

At least
60% of all adults should
participate **in training** every year by **2030**

Source: European Commission: Porto Social Summit, 7 May 2021

There also was agreement that the number of people at risk of poverty or social exclusion should be reduced by at least 15 million, including at least 5 million children.[15]

The World Economic Forum (WEF) also started a Reskilling Revolution initiative[16] which includes a strong call for action and collaboration for change in upskilling. Their report on 'Upskilling for shared prosperity' identifies key areas for action for new approaches to upskilling by different stakeholders.

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Source: World Economic Forum: "The Future of Jobs Report 2020"

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13 European Commission: Multiannual Financial Framework 2021-2027: https://www.consilium.europa.eu/en/policies/the-eu-budget/long-term-eu-budget-2021-2027/

14 EU funding instruments for upskilling and reskilling based on Commission proposals (subject to changes): https://ec.europa.eu/social/main.jsp?catId=1530&langId=en

15 European Commission: Porto Social Summit: all partners commit to 2030 social targets (7 May 2021): https://ec.europa.eu/commission/presscorner/detail/en/IP_21_2301

16 World Economic Forum: Reskilling Revolution: https://www.weforum.org/press/2020/01/the-reskilling-revolution-better-skills-better-jobs-better-education-for-a-billion-people-by-2030/

At the same time, McKinsey estimates[17] that up to 25% of workers will need to switch occupations in the aftermath of the COVID-19 pandemic.

According to a recent World Economic Forum-PwC report: "Upskilling for Shared Prosperity" (25th January 2021), upskilling has the potential to boost GDP by $6.5 trillion by 2030 globally[18].

Upskilling
to boost GDP by **$6.5 trillion** by **2030** globally

Source: World Economic Forum-PwC report: "Upskilling for Shared Prosperity" (2021)

To make this happen will require massive investment, efficient coordination and strong commitment towards upskilling investment by each and all stakeholders around shared values.

Cost-benefit sketches

As mentioned in the introduction, according to the WEF, upskilling has the potential to boost GDP by $6.5 trillion by 2030 globally.

The EU's current workforce (2019) amounts to 191 million people. Assuming €500 per ILA credit and a claimer incidence of 30%, the investment would amount to €28.7 billion.

For a longer upskilling programme that would cost, e.g., on average € 3,000, upskilling 5% of the current workforce would sum up to the same amount exactly. 50% of workforce hence would mean an investment of more than a quarter trillion.

The WEF and Boston Consulting, for instance, estimate the average cost of upskilling to be approximately $25,000[19]. Bersin[20] argues that "it can cost as much as six times more to hire from the outside than to build from within." Chopra-McGowan and Srinivas B. Reddy[21] comment that "(w)hile this calculation varies significantly based on the occupation and job function, it presents a strong case for employers and governments to consider reskilling costs from a holistic perspective."

Cedefop has published in 2017 a scenario where the proportion of low skilled workforce would be effectively halved (from 14.7% to 7.4) through a massive upskilling campaign. The funding costs were modelled to be around €156

17 https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19

18 World Economic Forum and PwC: Upskilling for Shared Prosperity. 2021: https://www.weforum.org/agenda/2021/01/calling-global-upskilling-movement/

19 https://www.weforum.org/press/2019/01/who-pays-for-the-reskilling-revolution-investment-to-safeguard-america-s-at-risk-workers-likely-to-cost-government-29-billion/

20 https://joshbersin.com/2019/10/build-vs-buy-the-days-of-hiring-scarce-technical-skills-are-over/

21 https://hbr.org/2020/07/what-would-it-take-to-reskill-entire-industries#:~:text=As%20such%2C%20reskilling%20refers%20not,Format

billion over a ten-year horizon. Cedefop calculated the total net benefit of this programme to be more than 2 trillion euros[22].

An ambitious common European vision and the key areas for action identified are a good starting point. Now, these need to be reflected in compelling, long-term national EU Member State visions and strategies aimed at implementing concrete actions at national level including concrete actions for developing new and scalable successful workforce upskilling programmes in a fast and result-driven fashion.

Member States and EU policies need to develop a vision of where they want to be in 2030 and adapt their programmes and incentives to better anticipate and cope with change allowing individuals and organisations to create the skills required in the future and provide the economy with a larger talent pool. Education and training systems in Europe need also to co-evolve on these new demands and develop appropriate training offers cooperatively with industry. Individuals and employers need to be given the tools for mapping out their future, allowing for self-assessment of skills and concrete specification of future skill pathways and to be supported in matching their offers and demands. Finally, policy needs to be fully enabled to develop new and timely political leverage.

This is a call for action – a call addressed to all stakeholders to take on responsibility and dare to take bold and coordinated action.

40%

of current workers' **core skills** are expected **to change** in the next **five years**

Source: World Economic Forum: "The Future of Jobs Report 2020"

To turn the ambitious goals into reality, all stakeholders have a responsibility and role to play, including citizens, businesses and industry, educators and training providers, and government. This will be crucial for Europe to achieve greater levels of service innovation, widespread skills creation and upskilling a smart workforce in Europe.

This Report is an output of the service contract "EASME/COSME/2018/016 "High-Tech Skills for Industry: Fostering New Services and Jobs Creation" (2019-2021). The target group of this report is decision-makers in governments, educational and training institutions, businesses and industry, their associations – on local, regional, national and European level, civil society organisations and the individual citizens. Its structure encompasses several chapters. It starts with chapters on the rationale and relevant trends followed by an elaboration of the scenarios and a vision for upskilling Europe until

[22] Cedefop: Investing in skills pays off: the economic and social cost of low-skilled adults in the EU, 2017: https://www.cedefop.europa.eu/files/5560_es_investing_in_skills.pdf

2030. This is followed by a brief overview of key recommendations and actions to foster upskilling in Europe in a nutshell. The descriptions of the recommendations with the related actions follow in a further chapter.

TRENDS

The current **COVID-19 pandemic** has caused dramatic disruptions. Many businesses and citizens have suffered severe losses of both material and immaterial kinds and struggle finding the right responses to a changed world. The pandemic has made apparent the strengths of our economies, society and political systems in some areas. Yet - and specifically - it has also shown some areas of insufficiency and persistence of structures and behaviours that prevent necessary change when rapid adaptation is needed.

However, the IMF in recent economic outlooks has predicted that the **recovery of European and advanced global economies** will be faster than expected and that they will emerge largely unscathed from the pandemic. "The big story from the recent meetings of the IMF and the World Bank is that the world economy is recovering substantially more quickly than expected even six months ago".[23] "Together these improvements in the outlook have led the fund to predict that, as a whole, advanced economies are on course to lose less than 1 % of output by 2024 compared with its pre-pandemic forecasts — an outcome that seemed barely plausible last October (2020). The US is a the top of the pack and now has forecasts showing it on a stronger path than before the pandemic, but other advanced economies are not far behind in the medium term" […] "For most advanced economies, it says, there will be only limited scars from the crisis".[24] And finally a further Financial Times author echoes this forecast when stating: "The world's largest economies on both sides of the Atlantic have a good chance of recovering the lost ground caused by the coronavirus pandemic by the end of the year, much faster than economists had previously feared. Economists have revised up their forecasts for US and eurozone economic performance after data this week showed both economies displaying more resilience than had been expected".[25]

Recent and ongoing adoption of advanced **technology** developments by industry and businesses around the globe require massive investments in upskilling the workforce. Relevant advanced technologies include cloud computing services, big data, artificial intelligence (AI), blockchain, Industrial Internet of Things (IIOT) and cyber-physical systems.

Today every business, in every industry, needs a sustainable innovation strategy because innovation is what fuels the economy and is the key to continuous growth, sustaining competitive advantage, and building stakeholder value for the long term. As advances such as cloud computing services, big data, artificial intelligence (AI), machine learning, blockchain, IoT, and more, gather momentum, both the public and the private sectors have a great opportunity to create a future in which business, society and life thrive. For this to take place, however, suitable skills development as well as upskilling and reskilling strategies and related concrete actions by all stakeholders are of central importance, and even more urgent in the aftermath of the COVID-19 pandemic.

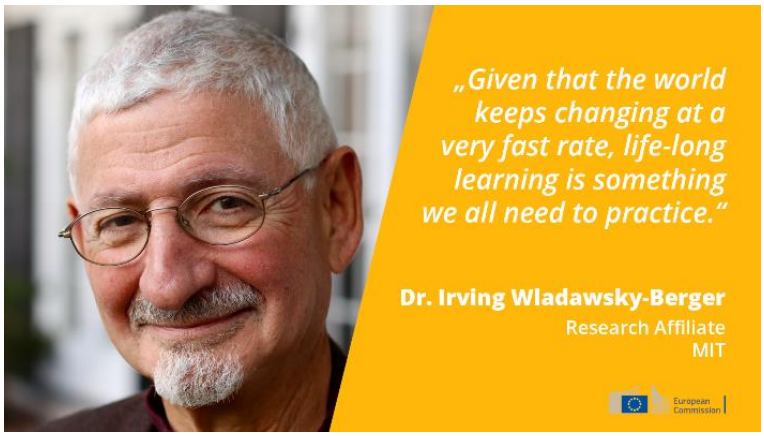
[23] Financial Times (4/21/2021): Martin Wolf: Economic recovery masks the dangers of a divided world.

[24] Financial Times (4/21/2021) Chris Giles: 'This crisis is different': the dramatic rebound in the global economy.

[25] Financial Times (5/2/2021): Chris Giles: Global economy recovery. Largest economies forecast to regain pre-Covid levels by end of year.

Besides a health crisis with worldwide consequences, the pandemic brought rapid changes in the ways that workers interacted in labour markets. The widespread use of social containment measures fostered teleworking from home, rather than commuting to offices. In turn, it stimulated online digital platforms usage to bring together supply and demand of goods and services in different sectors. Both these changes (teleworking, online digital platform usage) accelerated a greener and more digital economy with both workers and customers gaining increased ICT exposure and experiences.

People and companies are using platforms more than before as these tools sustained economic interactions in times of confinement. Its uptake has increased as users get used to them, and platforms themselves augment and enhance their features. However, this context introduces new challenges for users, policy and workers. One of them refers to the enormous amount of data produced by users while utilising these tools. While the information shared in virtual interactions is useful for platforms to enhance and tailor their digital service offerings, concerns about data protection arise. The former urges policymakers to take a more active role to ensure that platform operators comply with current legislation and, where necessary, introduce new policies.



On the other hand, the use of platforms by freelancers to generate income through part-time gigs raises additional concerns, especially regarding labour conditions. The variable nature of this type of employment may sometimes have a higher risk to financial stability for self-employed labourers. Additionally, while platforms have reputation mechanisms to signal quality, gig workers do not usually have similar features to come together and express their voices and concerns to platform owners and administrators. The former requires policymaking to support platform workers to associate and channel their opinions and interests, which might translate into a reduction in the power differential between these actors and more bargaining power.

The impact of **demographic ageing** within the European Union (EU) is likely to be of major significance in the coming decades. According to the European statistical office (Eurostat) "consistently low birth rates and higher life expectancy are transforming the shape of the EU-27's age pyramid. As a result, the proportion of people of working age in the EU-27 is shrinking while the relative number of those retired is expanding"[26]. A shrinking working age population is going to increasingly cause problems which already today becomes visible in a shortage of skilled workers in many sectors. It is against this background that society and economy need to make optimal use of available people and best qualify and regularly upskill them with the skills for the future. This will only be possible if Europe manages to adapt or newly establish the necessary education and training systems to ensure all workers are continuously equipped with the skills to make them fit for the future.

In this context, the development of new technologies and their rapid uptake forced by the pandemic have accelerated businesses' digital transformation. This phenomenon coincides with other social effects that make upskilling and reskilling of the workforce a priority for Europe to become a resilient, green and digital service competitive region. While policymaking alone cannot achieve these goals, it can set the ground and enable the conditions for fruitful initiatives.

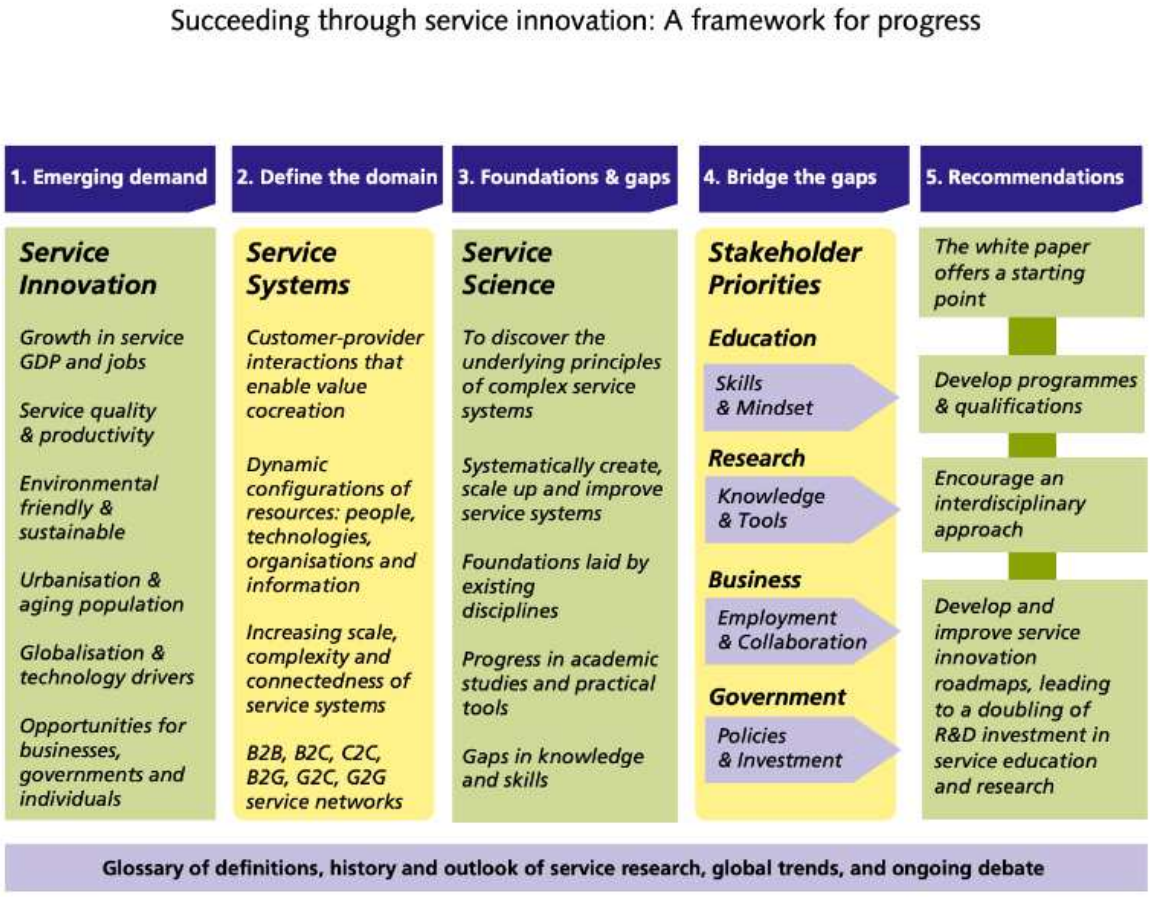
[26] Eurostat Statistics Explained: Population structure and ageing, August 2020: https://ec.europa.eu/eurostat/statistics-explained/index.php/Population_structure_and_ageing

Then, firms, unions and other social partners need to prioritise their needs and look for multi-stakeholder initiatives to tackle the skills shortages in key sectors, which, when effectively addressed, results in a boost in employment and social welfare.

UPSKILLING AS SERVICE INNOVATION – UPSKILLING FOR SERVICE INNOVATION

In the last decade, automation powered by advanced technologies, such as cloud computing services, big data, artificial intelligence (AI), coupled with solid computing capabilities and sophisticated software algorithms with creative business and organisation models have been supercharging new smart services, and therefore increasing service innovation in business and society. This trend is accelerating as high-value, data-driven, science-based service innovations are increasing productivity, quality, and compliance in every corner of business and society systems, accelerated in part by a global pandemic that drove demand for these recent advanced technology developments.

In many industries, the most in-demand occupations, specialities, and skills did not exist ten or even five years ago. In a post-COVID-19 recovery, the pace of change will accelerate at a much more rapid rate. This will present tremendous opportunities and many challenges for businesses, government, education, research, the workforce and citizens in Europe for the next decade and beyond.



Source: Succeeding through service innovation, A service perspective for education, research, business and government (see footnote)

In anticipation of this global trend, the Cambridge University Service Alliance and IBM had already partnered with prominent service scientists from around the world. In 2010, they delivered the White Paper: "Succeeding Through

Service Innovation: A Framework for Progress"[27], which made a call to action to key stakeholders to advance service innovation, create Service Innovation Roadmaps and double service R&D (research and development) investments that would, in turn, increase the demand for T-shaped professionals, and the upskilling of the workforce.

The stakes for Europe are much greater today than when the Cambridge report first came out over a decade ago. In addition to the fast development of high-tech enabled new services, the European Green Deal is turning climate and environmental challenges into tremendous opportunities for new services and jobs. Simultaneously, the COVID-19 pandemic and its tragic aftermath has widened the gap between already disadvantaged low-skilled and high-skilled workers, accelerating the need for massive upskilling actions from both stakeholders' entities and citizens.

THE ROLE OF SERVICE INNOVATION ROADMAPS

We propose that responsible stakeholders (workers, businesses/ industry, governments, education and training providers, researchers) make use of Service Innovation Roadmaps (SIR). It is necessary to co-create these with other stakeholders involved. These Service Innovation Roadmaps are a kind of business model canvas for their investment in their own mindful upskilling. They can be understood as a tool summarising responsible entities' learning investments and explicit actions to acquire the required training for organisations to succeed.[28] To that extent, they help stakeholders discover their real needs and potentials.

In the sections below, we analyse three investment scenarios with the aim to create a shared vision amongst all the stakeholders for an upskilled and thriving Europe 2030. The big risk is not investing enough in upskilling consciously (mindfully).

Three major types of upskilling investments are required for full success. All these are captured in effective Service Innovation Roadmaps:

INCREASE: Further support for winning strategies. Here the investment is made in providing greater resources to existing education and training activities. It refers to incrementally honing skills (individuals) or improving/keeping up to date existing educational offers (education providers) or sustaining the value proposition of existing services and products (firms). It can also mean to go for the low hanging fruit where obvious bottlenecks or roadblocks can be overcome or improving efficiencies. In policy terms it can mean pursuing a supply-side approach by, for instance, providing greater resources for existing training offers known to offer outstanding results in increasing employability, or fostering own best practices. It can also mean supporting incremental efficiency improvement of existing education and training institutions, incentives, or regulations. Efficiency gains (often technology-enabled) in existing winning

[27] University of Cambridge and IBM: Succeeding through service innovation – A perspective for education, research, business and government (White Paper) 2010: https://www.ifm.eng.cam.ac.uk/uploads/Resources/Reports/080428cambridge_ssme_whitepaper.pdf

[28] Service Science and Service Innovation, Spohrer, J., Blog post (2021): http://service-science.info/archives/5443

strategies can allow both doing more of the existing winning strategies as well as freeing up investment for transform and innovate activities. Furthermore, successful winning strategies can generate new surpluses, thereby fuelling even greater overall investment in a positive feedback loop of gains.

