Directing business policies. The challenges to Industry 5.0.

BRIDGES 5.0 Policy Brief #5

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Key points.

- Manufacturing is one of the main sectors in the European Union (EU) in terms of its contribution to employment and economic growth. In the past years, it has been increasingly recognised that manufacturing is strongly affected by the twin digital and green transitions and plays a pivotal role in shaping them. Up- and reskilling are key to addressing both quantitative and qualitative mismatches between labour demand and supply arising from these transitions.

- Within the EU industrial policy, Industry 5.0 has emerged as a key paradigm alongside Industry 4.0. It recognises that to make the twin transition work for companies as well as workers, efforts must be made to achieve a more human-centric, sustainable, and resilient manufacturing industry. By advancing Industry 5.0, European policymakers aim to align the EU's economic and social goals by firmly putting quality jobs and the well-being of workers at the top of the agenda.

- Despite this strong push from policymakers at the EU level, Industry 5.0 has not yet been taken up by policymakers in the Member States, nor has it been translated into practice. The lack of a uniform, widely accepted definition of Industry 5.0 and its three pillars hamper the understanding and uptake of Industry 5.0. Familiarity with Industry 5.0 is limited among most companies and stakeholders. As a result, there are only a few examples of policies and practices at the company level directly dedicated to the transition towards Industry 5.0.

- Yet, at the same time, companies and sectors increasingly pay attention to issues such as their workers' health and well-being, their environmental impact, and their resilience to (supply chain) shocks. These topics are often embedded in other policies and programmes beyond the EU industrial strategy. In this context, Industry 5.0 is not a goal in itself but rather a way to achieve a more human-centric, sustainable, and resilient manufacturing industry. Companies should define their targets and determine how to measure the progress made. Improving the quality of work and participation in up- and reskilling are important, but such efforts need to be aligned with digital, green and resilience goals in training.

- To make sure that the potential benefits of Industry 5.0 materialise, securing the right supply of skilled workers who will enable companies to optimise the gains from digital technology and the right skills to deal with the digital and green transition are needed to achieve a sustainable, resilient, and fairer future for Europe. To do so, it is important to shed light on how the transition towards Industry 5.0 will affect the demand and supply of skills.

- The BRIDGES 5.0 project aims to help accelerate the transition towards Industry 5.0 in Europe in several ways: it proposes a conceptual framework for Industry 5.0, as well as ways to identify, measure and develop skills for Industry 5.0 among diverse groups of workers, and puts forward recommendations for companies, sectors, social partners and policymakers at EU level and in the Member States.

Context and importance of the issue.

Background to BRIDGES 5.0 and this policy brief.

Launched in January 2023, the BRIDGES 5.0 project centres on workforce skills for Industry 5.0. The project has four main goals. The first goal is to map how jobs are transforming and what new jobs are emerging, and to understand Industry 5.0 requirements for these jobs and company practices. The second goal is to map Industry 5.0 skills and skills gaps for emerging green and digital jobs at the EU level and for diverse national institutional contexts and to enable the monitoring of such skills gaps through standards and taxonomies. The third goal is to set up skilling pathways using enriched teaching and learning factories concepts and to assess how these help reduce skill gaps for four target groups (managers, employees, job seekers, and students). The fourth goal is to engage with a wide range of stakeholders around Industry 5.0 and to co-produce an Industry 5.0 platform. By pursuing these goals, BRIDGES 5.0 aims to contribute to improved labour market matching and reduced skills gaps, and an overall better management of the risks and opportunities of the digital and green transitions.

In the first year of project implementation, the BRIDGES 5.0 team has been working on the conceptual and methodological underpinnings of the project and the data collection. Although several project activities have already started, currently, the conceptual framework (D1.1) is still under development and is only due by December 2023, while the measurement framework and data strategy (D2.1) are almost ready for use. Several efforts have been made to establish a network of actors and stakeholders around Industry 5.0 (including through dedicated project meetings and the establishment of an online platform). The development of the enriched teaching and learning factories concepts has also started.

This policy brief is the first of a series of eight policy briefs that the BRIDGES 5.0 project will produce. Their aim is to translate project findings into policy recommendations at the EU and national levels. This policy brief presents an initial reflection on the policy approach to make business policies more Industry 5.0. Other policy briefs will cover topics such as the conceptualisation of Industry 5.0, social change in learning practices, arrangements between partners in regional ecosystems and social ownership of new ways of supporting the target groups with the learning factory concept, among other issues.

