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Research Perspectives on the Future of Work



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Research Perspectives on the Future of Work

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EUROPEAN COMMISSION

Research Perspectives on the Future of Work

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(European Policy Centre)

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Executive summary

In a rapidly changing world, the future of work hinges on the degree to which workers and businesses are engaged in the twin digital and green transitions. Recognising the need for a dedicated space to anticipate questions on the future of work, the Directorate-General for Employment, Social Affairs and Inclusion and the Directorate-General for Research and Innovation have proposed a joint ERA4FutureWork initiative for Member States to discuss research and innovation (R & I) priorities. Through this initiative, the European Commission facilitated a dialogue between policymakers, social partners and stakeholders from academia, vocational education and training providers, at both the Member State and European levels, and discussed best practices and research priorities for the future of work. This study is the outcome of these consultations, and thus provides an overview of the current state of R & I on the future of work, highlighting existing efforts and identifying areas for further research. The main objective of this document is to examine gaps in R & I among Member States across four major research streams extensively discussed under the ERA4FutureWork initiative. These four streams are as follows.

- **The green transition and working life.** This stream explores ways to combine economic goals with environmental and social sustainability and innovation to reduce industry's environmental footprint and to address rising inequalities among workers.
- **Facing an increasingly digital world of work.** This stream aims to understand how human-centric technologies can ensure that innovation serves workers' needs, involving workers in new technology design and application and promoting well-being and mental health in the workplace.
- **The twin transitions and vulnerable groups.** This stream focuses on anticipating drivers of future inequalities to avoid creating new vulnerable groups and addresses the issues faced by existing vulnerable workers.
- **The future of work in EU public administrations.** This stream investigates the challenges of digitalisation and new working arrangements in public administrations and the need for governments to reinforce their employment strategies.

To address these four research streams, four workshops were organised with relevant stakeholders. The workshops' aim was to identify emerging trends and knowledge gaps with respect to the EU's green transition and working life, with the goal of setting R & I priorities for the years ahead. In exploring these cross-cutting areas, the study advocates a proactive and strategic approach to integrating new work approaches, reindustrialisation and future work trends with green and digital transition policies. This integration is vital for shaping employment patterns, skill requirements and workplace dynamics in European cities and regions, with the ultimate goal of informing scientists and policymakers responsible for R & I initiatives across Europe. To achieve these

objectives, the agenda proposes a range of R & I actions, including innovative educational programmes, analysis of labour mobility patterns and skills shortages, and assessment of work platformisation and its implications. R & I can in fact provide the necessary analytical foundation for setting policies that shape sustainable and equitable societies, founded on decent and dignified work. To this end, it is crucial that policymakers align their efforts with technological advances, address emerging threats and base interventions on robust, future-proof principles.

1. Introduction

As the global landscape of work rapidly evolves, propelled by technological advances and environmental challenges, it is imperative to anticipate and address the implications of such changes for workers and sectors. Economic, ecological, digital, demographic and social transformations are driving changes to the labour market, reshaping millions of jobs in the European Union (EU). New professions are being created, while existing professions are being deeply transformed, phased out or replaced by new technologies. In light of the current permacrisis ⁽¹⁾, with one challenge seamlessly followed by the next, achieving sustainability and building resilience is key. The role of well-designed labour and social policy in strengthening societal resilience through absorbing shocks and acting as stabilisers is increasingly recognised ⁽²⁾. Strong social protection schemes are the most important feature in predicting the shock-absorbing capacity of a country, while well-designed labour market policies help people to ‘bounce forward’ from shocks, with positive implications for economic resilience ⁽³⁾. Well-crafted social policies empower citizens to embrace new opportunities in the labour market, fostering economic prosperity at the micro and macro levels. Through robust social protection and inclusion initiatives, workers gain stability and income security during job transitions and life events. Furthermore, supportive services facilitate skills development, promote well-being and enable workers to balance employment with caregiving responsibilities ⁽⁴⁾.

Research and innovation (R & I) serves as a fundamental driver of a sustainable, digital and resilient economy in which citizens can prosper, in alignment with the principles enshrined in the European Pillar of Social Rights (EPSR) and its action plan. Historically, R & I has been key to improving productivity, economic growth and living standards ⁽⁵⁾. Today, with the EU facing climate and technological challenges as well as an ageing population and growing skills gaps, the importance of R & I in driving social and

⁽¹⁾ Zuleeg, F., Emmanouilidis, J. and Borges de Castro, R., *Europe in the Age of Permacrisis*, European Policy Centre, Brussels, 2021.