TRANSFORM: Adoption of external best practice. These investments are efforts in implementing reforms and *external* best practices, involving learning from peers, competitors, other institutions or other political entities and countries. It incorporates a step beyond *INCREASE* in this regard. For instance, where off-the-shelf solutions or existing domestic training offers are not sensible or feasible, policy makers or training procurers may want to look out for best practices and experiences of other regions, countries, or industries. This decision process obviously requires greater efforts, political courage, more orientation and analysis to select and then potentially emulate best practice.

INNOVATE: Create new concepts. These investments explore, create and implement new structures, knowledge and activities more adapted to meet the current and future needs of businesses and the workforce. Existing solutions are starting to fail, new environmental factors require more radical change and adaptation, or simply a new leadership opportunity arises (that others will copy eventually in a *TRANSFORM* learning step). It can mean pursuing a demand-led and anticipatory approach. While innovate activities can be the most risky investments, they can also lead to the largest overall returns in the long run.

It is important to note that, for each stakeholder, each of these investments has its role to play and all three types should be incorporated in the future vision for each entity. The question is where each type is the most appropriate, efficient and credible one.

A Service Innovation Roadmap begins to make these investment decisions and the basis on which to make them explicit. The business model canvas is a popular way to think about Service Innovation Roadmaps for one value proposition or investment opportunity at a time. Such a roadmap for multi-stakeholder partnerships or for each stakeholder entity has multiple investment opportunities in three categories Increase-Transform-Innovate, depending on the profile, the size and the organisational maturity of the partnership or the entity.

These kinds of investments need to be made based on individual decisions and analytics involving strategic planning and foresight – for businesses as well as for workers, education providers and policy makers. Some examples of factors that enable investments of the Increase-, Transform-, or Innovate type are given below.

Examples of factors enabling Increase-Transform-Innovation upskilling

	Increase	Transform	Innovate
Industry (individual business level)	• Enabling workplace learning, e.g., through encouraging and providing access to learning resources and peer exchange. • Trustful culture to help identify individual workers pain points and bottlenecks and act upon them. • Increase participation rate in further training.	• Ecosystem awareness. • Strategic skills foresight and corresponding upskilling investment.	• Future awareness. • Strategic skills foresight and related upskilling investment and hiring. • Foster entrepreneurship, play, experimentation, and creativity.

	Increase	Transform	Innovate
Workers	• Workplace learning, e.g., through co-workers, tutorials/how-to's and piecemeal OER or MOOCs. Low to mid-level importance of certification/badging.	• Finding a role model • Upskilling through further qualification classes, comprehensive MOOCs or OER and other means. High importance of certification.	• Re-inventing oneself, reskilling for new job roles and for creating innovative start-ups.
Education providers	• Review processes for incremental improvement of offers.	• Co-creation with industry. • Emulating best practice.	• Entrepreneurial university.

CURRENT SKILL NEEDS IN TECHNOLOGY-ENABLED SERVICES

STEM innovations over the last couple of decades have led to tremendous changes in the way we work and co-create value in and across diverse service systems. Increasingly we need to understand and manage complexity to navigate the changing nature of new value co-creation paradigms. It requires workers to be more collaborative and open. To understand, manage, and thrive in this changing world, workers must become more T-shaped.[29]

This means that to be an excellent service professional or a data scientist, one must also be a savvy entrepreneur, have high emotional intelligence, be curious and inquisitive, develop an understanding of other disciplines, functions (even industry verticals), and systems, manage complexity, and value diversity of experience, knowledge, geographic location, and ethnicity.

According to a recent study by LinkedIn (2019) [30], skills that are in demand today include a mix of hard skills and soft skills. The type of hard skills that companies need the most include cloud computing, artificial intelligence, analytical reasoning, people management, user experience (UX) design, mobile application development, video production, sales leadership, data science, computer graphics, and corporate communications. Some of these skill demands reflect the technologies waves that are driving and will continue to drive major share of these job demands include (in alphabetical order) 5G, AI, AR/VR, Autonomous Vehicles, Blockchain, Cybersecurity, Digital Twins, Hybrid multi-cloud and app modernisation, Internet-of-Thing (IoT), Quantum, Robotics and Drones, and others. Demand will go up for highly technical software, AI and robotics talent with background in computer science or engineering to research, design, develop, test, launch, and maintain these highly sophisticated service system platforms. This trend has already begun. According to data from Burning Glass, the scale of job postings in the auto industry has already significantly shifted toward software[31].

[29] T-shaped professionals can combine STEM skills with work practice process innovation skills such as design, agile, and open source, service thinking, plus an array of soft skills such as empathy, creativity, persuasion, collaboration, adaptability, communication (written and oral), time management and more.

[30] https://learning.linkedin.com/blog/top-skills/the-skills-companies-need-most-in-2019--and-how-to-learn-them (downloaded on March 30, 2020)

[31] http://burning-glass.com/manufacturing-shift-software-jobs-now-outpace-production-openings/

However, it is neither possible nor sensible to upskill everyone to become an IT specialist in one of the above areas of technological development, the number of such specialists needing to be increased significantly notwithstanding.

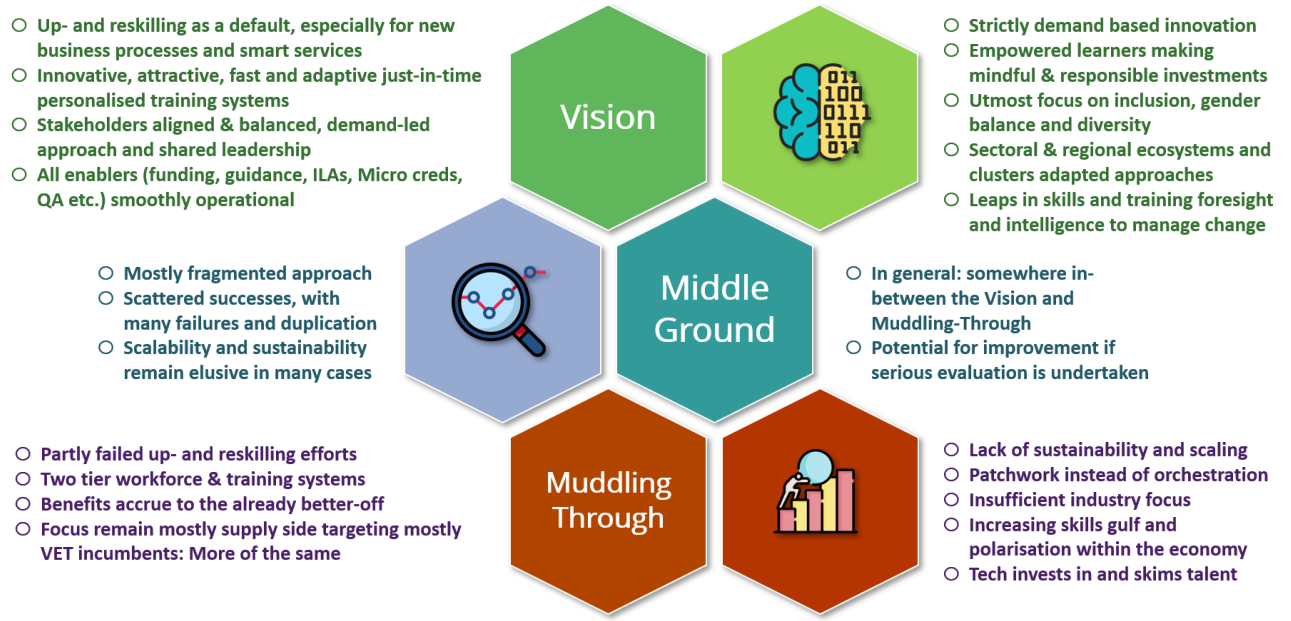
It is much more sensible to give everyone, blue collar or white collar, employed, self-employed or atypical worker, the skills to work *with* the technology and in a context where these technologies shape and augment everybody's work life. This certainly includes tech-savviness but also many other skills, competences and attitudes such as cognitive, social, cultural, communication and self-related competences that are necessary to thrive in a fast-changing economy.

SCENARIOS AND VISION FOR UPSKILLING EUROPE 2030

Tasked with the development of a vision for 2030, it was decided that this vision take the form of a scenario for that year, describing the future status quo of different stakeholders and back-cast on their actions and decisions until then. It was decided to contrast this scenario with two alternative realities that take different actions and decisions as a base leading to less optimal outcomes. The scenarios are therefore not to be understood in the common sense of scenario planning methodologies but rather present a vision contrasted with two counterfactuals.

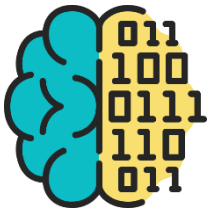
The three scenarios and their characteristics are presented in the following sections. Expert workshops, desk research and individual critical feedback have contributed to assess challenges. The scenarios aim to envision actionable pathways for upskilling actions to achieve an adequately skilled workforce in Europe by 2030.

Overview of main scenario features



	Muddling through	Middle Ground	Vision
Macro-economic	Low GDP growth, debt reduction, deflationary.	Moderate GDP growth, recovery.	High GDP growth, quick recovery.
Governance	Coordination is lacking, mainly top-down. Strong focus on **supply side** subsidies.	Coordination is good, sectoral approaches. National responsible bodies. Sustainability KPIs.	**Coordination is central and, by design, learning**, while actions are **local** (not necessarily in geographic terms but user segmentation) and decentralised. Sectoral approaches. Strong focus on **demand side** subsidies.
Co-created projects	Mainly large-scale **lighthouse projects** and **demonstrators.**	Numerous projects **benefitting** mainly **participant companies** and **institutions**. Attempts at spill-over and trickle down.	Numerous and **diverse.** Focus on **transfer** of benefits beyond participants. **Scalability** **Transparency and success control.** **>75% SMEs.**
Employers / industry	**Focus on operations** leaves little room for skilling activities. ILAs and vouchers: hurdles for SMEs, used in **outplacement and redundancy** programmes.	Training is **taken up** thanks to funding programmes with a **bias towards larger corporations** rather than SMEs.	**Funding and information** are easily available and upskilling measures for company workforces taken up. **Custom-fit f**or different types of business. **Multipliers** such as the chambers of commerce. Innovation and technology

	Muddling through	Middle Ground	Vision
			hubs encourage local demand for and providing access to consulting and tech transfer for **regional economies, capacity building** for skills formation in their communities of businesses. ILAs and vouchers taken up broadly at enterprise level, **embodied in employer processes**, **training levy or similar national schemes in place.**
SMEs	Participation in projects often **fig leaf character**, hopes for spill-over and trickle down.	Actively supported to participate, yet still bias.	**Empowered**. **Analysis of needs and future opportunitie**s for service-based innovation, support access or build up the skills needed. **Start-ups** rampant, Public-private-partnership (PPP) supported ecosystems.
Workforce	**Divided and largely detached from growth, scattered information on available training, funding etc. ILAs and vouchers taken up by the previous beneficiaries. AI and automation mainly a source of underemployment and polarisation.**	**Empowered. One-stop shop info, generic help and assessment tools. ILAs and vouchers taken up widely, tapped new user groups, attempts at correcting bias.**	**Driving. Custom-made, pro-active, user centric information and guidance. ILAs and vouchers taken up broadly by learners. Worker augmentation through AI a facilitator of transitioning workforces, easing relocation.**
VET	**Business as usual**, demonstrator projects without broader diffusion.	Increased **curriculum reform** speed.	**Industry** is heavily involved in VET reform, **service-related skills,** focus on **CVET** and worker engagement, **fast-track CVET programmes**, partial qualifications in **VET-micro-credentials**, centres of **VET Excellence** across Europe. Micro-credentials and stackable education and training widely recognised and taken up, included in CVET.
Higher Education	**Forerunners rely on keen individuals** as drivers, no institutionalisation. Funding fosters existing structures. Standardised distance learning permits more focus on research. **Micro-credentials** and stackable education **a niche market** for high tech workers.	**Vocational oriented MOOCs Interdisciplinary projects** to foster tech-based service innovation, increased interest in SSMED.	**Business model** mainstream. **Incentive structures** for fellows engaging in professional education. **Universities are a major source of entrepreneurship and new high-tech enabled services**. **Micro-credentials and stackable education widely recognised and taken up.**
(other) Training providers	**Quality and transparency issues**. Lack of qualified trainers and training developers, both technical and didactical. **MOOCs and vendor trainings blossom because of scalability.**	Quality and transparency issues tackled through self-commitment and ISO certification.	**Lightweight quality regime**, utmost **transparency of learning outcomes, learner experience and ratings** overseen by a **national responsible training quality body**. Train-the-trainer is supported.



Scenario 1: The Vision scenario

An unprecedented mobilisation of budget and the creation of a joint upskilling ecosystem has enabled Europe to adequate its skill base to the post-pandemic reality. Grasping the importance of acting on a large scale at the beginning of the decade, extraordinary financial funds were mobilised through NextGenerationEU, European Recovery Instrument, including the REACT-EU instrument, and the reinforced multiannual financial framework (2021-2027). Until early 2020, the need for upskilling to prevent job losses from automation had been highlighted by a number of – widely ignored – labour experts and economists. Yet, the COVID-19 pandemic gave the missing impulse to tackle the long looming skills challenge, not only overcoming the pandemic crisis.

Europe has managed to:

- Recover its GDP on the pre-crisis trajectory path. In fact, the EU and US economies have met the predictions of major economists and recovered before the end of 2021.[32] A major push factor towards these achievements were the public stimulus payments to heat up consumption, as well as a surge in consumer spending after the end of COVID-19 restrictions.
- Establish upskilling as a default to ensure an employable workforce.
- Reinforce, above all, the most in-demand skills for an innovative, service-based economy.
- Reduce the gender gap in digital skills, reaffirming its commitment to achieving an even composition of ICT specialists. The pandemic accelerated the gap's reduction in basic digital skills by two times the 2015-2019 decrease,[33] placing it at less than 5%.
- Shape skills creation systems (training and education governance and organisations) which are agile and flexible enough to tackle an emergent, unstable and increasingly complex competences environment after some disruption in training and recruitment resulting from an international trend towards employers focussing more on skills rather than on traditional education only.[34]

This was achieved through and supported by a multi-layered and concrete policy toolbox.

The vision for 2030

In this scenario, stakeholders find themselves in the following situation in 2030:

Government / policy makers

The upskilling "elephant in the room" was actively tackled at the start of the pandemic, particularly through EU funds mobilisations, recommendations and guidance for Member States to ramp up huge upskilling schemes. The skills demand on data and intelligence were discovered through consultations with key stakeholders about how to deploy known best practices and proven concepts. The situation resembled the era after the German Reunification, when an

[32] As assumed by Financial Times (5/2/2021): Chris Giles: Global economy recovery. Largest economies forecast to regain pre-Covid levels by end of year. https://www.ft.com/content/dce3f4be-2da7-4cf8-a990-a867a9c2eb86..

[33] European Commission (2020). Women in Digital Scoreboard 2020. See: https://ec.europa.eu/digital-single-market/en/women-digital-0

[34] Financial Times (5/3/2021): Andrew Jack: Employers shift focus from education to skills: https://www.ft.com/content/4e610474-9c93-4e47-a042-915d2222cc4b

unprecedented public sector funded training scheme led around 1 million citizens to participate in upskilling and reskilling programmes from 1993-1996.[35]

The European upskilling plan benefitted from these experiences when policy makers started to launch massive programmes. Roughly, the strategy can be described as a consequent deployment of the European Skills Agenda for Sustainable Competitiveness, Social Fairness and Resilience.[36] Additional relevant proven concepts and international best practices were studied, coupled with a consultation with key stakeholders on how to implement the programmes. Based on the big funding mechanisms, the following mechanisms especially contributed to the scheme's success:

1. Individual Learning Accounts: Following the EU proposal for a Council Recommendation in late 2021[37] and a respective regulation in 2023, all Member States introduced ILAs with an annual credit of €500-700 per person aged 18-68. The ILAs are funded through a training levy applied to all medium and large companies. Lagging regions are supported through the European Regional Development Fund and have a lower training levy. The popularity of ILAs was enhanced through a massive PR campaign.
2. Micro-credentials: A standard framework for micro-credentials was adopted, that involves higher education, VET and informal training providers. Special attention was given to micro-credentials in VET, since this realm had received fewer attention compared to higher education prior to 2020. The model for vocational micro-credentials was inspired by MOOCs, bootcamps and nanodegrees previously offered by commercial (online) providers, but also by public institutions. Thus, micro-credentials are offered as sub-modules of a VET profession which are certified individually but can be stacked to a whole vocational degree.
3. Reskilling programmes: For professions and sectors which were most affected by automation and the pandemic, reskilling programmes towards highly demanded professions, especially in ICT and healthcare. Schemes have a duration of 9 to 36 months during which participants receive a scholarship of the monthly minimum wage, to cover living expenses. Early practical placements with companies enhance the employability and prevent lock-in effects in social benefits. The programmes are available for unemployed and workers in affected areas aged 18-50.
4. Twinnings: The funding scheme of Twinnings[38] enabled a bilateral cross-border exchange between originator organisations with well-succeeded upskilling schemes and adopters with similar challenges. In this way, good practices are not only disseminated on paper, but deployed with the help of practitioners.

The European Commission invested in making available all relevant data and information (skills intelligence and best practices) and provided a **toolbox** for policy makers allowing rapid and efficient mobilisation of resources and funding.

Toolbox for policy and decision-makers – examples of contents

- Current and emerging practice of national upskilling strategies, position papers and programmes
- Concrete learning examples such as experiences with ILAs and micro-credentials
- Best and emerging practice library of projects and initiatives (incl. sectoral and industrial ecosystems segmentation, target group of learners and employers, domain of learning outcomes, scale and scalability, KPIs and evaluation)

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[35] See Fitzenberger, Völter (2007), Long-Run Effects of Training Programs for the Unemployed in East Germany. See: https://www.iza.org/publications/dp/2630/long-run-effects-of-training-programs-for-the-unemployed-in-east-germany .

[36] https://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=9723

[37] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12876-Individual-Learning-Accounts-A-possibility-to-empower-individuals-to-undertake-training/public-consultation

[38] See examples of current Twinnings in other domains here: https://ec.europa.eu/neighbourhood-enlargement/tenders/twinning_en; https://digitalhealtheurope.eu/twinnings/

- Best practice of industry and other stakeholders' engagement for programme design
- Funding guidance for upskilling campaigns (rules of participation, application, eligibility)
- Skills and labour market intelligence and information systems (by region, sector)
- Skills and labour market foresight (by region, sector)
- Training and certification market information, information about platforms
- Standards and quality labels
- Twinnings: EU-funded mechanism for facilitating the transfer and implementation of innovative practices in upskilling and reskilling from one region to another.