Given the early stage of the project implementation, this policy brief mainly relies on the draft conceptual framework under development by BRIDGES 5.0, as well as a draft manuscript for an academic article building on that framework. It uses inputs from the BRIDGES 5.0 Company Board, Stakeholder Board and Scientific Advisory Board gathered through meetings and bilateral exchanges. In the fall of 2023, a series of dialogue workshops with key stakeholders will be organised, of which the outcomes will be included in an updated version of this policy brief. Based on the initial inputs, it became clear that many companies and stakeholders are themselves still uncertain about their understanding of the Industry 5.0 concept and how to put it into practice. For that reason, knowledge and experience with businesses policies and practices is very limited and needs further elaboration. This policy brief, therefore, mainly considers challenges related to labour and skills shortages and lifelong learning in the workplace. This work is also situated in an emerging academic and grey literature on the topic.

Why BRIDGES 5.0 focuses on workforce skills.

Industry 5.0 is generally seen as a complement to Industry 4.0, and both up- and reskilling are critical to its successful adoption. In this regard, the European Commission underlined in its communication on the new industrial strategy that *"a competitive industry depends on recruiting and retaining a qualified workforce. As the twin transitions gather speed, Europe will need to ensure that education and training keep pace. Making lifelong learning a reality for all will become all the more important: in the next five years alone, 120 million Europeans will have to up- or reskill."* (European Commission, 2020, p. 11). One of the key objectives of the industrial policy should thus be to develop skills and support lifelong learning.

In the debate concerning the fourth industrial revolution, one of the main topics relates to how job destruction, job creation and job transformations affect labour demand, and what this implies in terms of up- and reskilling for workers and the transferability of skills.

Studies aiming to estimate what share of employment and to determine which jobs would be affected by automation have yielded different results, depending on the conceptualisations and statistical approaches used. In addition, it is typically much more difficult to predict what and how many new jobs will be created following the introduction of a certain new technology. As a result, policymakers and stakeholders tend to focus more on the challenges rather than the opportunities of technological transformations.

Whereas early studies highlighted that traditional blue-collar routine jobs were especially likely to be automated and disappear, later research showed that white-collar non-routine jobs are at risk of automation as well. These studies tie into the larger debate on polarisation and upgrading. In addition, while some research predicted massive jobs losses following the fourth industrial revolution, other work built on the notion of jobs as a bundling of tasks, some of which would be performed/replaced by technology while others would (still) be taken up by humans. In such cases, jobs may not disappear completely but rather undergo a transformation. However, this opens a potential divide relating to the organisation of work. Companies in which work is organised on Tayloristic lines (simplified, low-skill tasks separated from planning and preparation functions) may be highly vulnerable to extensive job loss. In contrast, where jobs contain a broad bundling of tasks (including planning and preparation), automation can be targeted in ways that release workers from low-skill, repetitive and physically arduous functions.

In this context, attention is increasingly being paid to the skills that humans need to execute those tasks that cannot be automated, and to those skills, they would need to be able to work or interact with such new technology. Where workers are empowered as active participants in selecting and deploying new technologies, they are likely to become agents of their own upskilling. Rather than automation, such an approach would imply augmentation or the use of technologies to enrich workers' skills. Furthermore, social skills play an increasingly prominent role where Tayloristic divisions of labour are absent, thereby requiring enhanced collaboration and teamwork across the production process.

In this respect, it is important for policymakers to recognise that successful transitions to Industry 5.0, including workforce upskilling and lifelong learning, are more likely in organisational settings already characterised by high levels of employee autonomy, cross-functional task delivery, problem-solving and involvement in improvement and innovation.

Supporting companies in the adoption of such workplace practices ("workplace innovation") is therefore an important policy enabler of Industry 5.0.

In recent years, the EU has embraced Industry 5.0 as a key paradigm in its industrial policy. Whereas Industry 4.0 was primarily driven by productivity and technological considerations, in the last decade it has been clearly demonstrated that a wider perspective is necessary in order to make the digital transformation work. Industry 5.0 brings such a perspective by adding sustainability, resilience, and human-centricity into the mix. Compared to Industry 4.0, the transition towards Industry 5.0 is policy- and values-driven. In short, Industry 5.0 will need to be a strategic choice for companies, one in which boards and senior teams align organisational values, purpose, strategy, structures and culture with the goals of human-centricity, sustainability and resilience. The task for policymakers is to create the incentives, resources and regulatory context within which such strategic choices can be made.

Why change is necessary – a critique of existing policy options.

Despite a broad consensus on the importance of up- and reskilling in the context of the green and digital transitions, there is still a long road ahead. In the EU, many companies and sectors are faced with a lack of skilled workers. For some occupations, these labour shortages persist and appear to grow rather than shrink. Such labour shortages have been attributed to several drivers, including a declining labour supply (e.g., due to population ageing, a growing group of workers with long-term illnesses or conditions leaving the labour market), poor working conditions and low wages in some sectors, but also skills gaps and mismatches.