⁽²⁾ Giovannini, E., Benczur, P., Campolongo, F., Cariboni, J. and Manca, A., *Time for Transformative Resilience: The COVID-19 emergency*, Publications Office of the European Union, Luxembourg, 2020.

⁽³⁾ Informal Working Group Social Investment, ‘Social investment for resilient economies’, Draft final working document, Service Public Fédéral Sécurité Sociale, Brussels, 2023.

⁽⁴⁾ European Commission, *Employment and Social Developments in Europe*, Publications Office of the European Union, Luxembourg, 2018.

⁽⁵⁾ Steeman, J., Di Girolamo, V. and Mitra, A., *Why investing in research and innovation matters for a competitive, green and fair Europe: A rationale for public and private action*, European Commission: Directorate-General for Research and Innovation, Publications Office of the European Union, Luxembourg, 2024.

economic stability is increasingly important because it contributes to evidence-based policy.

The EU is a major player in R & I, accounting for an important share of global science and technology production. In addition, it has made significant investments in R & I through its research framework programmes (currently Horizon Europe), with EUR 95.5 billion in funding for 2021–2027 ⁽⁶⁾. This funding is focused on addressing key challenges and trends that directly and indirectly affect the future of work, such as automation, digitalisation and demographic changes.

The European Commission’s Directorate-General (DG) for Research and Innovation monitors 250 Horizon 2020 and Horizon Europe projects centred around policies relevant to the future of work. Of these projects, 212 focus on the objectives of the EPSR’s action plan and contribute to R & I on the future of work. The other 38 Horizon Europe projects are selected from different clusters, such as health, culture, creative industries, inclusive society and digital, and are highly relevant to the future of work, receiving a total EU contribution of nearly EUR 435 million for all 250 projects⁽⁷⁾. All these efforts strive to better integrate research, innovation and higher education in order to modernise the workforce and prepare for the future of work ⁽⁸⁾. This includes supporting synergies between research, innovation and education policies and programmes.

2. ERA4FutureWork

Recognising the need for a space for EU policymakers and stakeholders to anticipate potential changes to the world of work, and to discuss prioritisation of R & I funding for the future of work, DG Employment, Social Affairs and Inclusion and DG Research and Innovation teamed up to build the ERA4FutureWork forum. Through this framework, DG Employment, Social Affairs and Inclusion and DG Research and Innovation aim to promote a systematic dialogue between R & I and employment policymakers, as well as with social partners and stakeholders, such as university associations and vocational education and training (VET) providers.

Considering the current pace of technological, political and societal change, a series of stakeholder workshops was organised between April 2023 and February 2024 with the aim of proposing a path for future collaboration. These delved into the complexities of the transitions facing the EU and their impact across sectors, segments of the workforce

⁽⁶⁾ European Commission, *Horizon Europe, The EU Research & Innovation Programme 2021–27*, Publications Office of the European Union, Luxembourg, 2021.

⁽⁷⁾ European Commission, *Towards an EU research and innovation agenda for the future of work – Collaborating for fair, decent and rewarding jobs in Europe*, Publications Office of the European Union, Luxembourg, 2023.

⁽⁸⁾ European Commission, ‘Reforming and enhancing the European research and innovation system’, accessed 13 December 2024, https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/reforming-and-enhancing-european-research-and-innovation-system_en.

and social groups. The outcome of this dialogue is to highlight current research gaps and needs pertaining to the future of work and labour markets and to inform future work programmes under Horizon Europe or national funding.

The findings presented in this research were developed through a mixed approach comprising consultative processes involving relevant stakeholders, such as targeted events, and comprehensive desk research. While the overall effort of the initiative is to create a single, borderless market for R & I information and technological developments across the EU, this study provides an overview of the state of R & I in relation to the future of work, highlighting existing efforts and identifying areas for improvement.

3. Scope and vision

Understanding and navigating the future of labour markets and employment policies is paramount to shape sustainable and equitable societies based on decent and dignified work. The evolving landscape of work, however, demands insights into emerging trends to understand the pathways that can strengthen or hamper social cohesion or undermine the existing social *acquis*. In the workshops organised with national stakeholders, experts and the European Commission, four major research streams were highlighted.