The meanwhile established Common European Data Spaces[39] provide a genuine digital single market for data and have become a sound basis for skills intelligence. The secondary use of skills, curriculum, training and employment data has tremendously improved the analysis of labour market and workforce needs. National **roadmaps** were provided from all Member States and helped policy makers design and implement a holistic strategy for fostering service innovation, with a strong focus on efficient planning and resources allocation. From the start, a monitoring system was set in place, which allowed for stringent performance assessment. This independent supervision system conducted a critical review to also enable early spotting of any unintended consequences and design issues of these huge and partly system changing measures. These challenges would involve tackling hurdles seen in the post German Democratic Republic transformation, such as lack of matching between individual skills profiles and qualifications and insufficient training of employment agency case workers.[40]

Industry / employers

Employers and industry know how to assess incentives and funding mechanisms to support upskilling and reskilling measures for their workforce. Companies can request funds without much bureaucracy and following simple rules, to ensure equitable access to learning, especially for SMEs. Granting and supporting learning opportunities has become integral part of corporate identity and employer branding. The new "corporate skilling responsibility" is also demanded by the workforce. The post-COVID-19 transformations of entire sectors have contributed to this mindset. Pilot recruiters started to hire displaced gastronomy workers for customer service positions, building up on their existing skills in client orientation through short upskilling courses. Soon, many employers began to copy this approach. By 2025, offering top-up skill courses for side-entries from formerly unexplored industries and education pathways had become mainstream and contributed significantly to a smooth workforce transition.[41]

In this context, the training levy payment is part of the corporate skilling identity. After an initial phase of reluctance, this co-financing is broadly accepted, with yearly contribution sums proudly displayed on company social media and websites. The obligatory sum can be complemented voluntarily with additional payments. Companies who opt for this over-pay can apply for small tax exemptions – an option used by 10% of employers. Information on available training, incentives and funding are easily accessible on one central platform. Possible trainings are presented in a way that is

[39] European Commission (2020): Communication: A European Strategy for Data. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0066&from=EN

[40] See Fitzenberger, Völter (2007), Long-Run Effects of Training Programs for the Unemployed in East Germany. See: https://www.iza.org/publications/dp/2630/long-run-effects-of-training-programs-for-the-unemployed-in-east-germany

[41] See Financial Times (2021/05/03) Jack, Andrew: Employers shift focus from education to skills. https://www.ft.com/content/4e610474-9c93-4e47-a042-915d2222cc4b

custom fit for different types of business and sectors and are actively disseminated through multipliers, such as sectoral associations, chambers of commerce etc. Additionally, models for cross-company collaborations were developed and are well received by SMEs. This is a huge improvement from 2020, when 79% of companies declared they were not able to make use of public funds and only 12% were collaborating across companies (8% across industries).[42]

Government is sponsoring a huge amount of co-created projects between industry, education and training organisations, in return for transparency and success control. All projects with more than three partners are required to include at least one SME. This was met with reluctance first but has gradually shown positive results. They enable diverse methods and mechanisms of worker development for enterprises, pump-priming the capacity to offer large upskilling campaigns for education providers and a process of experimental learning and programme benchmarking for policy makers.

Innovation and technology hubs have been benefitting largely from the public funds for upskilling and reskilling becoming available after 2020/2021, emphasising their role in encouraging local demand for and providing access to consulting and tech transfer for regional economies. Their mission is going beyond tech transfer into capacity building for skills formation in their communities of businesses.

Skills intelligence for SMEs is offered by publicly funded analysis services. A low-threshold platform was developed, based on the Latvian tool DIGINNO[43]. While the latter concentrated on assessing the companies' digital maturity, the new platform analyses the needs and future opportunities for service-based innovation. This is complemented by a government-paid consulting offer, also with the aim of connecting companies with the possibilities to access or build up the skills needed.

Micro-credentials are widely recognised, after intense awareness-raising campaigns. These campaigns included inviting company directors and senior managers to try out one micro-credential course free-of-charge themselves.

Since 2025, Industry is highly involved in a VET reform, to enable more flexible curricula taking into account digital skills necessary to address the demands of industry. The reforms are run at national levels to ensure fitness-for-purpose given the national peculiarities of VET systems. Many companies offer VET micro-credentials, which are paid for equally by the government, workers and companies each. Companies have agreed on freeing their employees in a VET micro-qualification for two hours a week, while workers commit to dedicate their free time for the training hours that remain. As VET curricula were known to be particularly inert as regards implementing change, much focus was put on CVET and how to encourage workers to engage in it. Partial qualifications in VET-micro-credentials have become more common, with VET schools offering them as regular part of their teaching. They are available for all recognised VET professions. Centres of VET Excellence have been created across Europe.

Workers and social partners

Funds for professional training and a great portfolio of effective professional training opportunities, are now available for working-age population of all skills levels, occupational status and industry. The fact that workers expect training to be easy has ceased to be seen as a false perception but has re-directed new learning concepts for the workplace. Especially in non-academic professions workers have taken up well the "just-enough, just-for-me, just-in-time" training approach. There is an overall awareness of how workers can get advice on available training, funding, workplace rights and entitlements, and career pathways, to make an informed decision about their professional development. Career planning is not interpreted as something reserved to academics anymore.

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[42] World Economic Forum (2020): The Future of Jobs Report: https://www.weforum.org/reports/the-future-of-jobs-report-2020

[43] See DIGINNO: Digital Innovation Network: https://www.diginnotool.eu/home

In general, an explicit focus on those target groups traditionally under-represented in lifelong learning has slowly changed the paradox that those who would most need training, participate less in such activities. Especially for full-time re-trainings, scholarships to compensate income foregone while training have made a big impact in raising training participation. This right has been recommended on EU level and further negotiated with social partners. Since these aids were branded as scholarships, and not as "Paid training leaves" and bureaucratic obstacles have been removed, the share of those who formerly did not want to train due to the lack of income in this period has risen steadily. 10% of blue-collar workers from jobs in sectors hit hard by the pandemic and automation now opt for fulltime re-training with a scholarship (as a comparison example: in the Upper Austrian individual learning scheme, only 3% of participants were on a financed training leave in 2017[44]).

The ILAs which grant a non-repayable annual credit (i.e., varying between €300-500. Low-skilled individuals receive €500-800 per year), are widely known and accepted. The credit distribution favours specialised digital and "green" related skills. Apart from billboard announcements, especially a cooperation with 20 major European banks has had a big impact: in every bank account statement, the owner's ILA credits are displayed explicitly. These measures have helped to achieve an overall ILA-usage percentage of 30% in active workforce across the EU in 2030 (with a range between 9% and 50%), which is remarkable, compared to the 2,1 % in France in 2018.[45]

Another factor that led to more willingness in further training among workers were the effects of the pandemic. COVID-related unemployment peaked significantly higher for workers with less than secondary education (21,2% in the US in April 2020) then for those with tertiary education (8,45%) with the gap being much bigger than in the 2008 crisis.[47]

Workplace conditions for learning are supportive of both informal and formal learning and employers support workforce development. An attractive certification and credentials regime presents the right incentives for skills investment, fosters convertibility, and puts workers in a position to easily showcase their achievements and use these in negotiations with employers.

Despite all efforts, transitioning of a significant part of the workforce became a painful necessity due to industrial shifts that are still taking place in 2030. The COVID-19 crisis had left many industries battered so that it emerged that the status quo ante was unlikely ever to be regained for these industries. The same applies to the green transition effects on some industries. Another labour market disruption came from automation through so-called robotic process automation, which affected many middle-class clerical jobs.

Technological progress in man-machine interface, VR and human augmentation through AI turned out to be a facilitator of transitioning workforces. Workers of all levels are aware of the offer of micro-credentials in higher education, VET and beyond.

Universities and academic research

A new business model for universities engaging in professional development has finally become mainstream as they responded to the conditions set by governments eager to develop upskilling offers for already highly skilled

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[44] OECD (2019): Individual Learning Accounts: Panacea or Pandora's Box?: https://www.oecd-ilibrary.org/sites/203b21a8-en/1/2/4/index.html?itemId=/content/publication/203b21a8-en&_csp_=de440b0f73fd460cf664c2614fc125d7&itemIGO=oecd&itemContentType=book#section-d1e3356

[45] OECD (2019): Individual Learning Accounts: Panacea or Pandora's Box?: https://www.oecd-ilibrary.org/employment/individual-learning-schemes_203b21a8-en

[46] Cedefop (2016): Investing in skills pays off: the economic and social cost of low-skilled adults in the EU: https://www.cedefop.europa.eu/files/5560_es_investing_in_skills.pdf

[47] World Economic Forum (2020): The Future of Jobs Report: https://www.weforum.org/reports/the-future-of-jobs-report-2020.

professionals. Especially the newly established framework for micro-credentials helped universities to create small but scalable and stackable offerings for academic level professional education. Also, offering specific bachelor and master's degrees, as well as short cycles, tailored according to the industry's needs has become a commonly accepted business model for higher education in addition to traditional Bachelor and Master education programmes. Courses offered in cooperation with big companies, like the BMW Speed Up programme at the University of Applied Sciences in Esslingen[48] are offered as well as courses for employees from diverse companies, which were developed in cooperation with chambers of commerce.

After the COVID-19 crisis it soon emerged that many Asian countries were rapidly developing industrial policies grounded in their smart services research. The lesson taken from their success was that Europe needed to offer skills production, in conjunction with research, to all its workforce, not just to the youngest cohorts.

During the pandemic, distance learning leap-frogged within the oftentimes quite traditional European universities, fostering both modularity and scalability of educational offers – a synergy effect which would then largely benefit the development of professional education offers.

Pioneering universities eager to engage lifelong learning offers realised early on that the traditional tenure-track pathway for academic staff was not quite fit for purpose. Researchers did not want to be side-lined into an "adult education" silo which demanded more custom-made approaches than the undergraduate classes and therefore meant less time available for research. It was feared by many academics that the professional education track was to have less reputation than the traditional one. However, successful designs of the institutional setup and co-creation processes finally emerged, and diffused, from the competition by universities for the priming government funds. This was especially exemplified by a large uptake of micro-credentials. Through these designs, it became possible to keep curricula at pace with both technological progress and the relevant latest research, as well as in line with current and emerging industry practice.

University research is now a major source of entrepreneurship and new high-tech enabled services through university start-up incubators. This successful model of public-private partnerships has created a significant pipeline of innovation and entrepreneurship in Europe.

Training providers

As in the other scenarios, there was a sudden surge in demand for training. The prevailing paradigm for training is "just enough, just in time, just for me" ("3J") instead of "just in case": easily digestible learning units, immediately applicable on the job and personally targeted and available remotely.[49] Successful digital training systems based on performance support have been developed through multi-stakeholder partnerships (see below).

Rigorous quality assurance regimes were implemented from the very beginning to avoid a situation similar to the rather unregulated "training provider gold rush" that emerged in post-GDR, leading to training in some target professions that tremendously exceeded the actual demand[50]. This is accompanied by strict procurement guidelines for publicly funded

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[48] See Hochschule Esslingen Website: https://www.hs-esslingen.de/wirtschaft-und-technik/studienangebot/studium-plus/mechatronikcom-praxisbegleitend-b-eng/speed-up-das-bmw-bachelorprogramm/-

[49] World Economic Forum in collaboration with PwC: Upskilling for Shared Prosperity. Insight Report, January 2021: https://www.weforum.org/reports/upskilling-for-shared-prosperity

[50] See Reutter (2019): Irrtümer und Einsichten – Berufliche Weiterbildung in den neuen Ländern nach der Wende. Available at: https://material.rpi-virtuell.de/material/irrtuemer-und-einsichten-berufliche-weiterbildung-in-den-neuen-laendern-nach-der-wende/

training: contracts with training providers are made after specific calls for programmes, which are based on a careful evaluation of skills and labour market.

Another measure that made the training market more oriented towards learners' needs and interests were the Individual Learning Accounts. Since learners were equipped with the new, unprecedented purchasing power earmarked for training, training providers themselves have an interest in disseminating the ILA instrument through their social media and websites. This has also been observed in France in the 2010s.[51]

Bottlenecks identified included qualified trainers and training developers, both technical and didactical, but also co-creation specialists. The latter were in scarce supply also on the industry side. Therefore, sectoral train-the-trainer approaches were pursued and significantly supported early on to support European industrial policy.

As in the other scenarios, MOOC providers and other online adult training providers as well as vendor programmes benefitted and grew in yearly double digits. The "3J" approach is increasingly becoming mainstream in this realm as well. COVID-19 has accelerated the move away from a primarily premised-based teaching model.

Multi-stakeholder partnerships

Demand-led multi-stakeholder- partnerships in education and training with active participation from industry have so much become the new normal that its unwieldy name has finally disappeared.

Another important area of multi-stakeholder-partnerships is learning brand partnerships between employers, training providers and academia.

Executives play an important role in disseminating the "3J" trainings. Briefed by training providers and entitled to take a certain number of courses free of charge themselves, they recommend courses to workers. Attractive incentives were given to enable these seasoned industry practitioners to temporarily change sides and help training providers with development and delivery of suitable training offers.

Also, evaluation systems have been re-designed in a cooperation between training providers, education authorities and companies. In this way, attending 100% of the lessons and passing a written exam is not the only way to obtain a certificate for a micro-degree, for example. Inspired by the VET model, companies can also attest their employees' successful completion of the course by certifying that the learned content was successfully applied on the job – e.g., that the worker learned how to operate a new machine.

Academia and training providers, in consultation with workers, have collaborated in developing new training formats adapted to the "3J" learning: games, quizzes, videos and infographics are combined with augmented reality to make learning more entertaining for workers.

Civil society, NGOs, foundations

The third sector is thriving and has been a keen corrective of powerful particular interests. It continues to be of unmatched help in finding ways to improve accessibility and inclusiveness of the grand challenge of upskilling for services and jobs.

There are partnerships with the social sector to provide a sustainable support network for workers and learners to make sure they can focus sufficiently on their re-and upskilling. This includes an increase of available spots in kindergarten, but also for elderly care.

[51] See for example: Comment financer ma formation avec le CPF? (1020/11/9): https://www.youtube.com/watch?v=cKL18iDmPsA

Scenario 2: The Middle Ground scenario

In this scenario, Europe in 2030 shows good signs of consolidation after its struggle with the consequences of COVID-19. Europe has invested heavily in projects to foster entrepreneurship, plus upskilling and reskilling following the NextGenerationEU / European Recovery Instrument, including the REACT-EU instrument, and the reinforced multiannual financial framework for 2021- 2027. In doing so, it has made efforts to follow a stringent masterplan for economic transformation responding to the needs of the economy especially regarding productive services in the green economy. The upskilling has begun to bear fruit, although skills gaps keep surfacing continuously, as a side effect of the rapid technological advancement. The education and training systems are in response mode and cater for the emerging societal needs in an agile manner. Especially, Europe finds itself in a situation where:

- GDP growth is moderate at around 1.5%[52] and many workers have been able to find jobs matching their skills and qualifications. By the end of 2021, the eurozone had recovered its pre-pandemic output, which was, yet, a few months behind the prediction.[53] Fault lines from the industrial reconfigurations are still sensed, but the strong economy shows new opportunities for dislocated workers and failed entrepreneurs. The employment rate has almost recovered and is above 70%.
- Especially workers from the hardest-hit segments of the economy have been offered quick upskilling and reskilling measures and a majority succeeded in finding adequate offers that led to good jobs even if they mean starting over in completely new settings.
- For many, though not all, institutions in the education and training system, the massive collective effort at finally institutionalising lifelong learning has set them on a sustainable journey towards vocational and professional lifelong learning education.

The situation of stakeholders in 2030

Government / policy makers

As in the previous scenario, governments became active in funding and setting up upskilling and reskilling campaigns in unprecedented ways. From the outset, coordination was seen as a basic prerequisite and national responsible bodies were created at government level coordinating relevant initiatives by different ministries.

Analysis of different sector needs led to a semi-decentralised and demand-driven approach. As expected, some industries were better organised than others and succeeded more quickly in setting up sector-wide initiatives. These were funded in a first round for building consortia with major industry players together with higher education and vocational training institutions to quickly draft strategies writing up the most urgent skill needs, and the most likely technological developments expected to be shaping the respective industries going forward.

Business and sustainability plans were imperative to be developed for any further rollout funding and their implementation monitored. Abiding to these plans was seen as a painful duty by some consortia but a few real success stories could be accounted to be the result of these requirements. At the same time, stimulating demand was equally

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[52] As assumed by e.g., Cedefop, Eurofound (2018). Skills forecast trends and challenges to 2030 Luxembourg: Publications Office. Cedefop reference series; No 108. http://data.europa.eu/doi/10.2801/4492. DG ECFIN forecasts typically cover a shorter time horizon.

[53] As assumed by Financial Times (5/2/2021): Chris Giles: Global economy recovery. Largest economies forecast to regain pre-Covid levels by end of year. https://www.ft.com/content/dce3f4be-2da7-4cf8-a990-a867a9c2eb86.

on the agenda allowing workers to get substantial financial support for any upskilling activity related to future work and new jobs.

Industry / employers

The sectoral upskilling campaigns have seen good results by 2030. Many employers have benefitted either directly through funded projects or at least have started to benefit through renewed and better curricula which are slowly being implemented and rolled-out after successful demonstration and validation phases. Funding is available to support upskilling measures for company workforces and are actually taken up broadly, albeit with a bias towards larger corporations rather than SMEs.

Employees make use of the ILAs and training vouchers, but employees insisting on taking time off for training leads to some conflict at the workplace more often than not. Informed workers and a generally favourable public opinion about lifelong learning are gaining ground. This has in no small part been helped by massive information campaigns together with easy-to-use tools and resources that have been developed in all Member States and well-coordinated at EU level.

Workers and social partners

Workers increasingly make use of the incentives set by policy to invest in lifelong learning. There is still a bias towards highly skilled workers, but many low-skilled employees are increasingly engaged in upskilling activities. The availability of suitable trainings for workers of all kinds of jobs and sectors has improved and are increasingly taken up by workers. Workers are given all the information needed, such as available training, funding, workplace rights and entitlements, job opportunities and career pathways, to make an informed decision about their professional development.

Workplace conditions for learning are mixed – while some industries and high-skilled workers are significantly more deeply involved – there is still insufficient investment for many low skilled workers, (such as for example in logistics: warehouse workers, delivery drivers etc.). There are simply only few perspectives for much upward mobility within their current environment. Policy is trying to figure out how to make these kinds of jobs to be of episodic nature in many work-lives.

Transitioning of a significant part of the workforce became a painful necessity due to industrial shifts that are still taking place in 2030. The COVID-19 crisis, along with the changing consumption, investment and production patterns, had left many industries battered so that at some point it emerged that the *status quo* ante was unlikely ever to be regained for these industries. The same applies to the green transition effects on some industries. Transitioning almost entire industry workforces into new productive jobs was a task reminiscent of the transition process in Eastern European economies after the fall of the iron curtain, albeit, and luckily, at a significantly smaller scale and at a time of labour scarcity in many industries.

Universities and academic research

Universities have been involved in coordinated co-creation activities to curriculum reform with industry across sectors. Incentives to create vocational oriented MOOCs led to a whole variety of offers being on offer by 2030. The newly established framework for micro-credentials was of help for universities to create stackable offerings for academic level professional education and at least a niche market for these.

As funding for universities engaging in skills projects was available in unprecedented manner, existing STEM disciplines flourished and expanded. Especially interdisciplinary projects were funded to foster tech-based service innovation. This led to an increase in the interest in SSMED which was consulted about how to transform education further into this cross-disciplinary approach.

Training providers

The sudden surge in demand for training was anticipated and quality assurances rules implemented. However, the urgency of the problem forbade implementing strangling quality regimes. Instead, a lightweight approach was

desperately needed. Policy very much relied on self-commitment and ISO certification, which was not optimal but had probably helped avoid the crassest cases of fraud, waste and Potemkin village types of offers.

At the same time, MOOC providers and other recent adult training disruptors such as bootcamps which specialised on delivering a mainly online leaning blended learning, were able to generate enormous income, benefiting from their experience in offering scalable classes at a time when prices increased due to increased demand and subsidisation.

Also, especially big-tech vendors were quick to react to the new policy by marketing their courses to policy makers and the public to quickly reskill people into domains of high demand offering almost perfect jobs guarantees for graduates.

Multi-stakeholder partnerships

The sectoral and ecosystem-based approach to funding led to a strengthening of these systems and many funded projects were set up to initiate sustainable multi-stakeholder partnerships.