Companies can thus adopt different strategies to deal with labour shortages. One strategy is to focus on improving the quality of work to be more successful in attracting and retaining workers. In this regard, companies invest in employer branding measures, enhancing working and employment conditions and wages, not just by offering incentives such as flexible benefit plans, flexible working times and options for telework, but also by improving the quality of working life through greater empowerment and autonomy. In this way, companies can also become more inclusive.

Another often parallel strategy is to invest in up- and reskilling as part of an overarching strategy for lifelong learning, targeting both the companies' current workforce and newly hired workers. Up- and reskilling can be organised in the workplace or outside of it, although data does suggest that most adult learning in Europe happens inside companies. Offering training and opportunities for career development in itself can help to retain or attract workers.

However, to develop workforce skills for Industry 5.0, a good understanding is needed of how the demand for skills will change. Which skills are required for a more sustainable and resilient manufacturing industry in Europe capable of preventing and managing (supply chain) disruptions and adopting circular production processes? What is needed to establish a more human-centric manufacturing industry which provides better, safer, and healthier jobs, is more inclusive, and offers opportunities for those who struggle to connect with the labour

market? And how can workers be more involved in decision-making processes (going beyond the mere provision of information) in ways that fully utilise and develop their knowledge, skills and creativity?

This understanding is hampered by the lack of a clear conceptualisation of Industry 5.0. Although Industry 5.0 is increasingly discussed in academic and policy circles, the concept is not so well-known, nor widespread, at the company level. Furthermore, the concepts of human-centricity, sustainability and resilience – the three key pillars of Industry 5.0 – can be defined and measured in several ways as well, so companies and stakeholders may fill them in different ways. For example, when it comes to green skills and jobs, skills taxonomies are still being developed. This, however, does not mean that companies are not putting practices in place to achieve a more human-centric, sustainable and resilient manufacturing industry. Companies may simply not link those to the concept of Industry 5.0, or see them as part of an overarching strategy to make progress towards Industry 5.0.

More generally, participation in adult education remains too low in Europe due to barriers on both the companies' and the workers' side. Companies may lack information about the skills they already have in-house and how to utilise them, the skills they need (now and in the future), and how to develop those skills. Smaller organisations in particular may lack the knowledge and capacity to conduct skills assessments or audits. Some companies may also not acknowledge a need for skills development, arguing that their workers' current skills correspond to their needs or that they will recruit such workers rather than invest in training the workforce. A lack of information about the available training offer, mismatches in the content and format of the training offer, high costs of training, the fear that trained workers may leave the company, issues with the validation and recognition of skills, etc. are important barriers as well. For workers, barriers to participation in adult education relate to a lack of information on their training needs and the available training offer, poor past learning experiences, their personal situation, among other factors. On the policy level, adult education policies appear to be disconnected from other policy areas, such as economic or industrial policy and labour policy.

Proposals for change and policy recommendations.

The three challenges at the core of the BRIDGES 5.0 project allow the identification of key areas under which policy pointers can be proposed at this early stage of the project. These three challenges are (i) the need to develop a conceptual framework of Industry 5.0 which recognises its societal implications, (ii) the need to clarify the content and approach to skilling for a digital and green Industry 5.0, (iii) the aim to secure policy support for a digital and green Industry 5.0. The Industry 5.0 concept recognises the significant role of companies as drivers of change. Efforts to support the transition towards Industry 5.0 should build on this idea and put companies at the core.

Propose a conceptualisation of Industry 5.0 and its three key pillars that companies support, can easily understand and can apply to their own situation. That is why BRIDGES 5.0 insists that developing a conceptual framework for Industry 5.0 is a collaborative process involving

researchers, companies and stakeholders. The lack of a single conceptualisation of Industry 5.0, accounting for the skills dimension, complicates the debate and hampers the adoption of the concept. The conceptual framework of Industry 5.0 should highlight the organisational and societal implications of digital transformations when deciding to invest in technology. Involving workers and their representatives from the start is key. By emphasising these dimensions, companies can better gauge their own role as drivers of the transition towards a more human-centric, sustainable, and resilient manufacturing industry, and what this would require in terms of workplace practices, approaches to dealing with the workforce, etc. Companies should determine their goals as well as how they measure progress. In doing so, not only the 'quantity' or how many workers are reached by a measure should be considered, but also the quality of the measure and specifically its impact on quality of working lives. For example, in the area of training, it must be asserted that all workers have the right to training, can in fact exercise this right, have access to high-quality training, and are empowered to utilise and further develop their newly acquired skills in the workplace. The essential characteristics of high-quality training, therefore, need to be clearly defined, including in terms of its impact on the workplace. That is why the BRIDGES 5.0 project selected two state-of-the-art training interventions: learning and teaching factories. The added value of Industry 5.0 for companies should be highlighted.