- **The green transition and working life.** This stream explores ways to combine economic goals with environmental and social sustainability and innovation to reduce industry's environmental footprint and to address rising inequalities among workers (in knowledge, value or income), providing green solutions to strengthen industry and workers' resilience and autonomy in the event of adverse external effects.
- **Facing an increasingly digital world of work.** This stream aims to understand how human-centric technologies can ensure that innovation serves workers' needs and values and does not dictate the way in which they work; how to involve workers in the design and application of new technologies in workplaces at early stages; and how to consider and promote both physical and mental well-being in the workplace by exploring the effects of new technologies (e.g. artificial intelligence (AI) and virtual worlds) on workers.
- **The twin transitions and vulnerable groups: R & I actions, gaps and challenges.** This stream focuses on anticipating drivers of future inequalities to avoid creating new vulnerable groups and addresses the issues faced by existing vulnerable workers.
- **The future of work in EU public administrations: R & I actions, gaps and challenges.** This stream aims to understand what changes public administrations across Europe face, investigating specifically the challenges brought about by digitalisation and new working arrangements (e.g. remote

working), together with the need for governments to reinforce their employment strategies.

Achieving progress in these streams requires a strategic approach in anticipating future changes in the world of work, both by R & I and the relevant actors involved. The policy cycle and short-term legislative needs are neither predictable nor aligned with the pace and planning of research activities. When designing new social policies, policymakers need to be aware of technological context and developments to identify and mitigate emerging threats and base their interventions on robust, future-proof principles. R & I can provide a sound analytical underpinning to help achieve these objectives based on new data, its interpretations by scientists and the rigorous testing of different theories.

The following sections present findings from the workshops with experts and stakeholders on the four research streams. Section 4 examines the potential impact of the green transition on working conditions and working life, paying specific attention to balancing employment policies, crucial for reaching green and industrial targets, with social ones. In Section 5, the advances in digital technologies are explored in relation to their impact on the workforce. Sections 6–12 present findings from the workshops on what the future of work will entail for vulnerable workers, and the future of public services and the challenges they will face in the future. Finally, Section 13 examines the key research gaps and needs of the future R & I agenda, proposing innovation actions that prioritise the integration of future work trends with the policy paths of the green and digital transitions.

4. The green transition and working life

As the EU navigates the challenges pertaining to climate change, the imperative to transition towards greener, sustainable economies becomes increasingly urgent. Anticipated to significantly reshape the social and economic fabric of the EU, ongoing initiatives aimed at transitioning industries and economies from ‘brown’ to ‘green’, such as the European Green Deal and its related Green Deal industrial plan, are poised to trigger a substantial redistribution of both labour and capital across key sectors. Green investment is expected to yield a net increase of 2 million jobs in Europe by 2030, including middle-skilled and middle-income jobs in energy and construction⁽⁹⁾. Moreover, as stated by the European Commission, ‘The starting point for the Green Deal industrial plan is the need to massively increase the technological development, manufacturing production and installation of net-zero products and energy supply in the next decade, and the value added of an EU-wide approach to meet this challenge together. This is made more difficult by the global competition for raw materials and skilled personnel’⁽¹⁰⁾.

⁽⁹⁾ Vona, F., *Labour Markets and the Green Transition: A practitioner’s guide to the task-based approach*, Publications Office of the European Union, Luxembourg, 2021.

⁽¹⁰⁾ European Commission, *A Green Deal Industrial Plan for the Net-Zero Age*, Publications Office of the European Union, Luxembourg, 2023.

The green transition has already demanded (and will continue to demand) widespread reskilling and upskilling of workers. The unequal distribution of resources, capabilities and preparedness among various social demographics, sectors and regions within and across EU Member States is likely to influence the outcomes of the transition in a less-than-optimal manner ⁽¹¹⁾. This transition not only entails technological shifts and policy reforms but also fundamentally reshapes the landscape of employment, labour markets and skills needs and development. The evolving nature of work in the context of sustainability demands a nuanced understanding of the possible impact on job sectors, working conditions and the skill sets required for future employment.

The workshop organised for 27 April 2023 aimed to identify emerging trends and knowledge gaps with respect to the green transition and working life in the EU and to formulate R & I questions and priorities for the next 10 years as well as strategies for how to address them. Research councils, government agencies and trade unions gathered to share their knowledge and best practices.

5. Balancing social and employment objectives within the green transition: social challenges, just transition, work environment and gender

Participants in the workshop covered several key topics related to the green transition and its impact on labour, education and partnerships. They discussed the knowledge gaps surrounding the definition of green issues and the jobs that will be impacted and also long-term questions regarding the effects on working conditions and state reorganisation.