Civil society, NGOs, foundations

As in the first scenario, the third sector is an important factor in upskilling and reskilling. Close exchange with NGOs and philanthropic organisations was sought by policy to learn from their troves of (global) knowledge in helping upskill vulnerable groups especially.

Scenario 3: The Muddling Through scenario

In this scenario, Europe in 2030 looks back at a decade where it had invested heavily in upskilling and reskilling following the NextGenerationEU / European Recovery Instrument, including the REACT-EU instrument, and the reinforced multiannual financial framework for 2021 - 2027. Although a bold investment, Europe has only partly succeeded in overcoming the economic and social crises following the pandemic and alleviating the persistent skills challenge. Especially it finds itself in a situation where:

- Europe's economic recovery has taken longer than expected: By end 2022, the region met its pre-pandemic growth trajectory – a year later than forecasted by major economists in May 2021. The situation in the USA is similar.[54] An unexpectedly slow vaccination rollout was the major reason for this delayed recovery. In this way, consumers still struggle to increase their purchasing power, face more debt, or sold assets originally foreseen for retirement leading to a deflationary economic environment.[55] The employment rate (which was 73% in 2019) has slightly recovered after plummeting in the crisis but the quality of jobs and the career outlooks have decreased for many.
- Many businesses, especially small businesses, have not survived, and some sectors (especially in tourism, hospitality, culture, entertainment, and recreation) have been hit hard during and in the aftermath of the pandemic, and went through considerable restructuring, forcing workers to reskill and move to other sectors and types of occupations.
- Many workers from the hardest hit segments of the economy experience lack of demand for their skills and a rapid de-skilling of their qualifications and were forced into low-skill-low-pay jobs, many in the gig economy. This coincided with rapidly decreasing demand for especially mid-level but also highly skilled professionals due to robotic process automation.
- On the other hand, well-educated and highly skilled (with a college degree and above) individuals are better-off, have benefitted from increased upskilling support and thrive in productive sectors and more flexible working arrangements.
- As the public upskilling and reskilling investments level out, the education and training sector, including universities and for-profit providers, faces overcapacities and many wonder whether the increased efforts of the early 2020s had not severely missed focus on sustainability, been an over-investment after all, and had initiated a hog-cycle pattern in the training industry as well as in academia.

The situation of stakeholders in 2030

Government / policy makers

Many government programmes were initiated in 2021-2022 given the vast new resources made available for upskilling and reskilling. Ministries, such as those for the economy/industry, education, and labour and social affairs, but also industry and sector specific ones such as health, justice, and international cooperation, made their plans and drafted programmes. Rivalry, insufficient inhouse expertise and a simple lack of coordination in many countries soon became apparent and led to delays and many doubled efforts and missed opportunities.

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[54] Financial Times (5/2/2021): Chris Giles: Global economy recovery. Largest economies forecast to regain pre-Covid levels by end of year. https://www.ft.com/content/dce3f4be-2da7-4cf8-a990-a867a9c2eb86.

[55] See: Nathaniel Arnold and Vina Nguyen: Five Charts on the Euro Area's Post-COVID-19 Recovery and Growth. IMF, European Department (22 December 2020): https://www.imf.org/en/News/Articles/2020/12/21/na122220five-charts-on-the-euro-areas-postcovid19-recovery-and-growth.

In a rush to benefit from funds, traditional approaches were prioritised over more forward-looking analysis, leading to a lack of big picture-awareness, of diligent service innovation road-mapping and of a systemic, holistic, and an orchestrated approach. In hindsight, a thorough understanding of the "*Increase – Transform – Innovate*" schema for governments and policy makers could have helped avoid the rampant misspending and inefficiencies, with too much emphasis on supply, where projects were developed that hardly matched demand and so turned out to be straw fires, similar to the situation in Eastern Germany in the 90s, when a lack of government regulation led to training in areas that did not meet the labour market's needs.[56]

For lack of a long-term master plan, spending was directed to education and training constituencies coming up with projects based on open calls for proposals, which resulted in funding many fancy-sounding large-scale but one-off projects by those providers who knew best how to navigate funding regulations. It so turned out that these project consortia were not designed for sustainability and almost none ever transformed into any durable partnership but vanished when the funding ran out.

Funding supply also had the disadvantage of education and training providers having to convince funders, i.e., policy and administrative decision makers, of the value added of their offers – thus mostly leaving out of the equation employers, social partners and learners.

Consequently, the resulting portfolio was mostly biased towards opportunistic overhyped projects that made for good publicity, but as yet little impact, tackling only the needs of those that had the best lobbying, but also of projects that lay in the drawer but were hard to sell beforehand. It became clear that despite all very good intentions and ambitious targets, decision makers were not able to anticipate skill needs and actual demand in a top-down planning manner.

Industry / employers

The situation for employers regarding upskilling is ambivalent in 2030. Several had been taking part in projects in one way or another but still the large majority and especially SMEs have not benefited too much from the increased public efforts for upskilling and reskilling that accrued mainly to those companies which happened to participate in projects.

Funding is available to support upskilling and reskilling measures for company workforces and needs to be applied for in a quite traditional bureaucratic process. Since the funding administration is overburdened with decisions on granting funds, it takes a long time to decide while chances of success are modest, especially SMEs avoid wasting time and submitting application.

The prolonged dire economic situation had led to repeated rounds of consolidation leaving companies largely understaffed and relying on their most productive employees with close to zero redundant buffer reserves at all. Consequently, the requirements of daily operation leave no space for further training activities, which altogether results in an underinvestment in skills. With a focus on consolidation, increasing competition for scarce talent, innovation capacity is curbed as well. This has led to a situation where the funding targeting demand (industry) that has been implemented is hardly taken up by businesses except in outplacement and redundancy programmes. Individual Learning Accounts (ILAs) (in the few countries where they exist) and training vouchers are hardly claimed by employers and the workforce, as they are seen mainly as a means for reskilling unemployed and low-skilled workers.

The situation is quite different in a few forerunning smart businesses which have taken on service innovation opportunities. They are constantly in search for new talent and invest in training their workforces together with specialised training providers offering tailor-made cutting-edge trainings to a small but very productive high-tech

[56] See Reutter (2019): Irrtümer und Einsichten – Berufliche Weiterbildung in den neuen Ländern nach der Wende. Available at: https://material.rpi-virtuell.de/material/irrtuemer-und-einsichten-berufliche-weiterbildung-in-den-neuen-laendern-nach-der-wende/

services workforce. They are closely working with the best research and technical universities and have built a tight ecosystem that includes hiring pipelines.

Workers and social partners

The situation in 2030 for workers is characterised by an increasing gulf between a few highly productive and extremely well-paid tech workers and a majority of workers that are threatened by precarious employment and technological underemployment and hence have both, little income and little bargaining power. Many of the latter group have given up on what they perceive as a Red Queen's race they cannot endure or win, hence an increase of deaths of despair as witnessed in the US more than a decade earlier.[57] It has become more and more apparent that upskilling into better and more sophisticated jobs is especially hard to do for low skilled workers[58] and that the automated workplace for these workers leaves little room for any such activity[59].

This is not to say that many of the promises and developments that had for decades been expected in work, education and training did not materialise. Micro-credentials were a milestone in unbundling education and knitting real academic level further training into the work life reality of knowledge workers and professionals while vouchers and ILAs gave incentives to invest in it. However, ILAs have not been implemented in all countries and micro-credentials are restricted to the academic area. The experience of remote-everything during the pandemic gave rise to MOOCs, supported by OERs, being the natural choice for learning. However, while these developments did reach a critical mass to develop, still they only accrued to a (albeit sizable) minority of highly skilled and already better-off workers. The workers that do not partake in remote learning – or any upskilling for that matter - are those that have traditionally been underrepresented in training and lifelong learning before.

Workplace conditions for learning are impeded by focus on short term operational efficiency, and informal learning is expected by employers to happen effortlessly on the go. Skills are rarely certified but keen workers have resorted to informal badging alternatives.

Universities and academic research

Appeals to universities to engage in professional development were uttered repeatedly but did not reflect on the logic of operation set through regulations, incentives and funding realities in European higher education systems. Even universities eager to engage in it had to be quite inventive and rely on keen individuals as drivers to install entrepreneurial minded special purpose entities. Given that these were risky endeavours, the current organisational structure gave little incentives for universities to overcome organisational inertia and become active. And many of these individuals left - sooner or later - to the private sector.

The newly established framework for micro-credentials was of help, though, for universities to create stackable offerings for academic level professional education and at least a niche market for these. As funding for universities engaging in

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[57] Anne Case and Angus Deaton: Life expectancy in adulthood is falling for those without a BA degree, but as educational gaps have widened, racial gaps have narrowed (16 March 2021): https://www.pnas.org/content/118/11/e2024777118

[58] The WEF's Future of Jobs report (2020) estimates, based on their 2020 survey, that repetitive occupations and redundant jobs will decrease from 15.4% to 9%, while emerging professions will rise from 7.8% to 13.5%, suggesting a rapid adjustment in the labour market, accelerated partly by the advanced technologies. Additionally, Alabdulkareem et al. (2018) provide further measurements about the impact of skills on job trajectory, as well as the role of AI. A summary of the their paper (Unpacking the polarization of workplace skills) can be found here: https://www.media.mit.edu/posts/how-skills-affect-your-job-trajectory-and-their-implications-for-automation-by-ai/

[59] Bryan Walsh: The robo-job apocalypse is being delayed (18 November 2020): https://www.axios.com/mit-future-work-automation-jobs-robot-bb29a4a3-05e0-42b3-98f1-02598d1be2ea.html

skills projects was available in an unprecedented manner, existing STEM disciplines flourished and expanded. However, in this situation as a side-effect there was little productive pressure to truly innovate and invest in teaching and reach real interdisciplinarity beyond patchworked curricula. STEM chairs could realise many projects instead that they had long desired. SSMED (Service Science, Management, Engineering and Design) benefited in so far as the existing research programmes were indeed fostered. However, a real push to transferring it into the vocational skills formation of professionals lacked.

Distance learning was established during the pandemic as an integral part of the curriculum. At the same time, fewer students entered universities for demographic reasons and curbed international mobility. With funding increased through different skills pacts, universities were quite content to gradually shift the focus on research.

Training providers

The sudden surge in demand for training due to the newly grown government dedication led to a "gold rush" frenzy in the training provider scene. In their struggle to quickly deliver according to demand, quality suffered, and cases of fraud, waste and Potemkin village types of offer blossomed. This effect was intensified by the large uptake of Individual Learning Accounts, which increased the demand for upskilling offers from private training providers and at the same time raised prices. Training providers themselves actively promoted ILAs and encourage citizens to make use of them.

A lack of qualified trainers and talented training developers, both technical and didactical, soon became obvious. At the same time, MOOC providers and other recent adult training disruptors such as bootcamps which specialised on delivering a mainly online leaning blended learning, were able to generate large income, benefiting from their experience in offering scalable classes at a time when prices increased due to increased demand and subsidisation.

Also, especially big-tech vendors were quick to react to the new policy by marketing their courses to policy makers and the public to quickly reskill people into domains of high demand offering almost perfect jobs guarantees for graduates. Vendors often offer their courses for free or at low cost to lock-in future workers to their products.

Multi-stakeholder partnerships

Many new multi-stakeholder partnerships were started responding to project funding incentives. However, many lacked sustainability and were not really designed for scaling up.

Civil society, NGOs, foundations

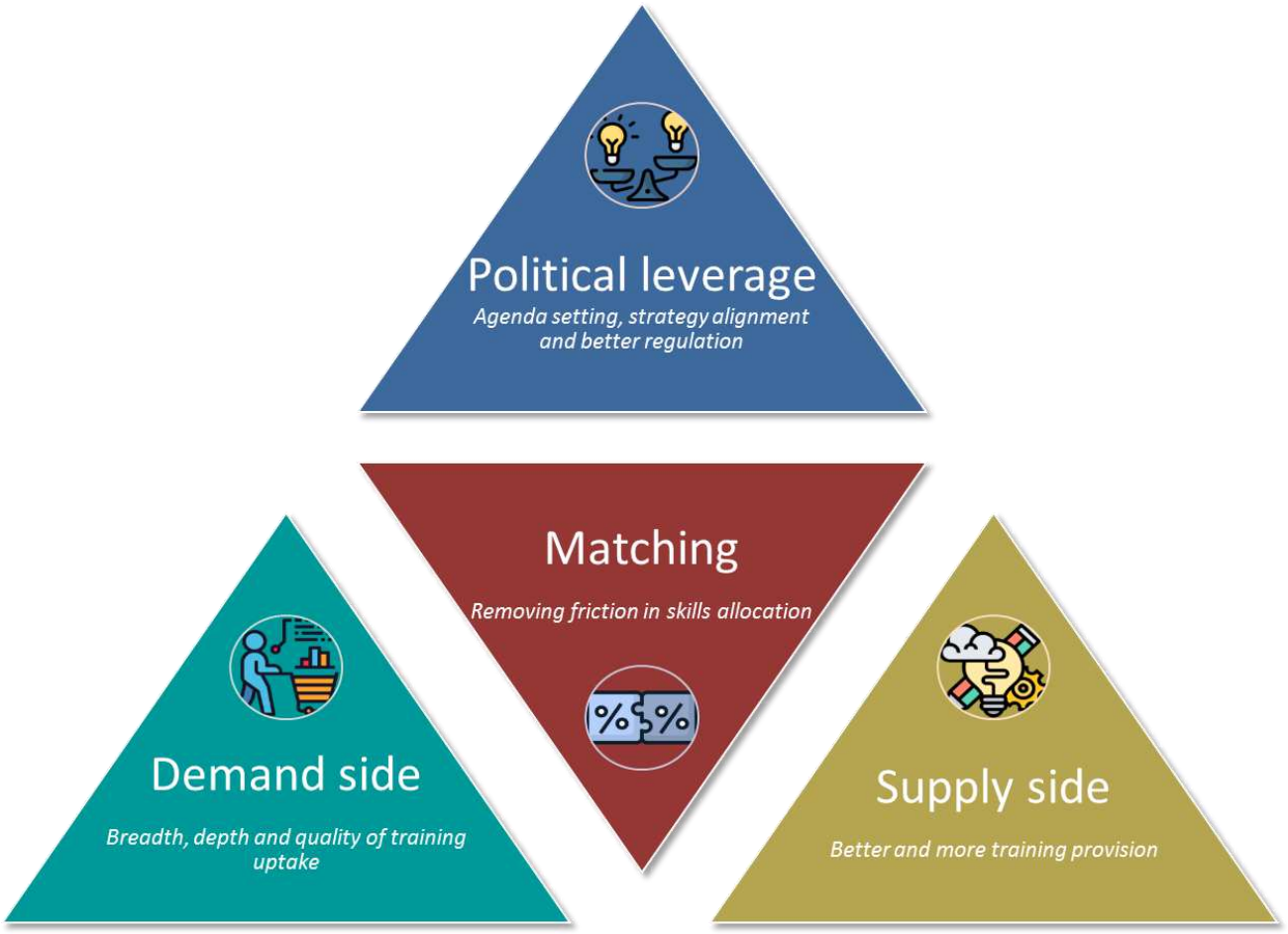
The third sector is an important factor in 2030 in alleviating the results of the economic mayhem in the aftermath of the pandemic. Fuelled by tech sector fortunes, charitable and philanthropic foundations offer programmes for diverse target groups at the discretion of their founders.

KEY RECOMMENDATIONS AND ACTIONS TO FOSTER UPSKILLING IN EUROPE

Europe should encourage and enable all stakeholders to take on responsibility for change and help them take bold and coordinated action based on a shared vision for the future. This will help turn the COVID-19 crisis - which has made deficits and challenges for the future more apparent - into an opportunity. The ambitious goals set out can only be achieved if all stakeholders are on board. This will be crucial for Europe's way towards service innovation, the necessary widespread upskilling and a smart workforce in Europe.

The work under this service contract led to recommendations and recommended actions in four areas that stakeholders and decision makers should target.

Recommendations for action – four areas



These recommendations are interlinked and reinforce each other mutually.

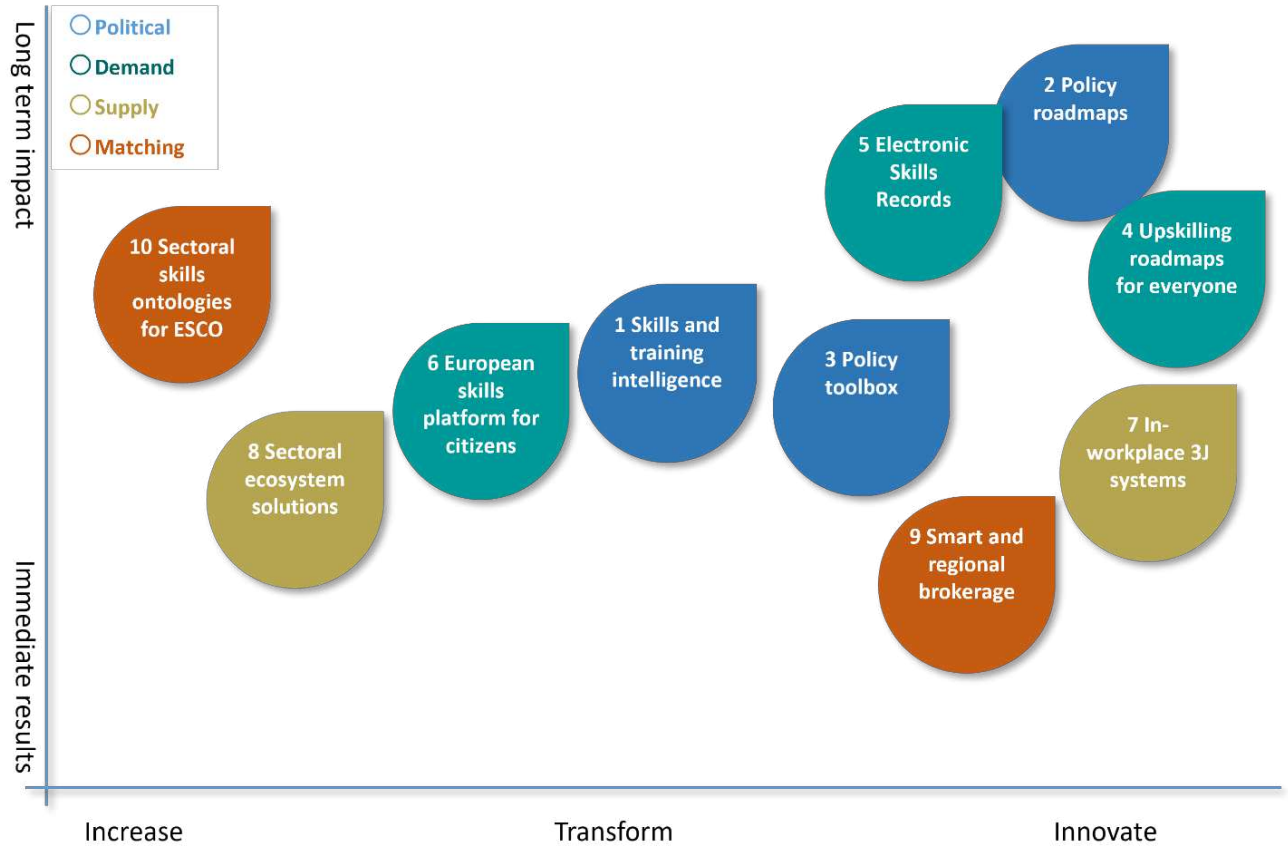
U	**Political leverage:** The European Commission and EU Member States should create and align skills development and upskilling visions and actionable Service Innovation Roadmaps with a 2030 time horizon. A portal with skills and market intelligence would be a valuable resource, ideally benefitting from the envisioned European (Skills) Data Spaces. Installing national upskilling agencies with far-reaching decision-making powers would avoid dispersion of responsibility and clearly allocate it to one instance. Agencies should also monitor the quality and labour market fit of upskilling offers. These activities need to be supported by a policy toolbox to be developed and made available along with necessary tools and advice. Of further importance are good practices to showcase and educate stakeholders and to scale implementation.
V	**Demand side:** For balancing demand and supply side measures, comparably more focus should be placed on subsidising the demand side with real upskilling goals, independent of current employment status. This funding priority for upskilling should involve the provision of strong incentives for and entitlement to lifelong learning, involving instruments like Individual Learning Accounts (ILAs) (worker level) and corporate upskilling responsibility (company level). Also, workers and companies need to be supported in developing their own Service Innovation Roadmap for upskilling, benefitting from new methods like knowledge exchange twin projects ("Twinnings") or Design Thinking. A minimum level of common skills terminology, especially in form of Electronic Skills Records (ESR) would facilitate showcasing of credentials.
W	**Supply side:** The European Commission and EU Member States together with industry and other stakeholders should prioritise industry commitment and sectoral ecosystem training solutions. Multi-stakeholder partnerships should develop "just enough, just in time, just for me" training formats, meeting the requirements of modern workflows and adapted to the respective target groups. Providing funding to scale-up promising initiatives to become mainstream is crucial, as many fitting formats already exist. To guarantee market relevance of training contents, more focus should be on the co-creation and operation of large-scale industry-university programmes, as well as equivalent VET formats.
X	**Matching:** Europe needs the large-scale operation of skills demand and supply brokerage platforms which help in skills assessment, matching candidates with suitable jobs and identifying most appropriate upskilling offers on worker and company level. A clear definition and further uptake of micro-credentials plays an important role in this context, since short and tailored learning units are increasingly demanded by both workers and industry, thereby helping to match the demand and supply side. A European, if not global, taxonomy of the skills is required to provide a framework for aligning around a universal language for skills. This would need to synthesise and build on existing taxonomies by integrating definitions and categorisations of skills that we know to be of growing relevance in a fast-changing labour market.