Transpose EU policy frameworks, initiatives, and actions to the national and sectoral contexts and ensure that skills are a transversal issue tackled across policy areas. This is required, not only to increase the familiarity and uptake of Industry 5.0 at the national, sectoral and company levels, but also because EU policymakers have limited competences in the area of labour and skills, and skills development usually takes place within companies with the support of a wide ecosystem of local, sectoral, regional or national actors (e.g., trade unions, training providers, sectoral federations, public employment services etc.). Depending on the target group, other actors may come into play, e.g. in the case of the unemployed. On this note, it is important that efforts and initiatives around skilling are not just considered within the adult education policies but also transferred to other levels and areas. Skills should not be an afterthought but rather a core component of policies targeting the future of work.

Gain insight into the framework conditions that push the transition to Industry 5.0. So far, the narrative around Industry 5.0 is strongly policy-driven: it is a deliberate choice made by policymakers to make progress towards a more human-centric, sustainable and resilient manufacturing industry. However, it must also be recognised that there are several drivers and dynamics, for example, the current labour shortages, which could help push the transition. Industry 5.0 could thus be part of the solution for some of the challenges that companies are faced with today. To make this work, a good understanding of such framework conditions, their interplay and relation to Industry 5.0, and how this could feed into company strategies and practices is required.

Create a community around Industry 5.0 in which companies play a leading role. As part of the BRIDGES 5.0 project, dialogue workshops will be organised, and a web platform will be created to gather a wide range of stakeholders around Industry 5.0. This should enable companies to discuss the challenges and opportunities of the transition towards Industry 5.0 with their peers and with other actors. This should allow us to identify good practices that could be transferred to other contexts or scaled up, as well as the reasons why these practices work. These insights, in turn, would help policymakers to create the right framework for the transition towards Industry 5.0. The European Commission's efforts to establish a Community of Practice Industry 5.0 are also noteworthy here.

Exploit that skills and training are an area of 'win-win' bargaining. In many countries, trade unions and employers' organisations play a key role in adult education, for example in the design, management and funding of lifelong learning programmes and systems. As ensuring that the workforce has the right set of skills benefits both employers and workers, training is often seen as an area of 'integrative' bargaining, where there is room for win-win negotiations between the social partners organisations. The recognition and support for skills development from both employers organisations and unions can provide an important lever for progress in this area. Social partners should thus be aware of their roles and reach.

Develop new strategies to facilitate training and learning. Already today, participation in adult education is very low in Europe, especially among those groups who need training the most. In addition, continuous learning will only become more important in the future. Policymakers should be aware of and address the barriers that companies and workers face concerning learning and training. Companies should make sure not to overlook certain groups of workers when providing training, such as lower-educated workers, workers performing manual labour, those with temporary contracts, etc. who tend to receive less training in general, and often get training that is job- and organisation-specific and cannot be easily transferred to other contexts. Skilling should be approached from a life-cycle perspective and built on training pathways rather than individual training efforts. Both the content and format of the training offered should be regularly updated to keep track of the latest developments. This includes new forms of teaching and learning, such as the innovative teaching and learning factories, which will be further developed in the BRIDGES 5.0 project. Companies can also experiment with innovative practices and share their experiences within their networks. This approach could also help to improve the learning culture among companies and workers.

Conclusion.

The BRIDGES 5.0 project bridges risks to an inclusive digital and green future by enhancing workforce skills for Industry 5.0. BRIDGES 5.0 adopts new concepts and approaches to shed light on how jobs and skills needs are transforming and what is required to make Industry 5.0 work. The project also puts forward skilling pathways for four target groups, skills taxonomies, standards, organisational models, and managerial practices. Since Industry 5.0 is policy- and values-driven, instead of technology-driven, having the buy-in of companies is key. BRIDGES 5.0 aims to equip companies with the knowledge, tools, and support to adopt the Industry 5.0 principles of resilience, sustainability, and human- and socio-centricity, and it establishes an ecosystem of actors around the Industry 5.0 platform. In that way, BRIDGES 5.0 contributes to the uptake and acceleration of Industry 5.0 in Europe.

Further reading

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BRIDGES 5.0 PROJECT IDENTITY

Project name	BRIDGES 5.0 Bridging Risks to an Inclusive Digital and Green future by Enhancing workforce Skills for industry 5.0
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	Conservatoire National des Arts et Métiers, Centre d'Études de l'Emploi et du Travail-Lirsa
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	Comau SPA
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