Recommendations will have different levels of impact, that is some can be expected to have an immediate, and some a more long-term time-to-impact. Along the dimensions of the service innovation roadmap scheme, some can be achieved by scaling up what is already existing and done (Increase), some are transforming or copying from good practices (Transform), and some would require new, bold and innovative action (Innovate). This is tentatively plotted in the following chart.

It must be noted that it is hard to assess ex ante, and therefore has to be taken with a grain of salt. As examples, sectoral ontologies are already well developed and understood and can be scaled up, but it might take longer for the impact,

because it is a very complex, multistakeholder process. Smart and regional brokerage, as another example, is relatively innovative, yet it might have immediate results. In the upper right corner, implementing service innovation roadmaps for policy making might take long to have an impact because policy making is a slow system and because several transmissions need to take effect first, but it could be a very innovative way of thinking about policymaking with a long-lasting positive effect on all citizens.

Recommendations for action – Time to impact and level of innovativeness



RECOMMENDATIONS FOR ACTION – POLITICAL LEVERAGE

A comprehensive and aligned European and individual national Member State vision and strategy and swiftly available, compelling actionable roadmaps ready for implementation at national and European level are urgently needed to further development of skills and upskilling of individuals throughout Europe.

Responsibility for skills development and upskilling in many Member States lies with all stakeholders, though in a coordinated way. Guidance and support are needed for the development of suitable and innovative policies and action plans for themselves, industries and the economy as a whole, enabled by relevant tools and guidance to bring about change.

Rapid capacity building is therefore needed to quickly provide upskilling and reskilling mechanisms and incentives, offer diverse opportunities, and make it the standard for career path development.

While the overarching vision of enhanced workforce skills for new jobs and services can serve as a common denominator, industrial structures as well as labour market conditions are vastly different across Member States. Member States are co-builders and co-funders of programmes and initiatives. It is therefore a challenging recommendation to align national pathways with the European vision – however in a customised way.

Some initial navigation support and guidance is provided in the WEF report but will need to become more substantiated and developed into concrete action. Dedicated, concrete and actionable policy briefs and practitioner briefs for each Member State now need to be developed together with Service Innovation Roadmaps and tools to enable both technical and financial assistance (see below for more details). This needs to have a specific focus on SMEs since a sizeable proportion (e.g., 33% of enterprises with 10-49 employees) of small firms undertake no training at all.

Action 1: Skills and training intelligence

Enable the creation of a best possible evidence base through excellent skills and training analytics and intelligence and a platform for fair and transparent diagnosis of national barriers to upskilling.

WHY? A rich skills data foundation for analytics and skills intelligence is needed that will provide opportunities for evaluation and monitoring, which will help policy makers to base their decisions on solid ground. Central questions to answer include:

- Which skills and occupations are in highest demand going forward?
- Which trainings, certifications and degrees yield the best results in terms of sustainable employability, salaries and career pathways?
- Which target groups (occupations, industries, regions, but also age, gender, family and educational background) are especially at risk of unemployment?
- Which upskilling and reskilling measures will likely support these groups the most?

1. Skills and training intelligence

Create a strong evidence base through excellent skills and training analytics and intelligence and set-up a platform for transparent diagnosis on the needs and solutions for upskilling and reskilling.

- Fine-grained data and forecasting at sectoral level
- Regional/national/EU
- Continuous monitoring
- Evaluation of existing measures.

Skills intelligence is under development at Cedefop. Training intelligence is needed as

Political Leverage

WHAT? The proposed evidence base is likely to include fine-grained **European, national and regional demand and supply figures and forecasting allowing for an extended time series analysis, continuous monitoring and benchmarking**. Skills demand and supply data could be based on vacancy data[60] at a regional level.

To best identify structural changes in the workforce, one may want to **move away from taking occupations as the only basis for analysis since these are likely to increasingly dissolve and become less appropriate for analysis purposes.** An alternative would be to develop future-oriented approaches to defining 'sets/bundles of competences and skills.

Given the current fragmented approach of the different ministries and government agencies on upskilling, a precise diagnosis will help to draft the right measures to support upskilling.

Good practice: Existing skills-related evidence bases on vacancy data to support policy development

Offers of data providers in the online vacancy data market –to name just a few– include:

- Skills-OVATE: Skills Online Vacancy Analysis Tool for Europe: https://www.cedefop.europa.eu/en/data-visualisations/skills-online-vacancies
- Textkernel: https://www.textkernel.com/
- Burning Glass: https://www.burning-glass.com/
- Economic Graph initiative of LinkedIn: https://economicgraphchallenge.linkedin.com/

[60] See related CEDEFOP activities 'Skills-OVATE: https://www.cedefop.europa.eu/en/data-visualisations/skills-online-vacancies, the offers of data providers in the online vacancy data market such as Textkernel: https://www.textkernel.com/, Burning Glass: https://www.burning-glass.com/, or the Economic Graph initiative of LinkedIn: https://economicgraphchallenge.linkedin.com/

It is recommended to establish a one-stop-shop for hosting or providing seamless access to such an evidence base and intelligence together with analytics tools. Specifically, the activities of CEDEFOP and the rich data sources of Eurostat need to be mentioned in this respect.[61] The former or both actors could play a leading role in the development and provision of such data, tools and related insights and reports to guide policy and strategy development of all stakeholders concerned.

Good practice: CEDEFOP Statistics and indicators

CEDEFOP's statistics and indicators work aims to support evidence-based policy and practice in vocational education and training, lifelong learning and skills. Products and services include dedicated publications and regular updates of key online statistics. Users can also access further statistics, indicators or related information. Its focus on vocational education and training statistics draws on European data collections and surveys to provide key summary indicators, from country trends in initial and continuing vocational training to resources and financing of VET.

Source : https://www.cedefop.europa.eu/en/publications-and-resources/statistics-and-indicators

HOW? The European Commission can build on a range of relevant monitoring and evaluation activities in skills analytics and intelligence initiated and run by different Directorates General over past years. Further innovative activities need to be added. This should include those of **career path tracking**. It is therefore recommended to use existing and new data and **develop, implement and use analytics tools allowing for career path tracking** for the Commission and Member State governments to base their evidence-based policy development in these fields on more solid grounds.

To maximise benefits, it should be ensured that skills and training intelligence data is accessible through open APIs.

The **Common European Data Spaces**, as foreseen in the European Strategy on Data[62], need to be leveraged for this. Especially secondary use of skills data in a Common European Skills Data Space (see box) needs to be leveraged for skills intelligence.

Good Practice: European Skills Data Space

The European Commission sets a strategy for technology development that empowers individuals and firms to control their data, leading to a single data market based on solid governance for data sovereignty.

Strengthening this initiative will make European companies identify trends pointing to unattended market segments, creating incentives for innovation. Moreover, firms, governments and academia can take advantage of non-personal data to get a clearer perspective about skills composition in each space, making it easier to foresee bottlenecks and act in consequence to solve skills mismatches.

Source: A European Data Strategy (2020):

Looking further, developments in big data and econometric modelling will allow to provide policy maker with toolkit of the future that will include **complexity economic tools** for prior impact assessment of policies and measures. Complexity economics tools are essentially modelling all entities dynamically changing their investment strategies. For instance, many stakeholder (i.e., employer, worker, training provision) strategies may well change in unpredicted ways while return on different kinds of investment may be volatile and sensitive to system level changes, and simplistic approaches to upskilling are not what is required in the long term.

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61 CEDEFOP: Statistics and indicators: https://www.cedefop.europa.eu/en/publications-and-resources/statistics-and-indicators

62 European Commission (2020): Communication: A European Strategy for Data. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0066&from=EN

Action 2: Policy roadmaps

Enable and facilitate the development and use of system-level analytics-based frameworks for change (SIR – Service Innovation Roadmaps) for national and regional policy makers.

WHY? For EU Member States, **national and regional vision and strategy development for adequate Service Innovation Roadmaps** is key. Past models, in which national actors copied ideas and instruments have not always proven effective and efficient. The aim should be for the national policy stakeholders to become innovative in the development of compelling, long-term national EU Member State visions and strategies including concrete actions for developing new and scaling-up successful workforce skills development and upskilling programmes in a fast and result-driven fashion.

WHAT? The development of 'Service Innovation Roadmaps' (*SIRs*) constitutes a promising pathway for achieving the shared vision. **Decision makers need to be given the necessary knowledge and guidance about the impact of new technologies such as AI and suitable responses in skills development and upskilling**. The three types of *SIRs* that entities (here: policy makers) need to mindfully create have been explained above: *Increase, Transform, Innovate*. Increase often reflects the most likely behaviour - trying harder at what one is already doing is what most entities feel comfortable doing. *Transform* requires figuring out whom to copy, such as another region which is doing better in terms of labour market outcomes. *Innovate* often requires breakthrough re-alignment of stakeholders.

The roadmapping should be overseen by a single entity coordinating efforts. In most governments, the skills topic is relevant to different ministries such as economy/industry, education and research, labour and social affairs, and others. This may lead to rivalry for competences, hindering efficiency, coordination and foregone synergies. At the same time and because of this rivalry, there is often a lack of accountability today on providing the right skills for the labour market. Skills as a topic is often incorporated within the Ministry of Education on national level. Yet, in labour markets with increasingly flexible skills demand, it might be important to treat this role outside of the context of long-term institutional education.

It is therefore recommended to create a single responsible government body to ensure coherence, orchestration, proper execution, monitoring and readjustment of skills measures.

HOW? The development of SIRs requires addressing a range of challenges and issues. Ultimately wise investments need to be made to improve the weakest links, the entities (workers, businesses, regions) being left behind.

A simplistic solution is more actionable knowledge and experience, so that people can more quickly re-orient to seize opportunities in emerging higher demand areas. New systems for "just enough, just in time, just for me" learning (see recommendation 7) are a promising solution for

2. Policy roadmaps

Enable and facilitate the development and use of system-level analytics-based frameworks for change (service innovation roadmaps) for national and regional policy makers.

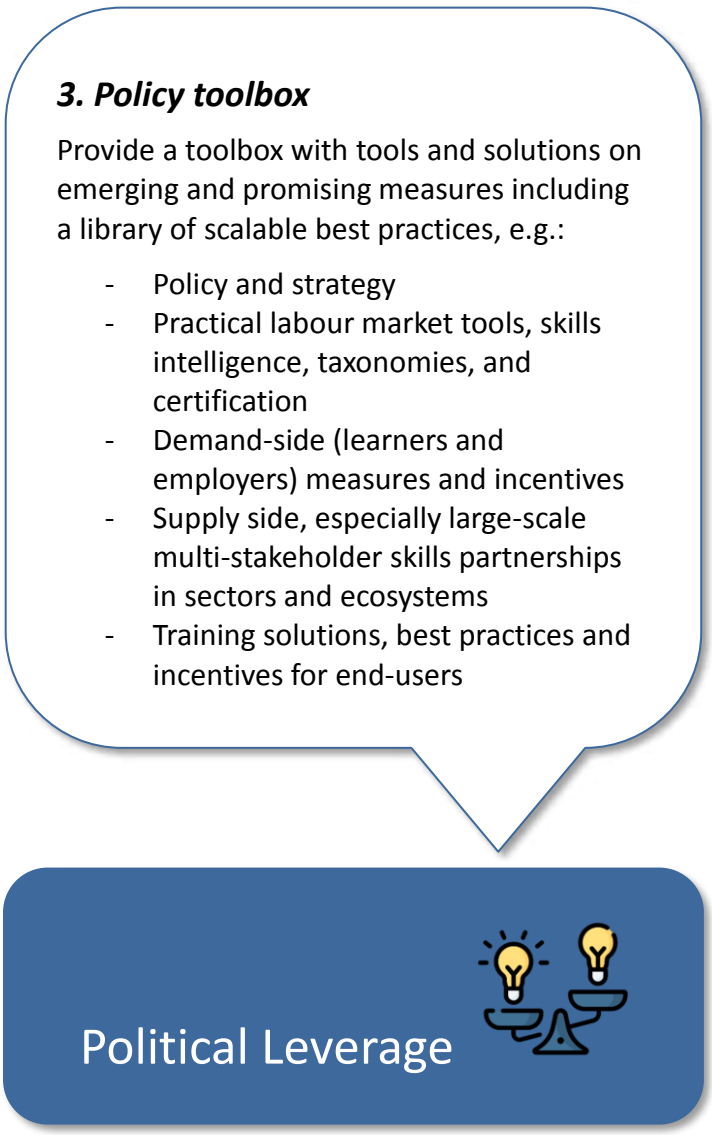
One goal is the clear discernment and wise partitioning of "Increase, Transform, and Innovate" types of investment and systemic changes – knowing what to do more, where to copy and where to stir invention.

Road mapping should be overseen by a single entity coordinating efforts.

Political Leverage

this aim. Service Innovation Roadmaps in upskilling should intensely consider this concept. Upskilling in this way, specifically if innovative with micro-credentials and new modes of training, etc., to pivot to new demand faster, perpetuates the employer-employee relationship as well as the patterns of entrepreneurial/start-up activities. Developing these new training models would mean to embrace *Transform* and *Innovate* Service Innovation Roadmaps. One way for policy to support these new skills roadmaps is to employ the funding instrument of Twinnings (see vision scenario and recommendation 7).

On a longer time-horizon, much of the upskilling currently seen as enabling employment will be in areas of work that machines will do an increasingly large amount of in the future, with 85 million jobs possibly being displaced due to this in the 26 economies covered by the *Future of Jobs* report[63]. The opportunity of using an *SIR* is to (also, and increasingly) reach beyond these patterns, acknowledging the paradigmatic change necessary and made possible through AI and worker augmentation. AI potentially increases workers' performance by taking over tedious parts of work. Therefore, increasingly it is about entities that can smartly invest limited resources (time, effort, capital, interactions) into the right kinds of opportunities, including opportunities for training and learning the right knowledge at the right point in time, rather than a matter of amount of training, degrees and more of the same. Policymaking needs to take account of this by enabling and supporting the process of finding mindful and smart individual pathways. (Also see 'toolbox').



Action 3: Policy toolbox

Develop a policy toolbox providing tools and advice addressed to policy makers and relevant stakeholders in the EU Member States and regions necessary to guide and ease implementation of concrete measures and actions.

WHY? The Member States and regional policy makers need support in the processes of ideation, selection and implementation of an overall strategy and the related actions to make these happen. *WHAT?* Member States and regional policy makers should be supported with a toolbox to select the most suitable measures for their specific domestic situation. At the same time, the toolbox should help them to remove barriers or inefficient measures. The

[63] See World Economic Forum (2020): The Future of Jobs Report: https://www.weforum.org/reports/the-future-of-jobs-report-2020

instruments and tools need to ease and enable transfer of best practice. For the toolbox to be useful, it must reflect on upskilling and reskilling at labour market levels meaning regional and national levels. Also, addressing different target groups is key.

The architecture of such a toolbox should include different dimensions such as national/regional level, sector, target groups and the key function of each tool.

Key target groups are:

- Individuals as citizens or employees
- SMEs
- Large enterprises and corporations
- Other organisations, such as public administrations
- VET providers
- Universities
- Governments.

This collection should be offered as an online platform, growing through user interaction and depicting stories of implementation and success cases.

The list below illustrates good practice examples of possible offers, tools and content for the policy box:

Policy and strategy

Showcasing of…

- policy initiatives and high-tech and services skills strategies,
- concrete upskilling projects from public and private sectors,
- national upskilling governance and institutional setup
- design and implementation of financial and fiscal incentives,
- templates to assess the return on investment of an upskilling programme,
- best practice and emerging practice library of funded projects and initiatives (by target group of learners and employers, domain of learning outcomes, sectoral differentiation, scale and scalability, KPIs and evaluation),

Practical labour market tools, skills intelligence, taxonomies and certification

- design and implementation of self-assessment and assessment tools,
- design and implementation of career pathway counselling,
- best practice matching services and tools,
- best practice digital skills intelligence, insights, reports,
- skills and labour market foresight (by region, sector),
- training and certification market information, information about the most relevant platforms, standards and quality labels.
- for SMEs, **diagnostics tools,** simplified workforce planning methodologies, future jobs and skills descriptions, reliable skills assessment, matching and training recommendation tools and communication briefs

Demand-side (learners and employers) measures

- implementation of transferable, cumulative Individual Learning Account (ILA) systems
- increase scope and funding of training vouchers, to involve entitlement for lifelong learning for citizens
- company-level service innovation roadmapping to help SMEs in updating their skills base.

Supply side, especially multi-stakeholder partnerships

- upskilling projects tailored for SMEs,
- best practice of stakeholder engagement in programme design, especially in "just enough, just in time, just for me" learning,
- scaling up of proven programmes to integrate them into common practice
- fostering co-creation through responsible national bodies bringing together actors and overseeing co-creation and operation of large-scale industry-university programmes.

Contents for end-users

For the toolbox to be useful beyond policymaking, contents should include tailored access to the relevant information items of the above policy maker toolbox which are relevant for the respective stakeholders, but also include:

- a practical overview of and information on funding programmes and opportunities,
- practical information on how to benefit from funding opportunities, such as rules of participation, application, eligibility,
- easy to use skills and labour market intelligence and information systems (e.g., by region, sector)
- **practitioner and policy briefs** to be developed as a series of briefs each specifically focussed on a specific target group and/or education and training level and format[64].

All these services should be provided via an online platform and as a single point of access in a one-stop-shop format, continuously maintained at regular intervals and ideally available in (most or all) EU languages.

Possible further enhancements could include communications and interaction options for individuals and experts offering access to the high-tech skills and jobs community, interaction between users, networking, and collaboration as well as a private interactive space for discussion of knowledge, policies, and strategies.

[64] These could be developed in a similar format to those of the OECD (Putting faces to the jobs at risk of automation: www.oecd.org › employment › Automation-policy-brief-2018) and ILO (ILO: Skills for employment policy briefs: https://www.ilo.org/skills/areas/skills-for-youth-employment/WCMS_167174/lang--en/index.htm) highlighting the issue at stake and recommended actions to be taken on 10-15 pages to allow the busy decision makers to quickly grasp the content and main messages and initiative further action.

Good practice: ILO Skills for employment policy briefs

International Labour Organization

▸ ILO brief

▸ Policy Brief

September 2020

▸ Effective governance and coordination in skills systems: towards a lifelong learning ecosystem

Key points

Due to the growing interest in lifelong learning (LLL), ILO member States and social partners are increasingly asking for advice on how to improve governance and coordination in skill systems. Skill systems are often fragmented and involve many actors: different government ministries and departments, employers, workers, research and regulatory agencies, public and private training organisations, employment service providers and regional and local authorities. Coordination between these organisations at national, sub-national and local levels is a key challenge for governments looking to strengthen TVET and skills systems and promote LLL. Recent research by the ILO, UNESCO and other international organisations highlights the importance of coordination and demonstrates how more effective coordination can have tangible positive effects on governance and key areas of policy and practice. Whilst coordination is clearly an important factor, it needs to operate alongside other key conditions to deliver improvements to governance. The research also demonstrates that coordination is more important for some key functions and processes in TVET and skills systems than it is for others. This policy brief looks at why coordination matters, what stakeholders can do to ensure improved coordination delivers measurable outcomes, and how improved coordination can lead to the establishment of a LLL ecosystem that better supports individuals and enterprises to navigate the world of work and learning.

The challenges of governance and coordination

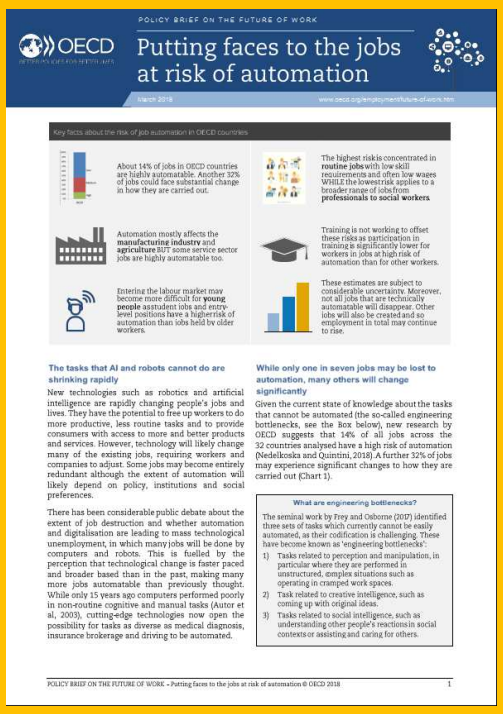
Several key challenges influence the effectiveness of governance and coordination in skill systems. These include:

- complex institutional arrangements with competing organizational mandates;
- weak inter-ministerial coordination of overlapping policies and strategies;
- limited coordination of resource mobilization and policy implementation; and
- the challenge of developing integrated policies that address the complex needs of diverse stakeholders in different contexts.

As we will explore in this note, all of these challenges are interconnected yet important in their own right. In many low and middle-income countries (LMICs), fragmentation persists across multiple ministries resulting in parallel or contradictory policies and strategies, financing, programmes and projects. Such fragmentation has negative implications for coordinated action and development, with flow on effects for legislation, planning, information and monitoring systems, and ultimately, the efforts of various institutions to align the supply and demand of skills. It also frustrates participation by employers and worker organisations, who are not always able to engage with the issue of skills development in a direct and effective manner. It also means that skills issues are not tackled in an effective and systemic way. In

Source : https://www.ilo.org/skills/areas/skills-for-youth-employment/WCMS_167174/lang--en/index.htm

Good practice: OECD policy briefs on the future of work



POLICY BRIEF ON THE FUTURE OF WORK

OECD

Putting faces to the jobs at risk of automation

March 2018

Key facts about the risk of job automation in OECD countries

About 14% of jobs in OECD countries are highly automatable. Another 32% of jobs could face substantial change in how they are carried out.

The highest risk is concentrated in **routine jobs** with low skill requirements and often low wages WHILE the lowest risk applies to a broader range of jobs from **professionals to social workers**

Automation mostly affects the **manufacturing industry** and **agriculture** BUT some service sector jobs are highly automatable too.

Training is not working to offset these risks as participation in training is significantly lower for workers in jobs at high risk of automation than for other workers.

Entering the labour market may become more difficult for **young people** as student jobs and entry-level positions have a higher risk of automation than jobs held by older workers.

These estimates are subject to considerable uncertainty. Moreover, not all jobs that are technically automatable will disappear. Other jobs will also be created and so employment in total may continue to rise.

The tasks that AI and robots cannot do are shrinking rapidly

New technologies such as robotics and artificial intelligence are rapidly changing people's jobs and lives. They have the potential to free up workers to do more productive, less routine tasks and to provide consumers with access to more and better products and services. However, technology will likely change many of the existing jobs, requiring workers and companies to adjust. Some jobs may become entirely redundant although the extent of automation will likely depend on policy, institutions and social preferences.

There has been considerable public debate about the extent of job destruction and whether automation and digitalisation are leading to mass technological unemployment, in which many jobs will be done by computers and robots. This is fuelled by the perception that technological change is faster paced and broader based than in the past, making many more jobs automatable than previously thought. While only 15 years ago computers performed poorly in non-routine cognitive and manual tasks (Autor et al, 2003), cutting-edge technologies now open the possibility for tasks as diverse as medical diagnosis, insurance brokerage and driving to be automated.

While only one in seven jobs may be lost to automation, many others will change significantly

Given the current state of knowledge about the tasks that cannot be automated (the so-called engineering bottlenecks, see the Box below), new research by OECD suggests that 14% of all jobs across the 32 countries analysed have a high risk of automation (Nedelkoska and Quintini, 2018). A further 32% of jobs may experience significant changes to how they are carried out (Chart 1).

What are engineering bottlenecks?

The seminal work by Frey and Osborne (2017) identified three sets of tasks which currently cannot be easily automated, as their codification is challenging. These have become known as 'engineering bottlenecks':

1) Tasks related to perception and manipulation, in particular where they are performed in unstructured, complex situations such as operating in cramped work spaces.
2) Task related to creative intelligence, such as coming up with original ideas.
3) Tasks related to social intelligence, such as understanding other people's reactions in social contexts or assisting and caring for others.

POLICY BRIEF ON THE FUTURE OF WORK - Putting faces to the jobs at risk of automation © OECD 2018 1

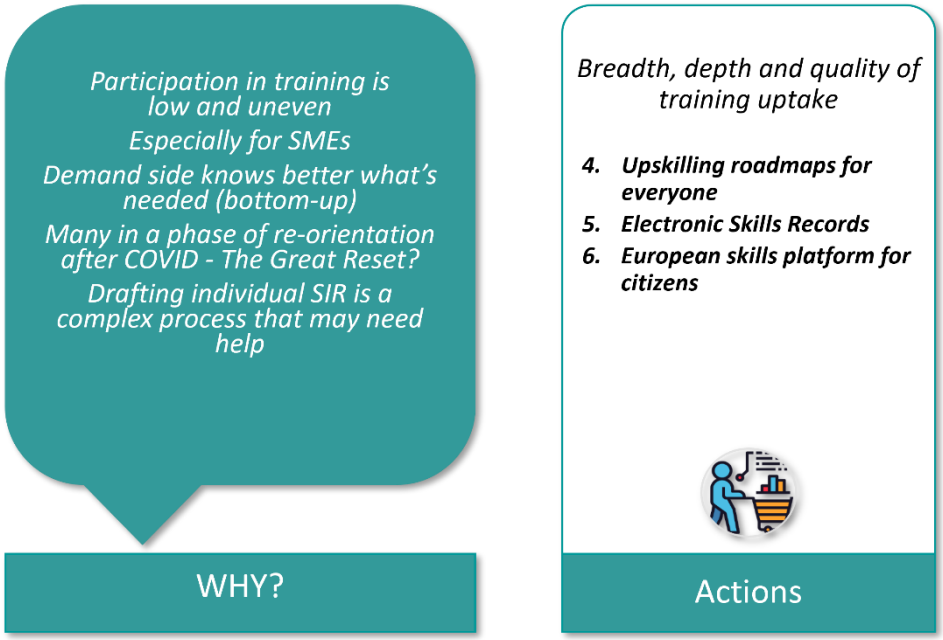
Source:

www.oecd.org › employment › Automation-policy-brief-2018

RECOMMENDATIONS FOR ACTION – DEMAND SIDE

Today, 9.2% of adults (ages 25-64) participate in training per month, and this figure is widely varying in Member States ranging from 1% to 29%. 71% of adults are reported to have a skills level that matches the job requirements, but in only 16% of establishments does the entire workforce have the required skills. As the vast majority of job-related training is employer-sponsored, and SMEs are underrepresented in providing training, especially SME employees but also the increasing group of atypical, freelance and platform workers, and people in professional transition are in danger of receiving too little training. At the same time, only 21% of businesses currently report being able to use public funds for upskilling.

Automation and the digitalisation catalyst that has been COVID-19 have brought about and will continue to cause disruptions of the labour market that often affect those that had had a hard time in pre-pandemic times already, especially those with lower educational levels, but increasingly also workers in mid-skills level jobs.



We argue that it needs to be ensured that sufficient weight and focus be placed on subsidising the demand side – workers as well as employers – and that it preferably receives more weight than subsidising the supply side. This support needs to be available for everybody with real upskilling intentions, independently of current employment status. By supporting the demand side especially, it will be ensured that exactly those training measures are fostered for which there is most urgent demand and from which learners will expect the highest returns in terms of employment prospect, career advancement and true personal development. The demand side representing millions of citizens and small businesses is in a much better position to steer the market into this direction than any centralised or even decentralised planning of supply side measures arguably ever could.

This is not to say that learners and small businesses a priori will always have the best knowledge of which skill development actually help them the most. Quite often they need help to even kickstart the process of thinking about these. Still, the outcome of such a process will be individually different – an individual Service Innovation Roadmap – and far from any one size fits all approaches, which underlines the importance of individualised counselling preceding ultimately individual decision making.

Subsidising **training vouchers** that equip individuals from hard-hit sectors with additional skills to find jobs in better-off industries is such a demand side measure that allows for incentivising training uptake. **Individual Learning Accounts** are an especially promising tool in this regard, as they give individuals autonomy to decide which training to take.

COVID-19 also had profound implications for the labour markets in certain industries, especially in the accommodation and food services industry, in the arts, entertainment and recreation industry, and in large parts of the retail industry. Leveraging upskilling schemes will need to have an especially big impact in these areas.

Good Practice : Compte Personnel de Formation (CPF)

In the French ILA scheme, every citizen in active workforce or jobseeker is awarded annual credit to (co-)finance upskilling courses from a broad range of offers – giving special emphasis to digital skills. Also certifying individuals' skills acquired outside of training in a so-called "skills balance sheet" is possible through the CPF. Credits were formerly expressed in annual hours of training, but are expressed in monetary terms since 2019, set at 500€ per year and can be accumulated up to €5000 in total. For individuals with an education below vocational diploma, values are €800 and €8000. The scheme is financed through a training levy paid by medium and large companies, and thus entirely employer funded.

Source : https://www.oecd-ilibrary.org/sites/203b21a8-en/1/2/4/index.html?itemId=/content/publication/203b21a8-en&_csp_=de440b0f73fd460cf664c2614fc125d7&itemIGO=oecd&itemContentType=book#section-d1e3356

Action 4: Upskilling roadmaps for everyone

Enable and facilitate the development and use of micro-level (both firm level and worker level) analytics-based frameworks for change (SIR – Service Innovation Roadmaps) – including counselling and training in drafting these.

WHY? Although the EU has made available unprecedented amounts of funding for upskilling and reskilling, especially in the post-pandemic situation, individual workers and SME often do not have enough guidance to access these funds to their advantage. The Future of Jobs Survey Reveals merely 21% of businesses report being able to make use of public funds for upskilling of their workforce.[65] Also, there is a need to establish a closer link for education and training programmes with other stakeholders. In the MIT publication "The Work of the Future: Building Better Jobs in an Age of Intelligent Machines", supporting programmes leading workers without a university degree to middle-class jobs is highlighted as a major priority. This support should take the form of work-based learning in close collaboration with employers. Also, personalised assistance for participants regarding financing, childcare etc. should increasingly target less educated workers.[66] In this view, the goal should be to provide support to developing upskilling frameworks for change in upskilling for workers and companies.

There has been increasing attention to the importance of counselling and guidance in alleviating the labour market disruptions caused by the pandemic recently. Coaching and mentoring schemes in the US seem to have made a huge difference in the success of upskilling because they close the so-called "last-mile gap".[67] because it provides social capital, motivation and networking leading to higher completion quota of online course participants and better job matching and placement.

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65 World Economic Forum (2020): The Future of Jobs Report: https://www.weforum.org/reports/the-future-of-jobs-report-2020

66 Autor, Mindell, Reyonolds (2020): The Work of the Future: Building Better Jobs in an Age of Intelligent Machines. https://workofthefuture.mit.edu/research-post/the-work-of-the-future-building-better-jobs-in-an-age-of-intelligent-machines/.

67 Steve Lohr in the New York Times, 14 June 2021: "To Fill Millions of Open Jobs, Many Workers Need More Than Skills" https://www.nytimes.com/2021/06/14/business/workers-jobs-coaching.html, see also Solberg, Scott (2019): Career Readiness for All (https://irp-cdn.multiscreensite.com/81ac0dbc/files/uploaded/Career%20Readiness%20for%20All%20FINALV.pdf)

WHAT? Define templates for actionable **upskilling Service Innovation Roadmaps for workers and organisations for** skills innovation. Help learners create individual roadmaps through extensive counselling and guidance, both algorithm-based and in personal contact.

HOW? The development of SIRs requires addressing a range of challenges and issues. Coming from the service science background, SIRs would summarise the learning investments for each responsible entity – in this case, workers and companies. For these entities to elaborate and maintain their own roadmaps, targeted guidance is needed. Promising starting points to develop these roadmaps already exist along the lines of the three SIR types: *1) Increase, 2) Transform, 3) Innovate.*

4. Upskilling roadmaps for everyone

Enable and facilitate the development and use of analytics-based frameworks for change (i.e., Service Innovation Roadmaps), at firm level and worker level

Focus on career counselling and use it in drafting these.

The *Increase* roadmap would relate to augmenting own proven practices – such as augmenting the access to paid educational leave for workers or enhancing upskilling courses offered by chambers of commerce.

One EU funding tool that is an excellent fit to develop *Transform* SIRs are **Twinnings**: two "twin" organisations - the originator and the adopter - team up to disseminate good practices in upskilling. The originator is the party that has successfully launched a skills innovation in their region, while the adopter is the implementing region. Twinnings typically last for one year and receive funding for the activities necessary to carry out the related activities. The aim is to de-risk the investment in upskilling innovations through interregional knowledge transfer of proven solutions with high scalability.[68] An imaginary Twinning example for a worker SIR would be a course skilling up laid-off hotel workers from the Bulgarian Black Sea coast to be customer support operators (adopter) by learning from a similar project for hotel workers from the French Riviera. An example from a company-level would be a Finnish bookshop that coaches a German counterpart on setting up an attractive website to tackle the competitive pressure from platform businesses.

Innovation refers to a newly created upskilling roadmap. An example would be a roadmap for upskilling of in-company vocational trainers to adapt vocational training to digitalisation – as it is being created in the German "Network Q 4.0" initiative (see box). Since this type of road-mapping does not directly rely on existing good practice, especially intense guidance is necessary for this type. **Design Thinking methods** are a good fit in this regard, as they help to elicit user's needs, even if they are only implicit.

Good Practice: Network Q 4.0

This initiative aims at enhancing soft and hard skills of in-company vocational trainers, to adapt VET education contents and processes to the demands of digitalisation. Operated jointly by the German Economic Institute, business training association and other partners, the network develops and implements tailor-made further qualification formats for in-company trainers. Business associations in all German Länder are the main drivers in

[68] The instrument has so far been applied above all in the areas of digital health and administration. A digital health related explanation of the concept can be found here: https://digitalhealtheurope.eu/twinnings/

this endeavour. They assess the regional and sector-specific training needs and consult with companies. Qualification prototypes are developed in Design Thinking within the regions. Network Q 4.0 then joins the regional best practices, to create a national standard for qualification. The German Economic Institute accompanies the project with labour-market analyses and surveys qualification needs in companies and vocational training staff.

Source : https://netzwerkq40.de/de/projekt/

a) Support worker level service innovation road-mapping

At worker level, it will be highly important to inform individuals about the likely future of their profession and career and the level of investment in skills to keep their employability. For instance, as an accountant in a professional service firm, the person should be informed and supported in an upskilling process to accompany the transformation of the accountant function which will be oriented on more added value tasks and supported by digital tools and applications. As a cashier in a retail shop given the limited sustainability of the function, the worker should be supported in a radical career re-orientation towards a more sustainable profession. This would require more time, more commitment and resources.

Good Practice : Transitions collectives - anticiper et accompagner la reconversion de vos salariés

In France, the government has created a new 'collective transition' mechanism (€500m), financed by the state, to facilitate professional reconversions. The measure was proposed by the social partners.

Collective Transitions makes it possible to anticipate the economic changes of the company by supporting volunteer employees towards a serene, prepared and assumed retraining. While retaining their remuneration and their employment contract, employees benefit from training funded by the State, with the aim of accessing a promising profession in the same catchment area.

Source : https://travail-emploi.gouv.fr/formation-professionnelle/formation-des-salaries/transitions_collectives/transitions-collectives

Good Practice: TRR and TSL Sweden – non-profit counselling for redundant workers

TRR for white-collar workers and TSL for blue-collar workers support workers in their search for a new job (financed by companies as a result of collective bargaining). TRR offers individual support to white-collar staff in the private sector in the form of personal advice on the way to find a new job or on starting an own company. It can be accompanied by the TRR supplementary unemployment benefit (AGE) - a financial contribution to supplement unemployment insurance to people over 40 who have worked for more than five years at companies that are connected to TRR.

Source : https://www.trr.se/en/ https://tsl.se/

b) Support company level service innovation road-mapping especially for SMEs.

SMEs do not have HR departments and they are not in a position with current resources to plan and execute upskilling investments. As mentioned before an SME focused upskilling approach is highly required to support them in transition. External technical support with appropriate methodology and relevant courses are of high importance.

In addition, as it is highly difficult for SMEs to attract new talents, the upskilling of their current workforce is then relatively more important than for large companies.

Diagnostics tools, simplified workforce planning methodologies, future jobs and skills descriptions, reliable skills assessment, matching and training recommendation tools and communication briefs for their employees represent examples of practical solutions required by SMEs. One starting point towards these SIR could be digital maturity assessment tools, like DIGINNO (see box).

Good Practice: DIGINNO - SME Digital maturity online

DIGINNO tool targets industry SME managers, helping them to self-assess their company's digital maturity and the necessity for digital upskilling for management and employees. In total, the tool assesses digital maturity in ten business dimensions, generating a personalised report, one of them "Human Resources Environment". Overall results are grouped in four maturity categories, from "tomorrow's heroes" to "champions' league".

The tool was initially developed by Smart Latvia and later expanded to versions in English, Estonian, Lithuanian, Polish and Swedish. Statistics on the website show that 60% of companies who took the test, are in the lower half of digitalisation maturity, having thus a real need to conduct the assessment.

Source : https://www.diginnotool.eu/home

Action 5: Electronic Skills Records

Develop a framework for Electronic Skills Records, especially regarding the European Skills Data Space

WHY? **Standardised formats** for skills specification are an increasingly valuable tool for jobseekers, human resources specialists, and education providers. While commercial professional network platforms like LinkedIn have been long leveraging this data as part of their business model, policy makers and public institutions have been lagging in using it for skills intelligence. A huge potential lies in ESRs, though, since they contribute to cross-validate existing skills in a unified framework and complement labour market analyses. The envisaged European Skills Data Space (see Recommendation 2) needs standardised and interoperable competence data to function. On an individual level, it simplifies the writing of CVs and allows organisations to keep an updated record of workers' competences. Also, developing "just enough, just in time, just for me" training concepts relies on universally understandable information on the individual's prior skills and experience.

WHAT? Consider the development of standardised **European Skills Records, possibly building up on Europass**.[69] This European CV platform has been active since 2005 with the aim of fostering transparency of qualifications and skills and

[69] For a comprehensive assessment of Europass features, see https://europa.eu/europass/en/about-europass

so enhance the mobility of workers in Europe. In 2018, it was decided to revise and expand the benefits and features for citizens but also broaden the mission of Europass to also help anticipate labour market needs and trends.

HOW? It makes sense to study the potential of Europass to serve as a blueprint for an electronic record instrument to inform upskilling policy decision making, facilitate skills demonstration for citizens and provide a comparable skills base for employers. Moreover, raising the public awareness of Europass might motivate its integration with other relevant search engines for job-seeking purposes to facilitate engagement in the labour market via the recognition of digital credentials (currently developed by the European Commission[70]).

Obviously, data and privacy protection need to be carefully considered in this endeavour. But **even if only a very basic standard set of skills** is part of an Electronic Skills Record, this would already provide leverage for skills intelligence and demonstration. Basic features could include country of residence, languages spoken according to CEF[71], highest level of education and digital skills according to DigComp[72].

This should be intrinsically linked with the planning of the envisaged **European Skills Data Space**. Electronic Skills Records need not necessarily be stored centrally but be available in an interoperable format that allows access to the anonymised data in a federated way.

The recommendation is closely related to recommendation 10 "Sectoral skills ontologies to feed into ESCO".

Action 6: European skills platform for citizens

Further strengthen platform-based services for citizens and businesses regarding skills information, funding options, career support and recruitment.

WHY? The use of online training programmes increased tremendously during the COVID-19 crisis.[73] As businesses decentralise their supporting operations to be developed remotely, employees are required to master specific skills to keep up with the pace of change while simultaneously continuing with the regular job duties that sustain operational processes.

6. European skills platform for citizens

Further strengthen platform-based services for citizens and businesses regarding skills information, funding options, career support and recruitment.

All stakeholders to fully support the Digital Skills and Jobs Platform.

Demand Side

[70] The documentation about the interoperability of Digital Credentials with Europass can be found here: https://europa.eu/europass/en/interoperability-europass

[71] https://www.coe.int/en/web/common-european-framework-reference-languages

[72] https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework

[73] According to the WEF's Future of Jobs (2020), social distancing and remote work measures established by governments to respond to the Covid-19 crisis have also fostered online learning. In fact, based on Coursera's data between April and June, the report found that *"there has been a four-fold increase in the numbers of individuals seeking out opportunities for learning online through their own initiative, a five-fold increase in employer provision of online learning opportunities to their workers and an*

However, in the current setting digital skills and occupation offers are plenty, but often scattered and disconnected among each other.

WHAT? Create a **centralised offer** where employees and interested individuals in general can obtain information about skills development trends and funding opportunities to enrol in the training option that best responds to their needs. Additionally, such a platform might serve employers for their recruitment processes while validating applicants' skills. This offer should not only include own contents, but above all point to existing online good practices - national, commercial and EU-level.

HOW? By offering different training paths (courses, modules or structured programmes in cooperation with training providers like universities), the **one-stop platform for upskilling offers** has efficiency implications for users and employers due to the economies of scale resulting from the data generated by each group, informing relevant stakeholders (e.g., government, training providers) about skills availability. A single access point for upskilling benefits both firms and individuals as they can reduce the information-seeking costs. Therefore, policymakers can respond by adapting public financial instruments (e.g., vouchers and subsidies) in accordance with markets' required skills. It should consider offerings in all 23 EU languages and include platforms form outside of the EU.

Good practice: Building a Common Language for Skills at Work – a global taxonomy (January 2021)

This taxonomy was presented at the World Economic Forum 2021 event. It provides a framework for aligning around a universal language for skills. It synthesizes and builds on existing taxonomies by integrating definitions and categorizations of skills that we know to be of growing relevance in a fast-changing labour market. It consists of both an interactive taxonomy with definitions as well as recommendations for adoption and use cases.

Source : https://www.weforum.org/reports/building-a-common-language-for-skills-at-work-a-global-taxonomy

The **Digital Skills and Jobs Platform** which has been launched in 2021 will be an ideal place for these services as it aims to provide a one-stop-shop for digital upskilling and job information in Europe. Its broad ambition to orchestrate an unprecedented collection of upskilling information and exchange opportunities should be fostered.[74]

even more extensive nine-fold enrolment increase for learners accessing online learning through government programmes" (p. 38).

[74] Disclosure: contractor empirica is also working as a subcontractor to the consortium tasked with the implementation of the Digital Skills and Jobs Platform (DSJP).

RECOMMENDATIONS FOR ACTION – SUPPLY SIDE

Europe has identified the need for large-scale upskilling of the workforce. It has started to foster the development and implementation of sectoral approaches to skills development and upskilling and is prioritising industry commitment and sectoral ecosystem training solutions. This is done through 21 blueprints for sectoral alliances on skills which are operating and funded through various EU funding streams. In each of these ecosystems, European multi-stakeholder partnerships with key players are to be established. The challenge is to further develop these to fully-fledged sectoral ecosystem solutions widely implemented and running throughout Europe. The necessary action required is for the European Commission, Member States and regions together with the industry stakeholders in each industrial ecosystem to come up with and provide the necessary budget for the defined upskillingskilling activities. With respect to the public share of the budget this requires the existence and use of suitable Member States and European Commission funding mechanisms, programmes and financial incentives to be ensured with respect to the European Commission intention to use the Recovery and Resilience Facility and MFF – Multiannual Financial Framework 2021-2027 for this purpose.

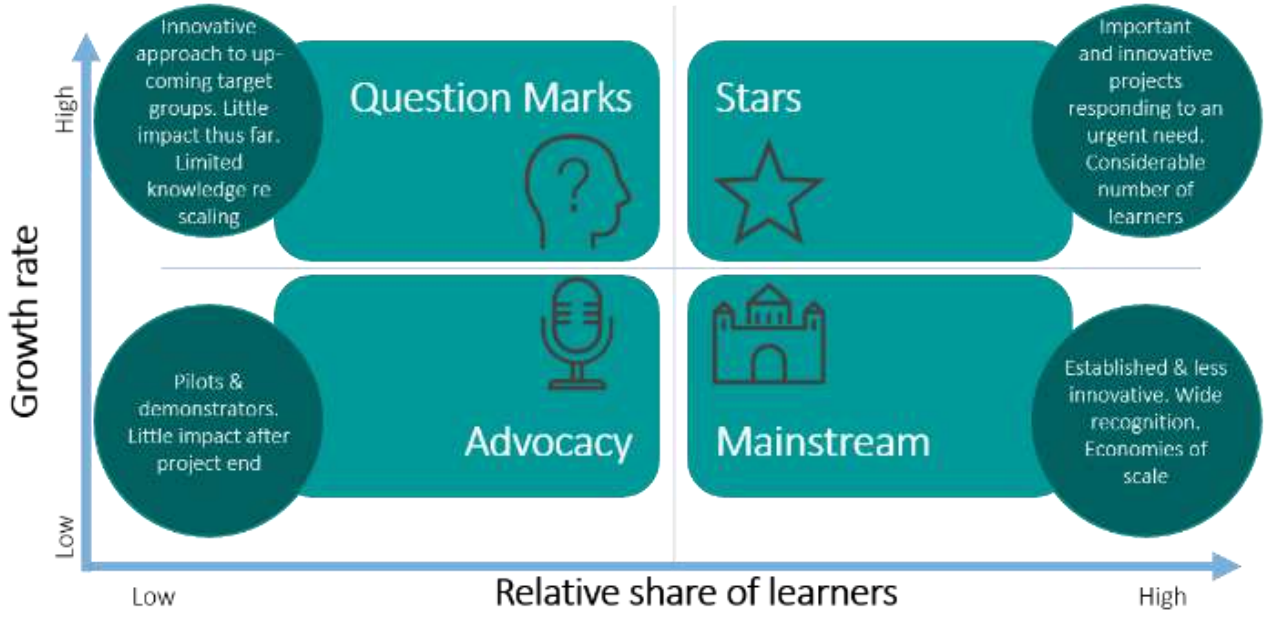
Co-creation activities bringing together education and training providers and industry for jointly developing training programmes demanded by the market are rather scarce in general and even more so when it comes to upskilling professionals and the workforce. However, these would make a change when it comes to equipping the workforce at all levels with the necessary skills for the future. This may require rooting co-creation funding in national upskilling schemes, fostering co-creation through responsible national bodies bringing together actors and overseeing co-creation and operation of large-scale industry-university programmes.

In addition to transforming and innovating traditional education and training systems to make them future-proof and taking on board further roles for instance in workforce upskilling activities at all levels a further challenge is lying in the need to develop in-workplace system for "Just enough, just in time, just for me" learning increasingly demanded by industry and the workforce. These require finding and developing programmes to fund multi-stakeholder partnerships for the development of "3J" learning systems and offers.

Finally, there is the challenge to scale up existing good practices identified in past research and created through previous EU-funded projects. Here multi-stage intervention funding instruments could make a difference. The challenge will be developing multi-stage funding instruments based on the lessons learned from best practices to help move promising

initiatives in the "stars" category into the "mainstream" stage with a view of scaling them up and achieving big impact. Many gems do exist with impressive records that deserve scaling and imitation elsewhere. [75]

Funding programme initiatives life cycle stages



Source: *empirica, 2019*

Action 7: Develop in-workplace system for "Just enough, just in time, just for me" learning

Fund multi-stakeholder partnerships for the development of "just enough, just in time, just for me" learning systems.

WHY? To upskill a workforce beyond academia, contents and methods need to be immediately actionable at the workplace. "Just enough, just in time, just for me" ("3J") describes an approach that does just this. "Just enough" relates to conveying necessary steps to accomplish a clearly defined goal, instead of excessive context. [76] "Just in time" means content that ties in with frequent work routines or is delivered immediately before the knowledge is needed. Thus, workers do not only learn the solution, but immediately apply it to their needs. "Just for me" relates to offering well-targeted learning contents to different groups. It should take into consideration the content background, range of experiences, terminology and priorities of a professional group. [77] [78] [79] In this approach, governments, training providers and employers should perceive and market "3J" training as direct performance support. The creation of a

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[75] See empirica (2019): Skills for Industry: High-Tech Skills: Scaling up best practices and re-focusing funding programmes and incentives. Final Report. https://op.europa.eu/en/publication-detail/-/publication/5c41434c-10d9-11ea-8c1f-01aa75ed71a1/language-en

[76] See https://www.chieflearningofficer.com/2012/09/14/just-in-time-vs-just-enough/

[77] See https://blog.udemy.com/4-tips-to-implement-just-in-time-learning-at-your-organization/

[78] See https://www.teambitesize.com/forum/2017/11/20/what-you-need-to-know-about-just-in-time-learning .

[79] See Müssig (2019): Just enough, just in time, just for me. In ProCare no. 24. Available at: https://link.springer.com/article/10.1007/s00735-019-1022-x .

knowledge base over time is a desirable side effect – but this grand goal often puts people off, since it seems too bothersome to achieve when declared explicitly.

WHAT? The main goal should be to create systems that smoothly integrate learning in the workflow. Thus, multi-stakeholder partnerships should develop "3J" support system learning environments. They are easy to use because they help identifying the chunk of information needed at a certain moment and mirror the workplace-specific thought processes. Overall, the "3J" approach entails that all stakeholders involved in providing training embrace an approach to address the learner that mirrors people's interaction with social media: small bites, personalised by algorithms, delivered in a visually appealing manner and taking into account people's reduced attention span. Instead of perceiving this as a disadvantageous trait of our time, stakeholders should embrace this new attitude and develop training contents around it.

7. Develop in-workplace system for "Just enough, just in time, just for me" learning

Fund multi-stakeholder partnerships for the development of "just enough, just in time, just for me" learning systems.

Supply side

HOW? In funding multi-stakeholder partnerships of training providers, academia, governments and industry practitioners, requirements and specifications could be included to develop digital training systems based on performance support. These systems should be easily accessible in the workplace, with a clear layout inspired by popular consumer apps. Especially for use in intense synchronous environments, like nursing, systems should be so intuitive that they can provide quick instructions in an emergency. Also, basic content for job starters should be grouped in a separate library from material for more experienced staff, to put into practice the "just for me" approach.[80]

Augmented reality can possibly help with this – e.g., in a warehouse setting, by over layering the intended instruction on the real equipment and location. But also less sophisticated tools can be primed for the "3J" approach if they are carefully curated: for example, a 10 minute video tutorial with time stamps relating to the contents of each section, so that learners can jump to the content they need and don't lose time with input they already know.[81] This practice has been applied by YouTubers for a long time, though education providers seem to shy away from it. Other engaging forms can be quizzes, games and infographics.[82]

[80] Inspired by Müssig (2019): Just enough, just in time, just for me. In ProCare no. 24. Available at: https://link.springer.com/article/10.1007/s00735-019-1022-x.

[81] See https://blog.udemy.com/4-tips-to-implement-just-in-time-learning-at-your-organization/

[82] Inspired by https://store.bobpikegroup.com/microlearning

Action 8: Sectoral ecosystem solutions

Further foster sectoral approaches and especially expand the Blueprints for sectoral cooperation on skills

WHY? Since 2018, a total of 21 blueprints for sectoral alliances on skills have been operated and funded through various EU funding streams. The **Blueprint pilot implementation** had an EU level investment of more than €100 million since and was organised into four waves of selection of sectors, ranging from automotive over tourism to blockchain. Each blueprint gathers stakeholders including business, trade unions, research institutions, education and training institutions and public authorities. The blueprints have shown to be successful and can be seen as good practices.

8. Sectoral ecosystem solutions

Further foster sectoral approaches and especially expand the Blueprints for sectoral cooperation on skills.

Supply side

WHAT? **The European Commission should foster sectoral approaches and especially expand the Blueprints for sectoral cooperation on skills**.[83] It makes sense to expand activities to all relevant sectors to support the creation of an abundant portfolio of professional training opportunities at all skills levels and industrial sectors. These need to be supported by campaigns to raise awareness and broaden implementation and move forward with their **roll-out at national and regional levels.**

HOW? Building on the projects and blueprints for sectoral cooperation on skills, a series of high-level roundtables and skills partnerships in industrial ecosystems have been initiated and organised by the European Commission. Altogether 14 such Industrial Ecosystems for the Recovery have been organised. Several of these roundtables and kick starts of partnerships have already started in 2020 and continued in 2021.

In each ecosystem, European multi-stakeholder partnerships with key players are to be established. These are supposed to develop a shared vision, e-skills strategies, skills intelligence and deliver ambitious re- and upskilling programmes based on KPIs and regular monitoring. The implementation period of these actions and commitments will be **2021-2025**. The 'Automotive' ecosystem has already announced its skills partnership with the ambition to upskill 5% of the workforce each year. This would result in around 700,000 people upskilled throughout the whole ecosystem. The estimated **private and public investment required** will amount to 7 billion euros. **The necessary action required is for the European Commission, Member States and regions together with the industry stakeholders in each industrial ecosystem to come up with and provide the necessary budget for the defined upskilling activities**. With respect to the public share of the budget this **requires the existence and use of suitable Member States and European Commission funding mechanisms, programmes and financial incentives**. This needs to be ensured with respect to the European Commission intension to use the Recovery and Resilience Facility and MFF – Multiannual Financial Framework 2021-2027 for this purpose.

[83] See The European Commission's Blueprint for Sectoral Cooperation on Skills, accessible at: https://ec.europa.eu/social/main.jsp?catId=1415&langId=en

From a strategic perspective, ecosystems' managing bodies should review their governance to actively forecast future skills demand and provide timely upskilling alternatives.[84] The former can take the structure of a transversal unit within the organisation chart or a committee where all participants discuss skills needs and propose joint actions relying on economies of scale to speed up the upskilling process. Although the functional form will depend on the respective sector's organisational structure (number of participants, their geographical distribution and the complexity of the relationships, among others), the crucial factor is the support of the public and private actors within the ecosystem.

Additionally, recommendations to foster upskilling programmes that impact productivity at the local level include establishing partnerships between local administrations and the European Commission to deploy fiscal incentives. The creation of shared funding and tax reductions schemes to which companies can apply via projects to finance joint training programmes constitute promising instruments to overcome skills mismatch that potentially result in competitive advantages for regions.

In following sectoral approaches, it is recommended to **exploit the existing Digital Innovation Hubs and Competence Centres** active in advanced technologies to **strengthen ecosystems through innovation hubs**. **Ecosystems that promote interaction among key actors** active at different stages of the value chain – industry, research, education and training – and from technical and non-technical backgrounds are needed. For these ecosystems to be replicable, so that Europe is widely covered, they need to be easy to understand and implement. These Innovation Hubs may have different focal points in the different European countries, fostering local strengths, such as telecommunications in the Nordic countries, education in Finland or automotive in Germany. These should be open to new actors and other countries and regions.

Good practice: UpSkill (Portugal)

Despite its name, this Portuguese endeavour is rather a reskilling programme, training 3.000 job seekers and workers from other sectors to be ICT professionals. The Portuguese ICT Business Association APDC took the initiative to launch this programme, collaborating with VET schools and more than 200 partner businesses. The two trainings on offer are programming as well as platform and network management. Six months of study in polytechnical institutes are combined with a three-month internship in a partner company. Participants receive a salary of €1,200 per month to cover living expenses. The first round is scheduled to graduate in mid-2021.

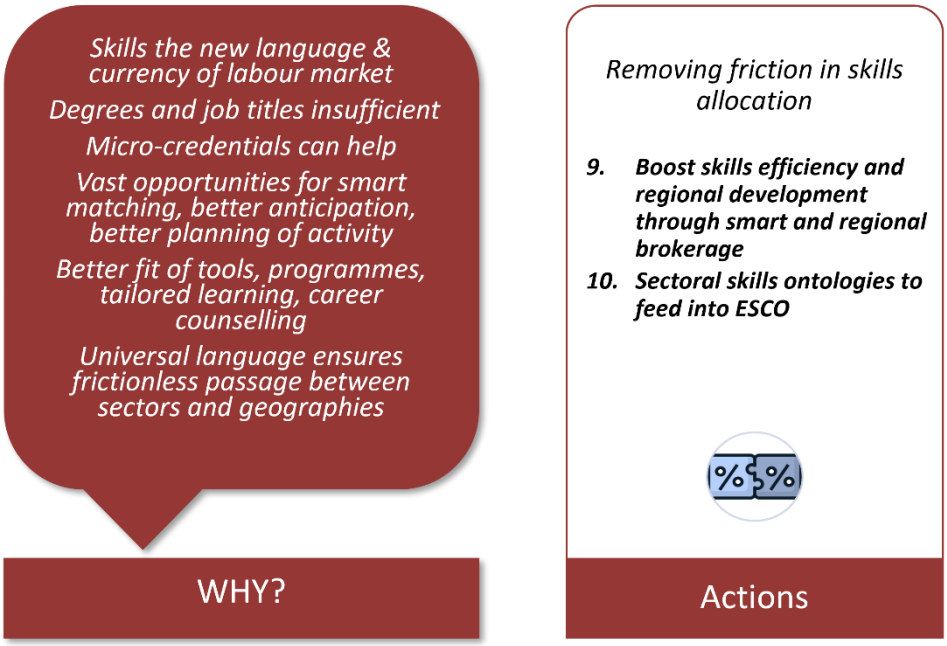
Source: https://upskill.pt/

[84] Along these lines, the Upskilling for Shared Prosperity report (WEF, 2021) calls for new approaches to upskilling and emphasise the need for forecasting skills development as a priority for all stakeholders since it will facilitate future actions towards a common research framework.

RECOMMENDATIONS FOR ACTION – MATCHING

Skills are increasingly the language of the labour market, replacing, or at least significantly augmenting, the categories of occupation and vocational or educational degree. At the same time the opportunities of big data and artificial intelligence make it much easier to match demand and supply in smart, unprecendeted ways, to much better anticipate skills demands and plan responses, and even to plan economic activity based on likely skills availability. In short, the social and economic efficiency gains to be reached by better skills data and ensuing matchmaking and removing friction are low-hanging fruit waiting to be picked.

Europe needs the large-scale operation of skills demand and supply matching platforms which help in skills assessment, finding suitable jobs, finding most appropriate upskilling offers and signposting to career opportunities for the workforce and for industry to find the appropriate upskilling programmes and the talents needed. The challenge is to identify and scale up the most promising smart brokerage, match-making initiatives mechanisms and platforms which bear the best potential for scaling up and sustainability.



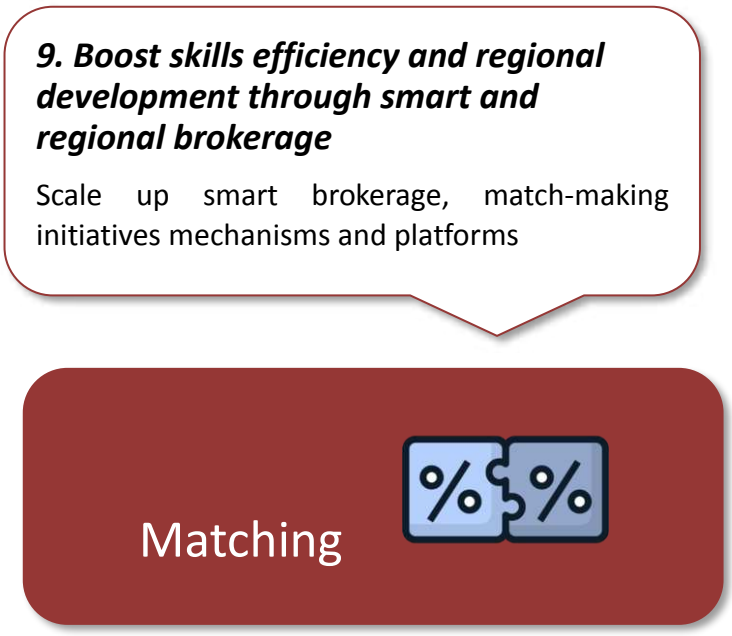
Micro-credentials play an important role in this context since they are one tool to tackle the need for just-in-time, short and tailored learning that has increased through the COVID-19 crisis and is increasingly demanded by both, workers and industry, thereby helping to match the demand and supply side. They also meet the need for increasing skills diversification through individualised personal lifelong career curricula.

A European if not global taxonomy of the skills is required to provide a framework for aligning around a universal language for skills. This would need to synthesise and build on existing taxonomies by integrating definitions and categorizations of skills that we know to be of growing relevance in a fast-changing labour market.

Action 9: Boost skills efficiency and regional development through smart and regional brokerage

Scale up smart brokerage, match-making initiatives mechanisms and platforms

WHY? Finding the labour force with the adequate skill set has become an increasing challenge for companies. This phenomenon affects labour productivity and weakens growth potential for firms to different extents depending on several factors like company's size, availability of resources, among others. However, it is expensive for firms to individually screen the market for the required human capital or look for training opportunities for their existing workforce.



However, just as important as the matching between the labour market demands and training offerings is the brokerage between those offerings and pre-existing skills. Upskilling and reskilling ideally builds on previous knowledge, talents and preferences to reduce upskilling costs, enhance adherence and guarantee more job satisfaction in the targeted function.

WHAT? It becomes necessary to develop further actions that overcome the bottlenecks that both supply and demand face. It is recommended lifting the use of matching schemes that rely on robust skills intelligence to come up with the precise allocation of human talent where it is most valued, based on innovative data-driven solutions.

HOW? Public and state bodies need to identify the most expeditious way to implement this. Depending on the availability of data and digital infrastructure for skills forecast, governments must decide whether it is cost-efficient (monetary but also in terms of time) to set up public offices to take care of matching programmes. Countries with a highly developed infrastructure and competencies are likely to carry out such initiatives on their own (see box).

Good practice: Luxembourg Digital Skills Bridge

The Luxembourg Digital Skills Bridge programme aims to support companies and their employees, whose activity will be radically transformed by major technological changes towards a new organisation, new functions and new jobs since the organisation of work is being partially, moderately or completely modified. The pilot project exists within the current legislative framework and is open to all companies, regardless of their sector of activity or their size. Small and medium-sized enterprises are supposed to benefit from the same tools and methodologies as large companies, adapted to their needs – to facilitate their transformation. Luxembourg Digital Skills Bridge calls itself a major innovation in qualifying and certifying continuing education: "The employee benefits from a skills assessment. An individual advisor supports him/her throughout the process, from the identification of a new position, to undergoing an accelerated, tailor-made, highly pragmatic and certifying training programme, until integration into the new function. The employees' career path will be secured, whether he/she remains in the current company or starts a new position at a different company. The mechanisms provided for by the Social Dialogue Act and the Retention Plan will apply and thus ensure the involvement of employees and social partners in the implementation of the upskilling process. By meeting the specific needs of each company and developing specialised training courses, Luxembourg Digital Skills Bridge will allow companies to dispose of the skills they require (at least partially) among their own

employees. Furthermore, each company will benefit from a technical assistance to plan its future jobs and skills management".

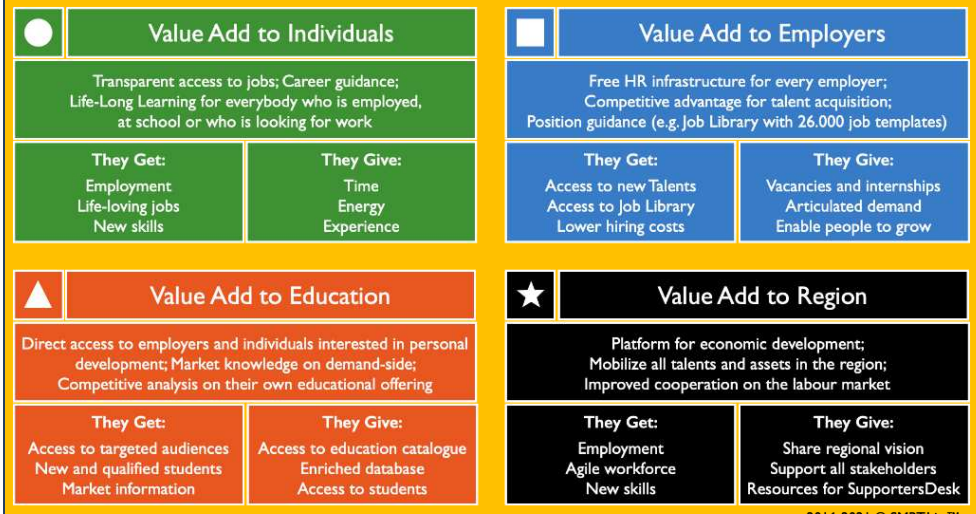
Source : https://adem.public.lu/en/employeurs/futureskills.html

However, countries with less-than-average capabilities (or with financial constraints for building up the required technological architecture) might rely on successful, experienced private providers to develop the process initially via licensing of existing tools but aiming for knowledge transfer to speed up capacity building (see box).

Good practice: SMRT.bio™ leverages technology to connect labour market stakeholders, aligning skills supply and demand

SMRT.BIO
UNLEASH YOUR TALENTS

SMRT.bio™ focuses on talent acquisition and development. It aims to connect four key stakeholders in the labour market – Individuals, Employers, Education and Regional representatives – enabling better matching of individuals with required labour market skills and educational offerings that are better aligned with graduate skills. It is active in the Netherlands, UK, Germany, Poland, Ukraine, Finland, Canada, USA, New Zealand, and South Africa. SMRT.bio is available for free to all stakeholders, while Regions, Employers and Education stakeholders can add additional services at a cost. SMRT.bio™ io has developed a social architecture to allow these four key stakeholders to collaborate and gain specific benefits.



Individuals can use the system to take psychometric tests and profile themselves, the logic being that the better a person is able to articulate his/her profile, the easier it is for an employer to match that person with a relevant job. Individuals can generate their own CVs, apply for vacancies and internships, and access personal learning advice.

Employers can use SMRT.bio™ to advertise and promote vacancies and internships. They also have access to the job library, which contains 26.000 template job descriptions and can use a fully automated selection process. As soon as a company joins the platform, they can go into the library and select jobs that they offer, together with any vacancies.

Education representatives can publish their learning catalogues on SMRT.bio™ and access big data analysis via CockpitWork, SMRT.bio's™ data analysis tool. The platform allows Education stakeholders to align their offerings with skills requirements and ensure that their offerings are competitive.

Regions can also conduct data analysis and can integrate the platform with existing job boards and coaching applications. Representatives of regions can use the platform for economic development, mobilizing talent and assets, and improving labour market cooperation.

This social architecture is complemented with four dedicated programmes: Jobs of Today, Entrepreneurship, Innovation, and Jobs of Future. All four programs are linked with the concept of lifelong learning. A key element of the Jobs of Today program is the SupportersDesk, a personal development program that supports unemployed people to gain work experience and to find work through a network of micro-SMEs. it allows unemployed people to be trained and coached to become certified supporters. These supporters reach out to employers and enrol them onto the platform. SMRT.bio™ partners with local organizations to implement SupportersDesk in their own regions.

SMRT.bio™ is an example of an innovative EdTech initiative because it harnesses data analytics in its efforts to align labour market demand with supply, the ultimate goal being to use collaboration and partnership to 're-invent the economy making it more robust and agile for the post-COVID era.'

Sources : https://smrt.bio

IgniteFuture.Today. (2021). Vision. Retrieved from https://ignitefuture.today/eng/info/vision

SupportersDesk. (2021). Home. Retrieved from https://www.supportersdesk.com/eng

SMRT.bio. (2021). Home. Retrieved from https://smrt.bio/international

It is recommended to **develop partnerships that strengthen local skill development ecosystems** (e.g., to channel local and regional business skill needs regarding training and hiring, pooling, **networking,** competence centres, best practices etc.) and create a single mechanism to channel the needs regarding training and acquisition of workers with the desired characteristics.

Incentive for employers to develop partnerships to do this does not only have the potential to access a bigger pool of qualified individuals but might also decrease costs given the bargaining power to negotiate bespoken training for a given industry, for instance. **IBM's Reskilling Japan** report[85] finds that almost 9 in 10 Japanese executives surveyed view partnering with other organisations as crucial to expand capabilities. Strengthening labour ecosystems and actively involving training providers benefits the current workforce through opportunities for skills adjustment and information about both local and international trends.

Furthermore, these skills development ecosystems serve as a **networking space** to connect key actors both across and within industries to work towards bolstering competence centres, such as clusters and digital innovation hubs. Additionally, by joining forces, organisations have the potential to bring together learning modules via libraries for training programmes, as well as platforms to show best practices and motivate exchange opportunities among ecosystem's participants for lifelong learning projects, based on successful experiences.

Good practice: Openskimr

The mission of the Openskimr pilot project is to spread and improve the availability of digital skills in Europe to foster digitisation to reduce the youth unemployment rate, to improve the employability, to provide guidance and to show possibilities to talents spread over the whole of Europe. Openskimr brings together talents, jobs and learnings to support people in creating their personal career route. It is designed as a lifelong companion which guides talents through their career in the STEM area. Openskimr is a platform for an independent expert and talent community. People from the research consortium and the industry can connect with young talents to develop the best possible match making system in the STEM area. It uses a set of algorithms which involve match making

[85] IBM Institute for Business Value (2018). *Reskilling Japan: Three steps to navigate Japan's skills challenge*. Accessible at: https://www.ibm.com/downloads/cas/PMG8DGWG

and recommendations of jobs and proper education, based on the talents' skill sets dynamics. Openskimr is built on the latest version of the European classification system ESCO (European Skills, Competences, Qualifications and Occupations) to provide international compatibility.

Source: https://openskimr.eu/

Good practice: LinkedIn Skills Path

Skills Path is a new way to use LinkedIn Recruiter for skills-based hiring. Skills Path brings together LinkedIn Learning courses with Skill Assessments to help recruiters evaluate candidates. More than a dozen companies are piloting Skills Path today. LinkedIn is aware that this is just the beginning. It will require partnerships with schools, employers, non-profit groups, and government workforce agencies, connect and collaborate with them to make Skill Path a reality.

Source:

https://business.linkedin.com/talent-solutions/blog/product-updates/2021/introducing-skills-path

Action 10: Sectoral skills ontologies to feed into ESCO

Build further sectoral skills ontologies imitating the success of the e-CF, based on industry stakeholder needs for use in recruitment, career counselling, training provision, curricula design, and skills assessment. Base these taxonomies on stakeholder input, data-based skills intelligence and feed them into ESCO.

WHY: The acceleration of change with regards to occupational skills has been described at length and is common wisdom by now. The WEF[86] has stated the need for a new skills taxonomy despite the existing frameworks such as by the European Commission in the form of ESCO and O*NET in the United States, focussing on "integrating additional emerging skills and attitudes, particularly as they relate to the trends highlighted in the Forum's ongoing insights. on the future of work. It aims to take a matrixed approach that combines skills and occupations."

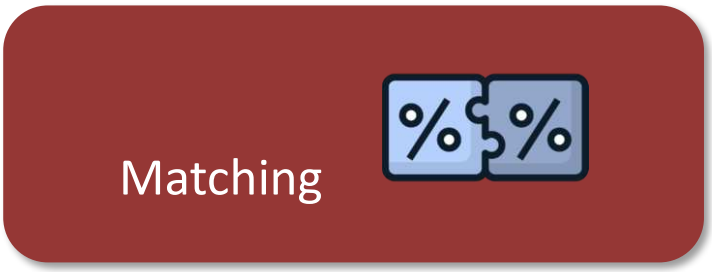
ESCO also takes a matrixed approach, however skills often tend to be assigned to single or very few occupations while actually similar skills appear in other occupations but with a different name. A good example for a matrixed approach that avoids this, fully integrated with ESCO, is the European Norm (EN) 16234-1 "European e-Competence Framework (e-CF)" where skills appear across a range of occupations and that also maps skills to occupations (job profiles) for ICT professionals.

Taxonomies as reference languages are used in broad array of use-cases such as recruitment, career counselling, training provision, curriculum design, skills assessment, and labour market information. A better understanding of the language in which skills are described can also ensure frictionless passage between sectors and geographies and enable better tools, generally. All these use-cases have slightly different requirements. However, only a shared taxonomy for all these cases enables inter-operability. Therefore, a compromise between these requirements must be sought.

[86] https://www.weforum.org/reports/building-a-common-language-for-skills-at-work-a-global-taxonomy

10. Sectoral skills ontologies to feed into ESCO

Build further sectoral skills ontologies imitating the development of the e-CF, based on industry needs for use in recruitment, career counselling, training provision, curricula design, and skills assessment. Base these taxonomies on stakeholder input, data-based skills intelligence and feed them into ESCO.



WHAT: The success of the e-CF can serve as a blueprint for building further sectoral skills ontologies/taxonomies based on industry stakeholder needs for use in recruitment, career counselling, training provision, curricula design, and skills assessment.

ESCO has already been well developed and we recommend keeping on developing this, augmenting perhaps a sectoral viewpoint and learn from the good example of the European e-Competence Framework, which also was a concerted effort at bringing in clear industry and stakeholder perspectives. Of course, the dilemma of classifications in highly volatile environments is that there is a serious time lag between an agreement based on due process and the ever-changing realities. Therefore, a two-speed system should be considered, where such agreed-on classifications are running in parallel with automated big data and AI based intelligence such as from Skills-OVATE, which can be harmonized into the system at certain intervals.

More interdisciplinary research on skills ontologies to derive context-relevant classifications is also needed.

HOW: Broad stakeholder involvement has proved very valuable in developing a shared taxonomy and remains imperative. It can and should increasingly be informed by data-based skills intelligence. Today taxonomies need to be ever more flexible in a fast-changing labour market, where some skills may change every week. LinkedIn for example has evolved as matchmaker for skills demand and supply and trends in skills, and descriptors used for signalling these online are observable much more easily today. Such an emergent reference language for skills in the labour market hence is naturally more fluid than a procedurally set reference language needed for curriculum design, cross-border comparability of qualifications (such as in VET or Bologna) or assessment. However, it needs to be borne in mind that LinkedIn and other data aggregators only provide a biased map of the labour market with a marked over-representation of high-skilled white-collar professionals (which is also true for the WEF proposal), which is why skills intelligence can only enhance but not replace the process of stakeholder dialogue and consensus building.

Good practice: European e-Competence Framework (e-CF)

European e-Competence Framework

The European Norm (EN) 16234-1 European e-Competence Framework (e-CF) provides a reference of 41 competences as applied at the Information and Communication Technology (ICT) workplace, using a common language for competences, skills, knowledge and proficiency levels that can be understood across Europe. This is complemented by 7 Transversal Aspects relevant to ICT professional competence performance. Consistent links to ICT qualification context (e.g., by the EQF) and familiar

frameworks (e.g., DigComp, European ICT Professional Role Profiles, behavioural skills, SFIA, ISO and further ICT industry standards) are provided.

Source:

https://www.ecompetences.eu/

OUTLOOK

The policy actions undertaken to tackle the COVID crisis create a good momentum to reduce the long existing skills challenge, especially through the massive investments made available for the twin transitions. The way towards one or another of the scenarios elaborated here is now influenced by the concrete choice of policy tools, as well as methods of stakeholder engagement. This report has developed a vision of not only a successful economic recovery, but of a targeted and well-orchestrated action, reducing the skills gap on multiple levels. The policy measures presented to reach this goal are intended as an inspiration, and not to be prescriptive.

In this sense, the suggested measurements can serve as a basis to develop concrete action plans for upskilling and reskilling in the post-COVID era that aim at reducing the workforce gap, keeping up Europe's competitiveness and helping citizens and workers thrive in an increasingly volatile, automated and data-based services driven post-pandemic Europe.

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