Experts from Sweden, from various professional backgrounds, presented their country's approach to managing the green transition and its impacts at the regional level, as well as their experience in building an R & I strategy that contributes to the needs of fairness and justice. Sweden is in a leading position vis-à-vis the green transformation: it has a low share of fossil fuels in its energy mix, it is increasing its battery production and recycling capacity, and it has initiated investments in raw materials for the green transition. The workshop highlighted that, while not all sectors of Sweden's economy are undergoing radical change due to the green transition, significant shifts are occurring in specific regions, particularly in northern Sweden, with clear impacts on the labour market. For example, the transition in the automotive sector could lead to the loss of 75 000 jobs in the coming years, although battery manufacturing may create around 2 500 new jobs. In addition, the circular economy is expected to provide up to 110 000 new jobs.

During the discussion on balancing social and employment objectives within the transition, various stakeholders and workshop participants highlighted critical challenges

⁽¹¹⁾ Grossi, T. and Rayner, L., *The Socio-ecological Dimension of the Green Deal Industrial Plan*, European Policy Centre, Brussels, 2024.

and proposed strategies to address them. One prominent theme was the recognition of knowledge gaps, particularly in agreeing on a green taxonomy for better understanding the potential impact of the transitions on job sectors and working conditions. Addressing these gaps requires collaboration among various stakeholders, including industries, universities and governmental bodies, as exemplified by successful models from Finland. In fact, a keynote speaker from the Finnish government highlighted the fruitful collaboration between energy cluster companies and higher education institutions that established the 'digitalisation academy', overcoming the issue of skills shortages in the Vaasa region ⁽¹²⁾.

In this respect, a representative from the European University Association highlighted that the collaboration dynamics between the state, universities and industry differ somewhat in innovation activities for the digital and green transitions ⁽¹³⁾. Within digital innovation, universities primarily work with small and medium-sized enterprises (SMEs), possibly due to a lower capital intensity of innovation in this sector. Conversely, in the green transition, universities tend to collaborate more with the state and other universities and research organisations, possibly due to the substantial infrastructure requirements needed to achieve greener solutions. The impact of public administration and governance was also mentioned, particularly in relation to the degree of centralisation within a country. Decentralised systems, such as those in northern Europe, may facilitate more collaboration between universities and local actors. These regions may benefit from increased partnerships and private–public schemes, potentially leading to more extensive and fruitful collaboration.

According to the speaker, there may also be more general differences between SMEs and large industrial players in R & I activities. Major players like large industrial entities tend to have dedicated R & I departments and substantial funds. In contrast, SMEs may lack the resources for long-term planning and extensive R & I investment. Therefore, a crucial research question arises regarding how to effectively enhance collaboration with SMEs in R & I for the twin transitions. Furthermore, broader stakeholder involvement, including involving the social partners in the design of R&I activities, is crucial to finding solutions to societal challenges.

Looking at the 10-year horizon, various participants have pointed to several risks and unknowns. These include the evolving needs of the labour market, the pace of technological advances and the potential for new forms of inequality in access to resources and opportunities. For example, in 2021, only 6 women for every 10 men were considered to have green skills, workers with higher education levels were more likely to have a green profile, and mostly older workers were more likely to be affected by job

⁽¹²⁾ Niemi, M. K., Dan, S., Kalliokoski, J. and Shahzad, K., *Talent Retention and the Development of Digital Skills: A study of the ecosystem-based Digitalisation Academy located in Vaasa, Finland*, Ministry of Economic Affairs and Employment of Finland, Helsinki, 2021.

⁽¹³⁾ Kozirog, K., Lucaci, S.-M. and Berghmans, S., *Universities as Key Drivers of Sustainable Innovation Ecosystems: Results of the EUA survey on universities and innovation*, European University Association, Brussels, 2022.

losses in brown sectors ⁽¹⁴⁾. Addressing these issues will require targeted research and innovative approaches to ensure that both SMEs and larger industrial players can contribute to and benefit from the twin transitions of digital and green innovation.

6. Skills for a successful and fair green transition

Skills intelligence, skills development and adaptation play a key role in the successful realisation of a fair, green transition ⁽¹⁵⁾. With the accelerated pace of the transition to clean energy, the lack of sufficient workers with relevant skill sets, including skills in digitalisation, hybridisation and system optimisation, is creating a bottleneck. Ongoing labour shortages in the EU at both professional and highly skilled levels reflect a crisis of high-quality jobs, with Member States grappling with skills gaps across their value chains. In fact, stakeholders involved in the dialogue warned that there remains a significant disparity between existing training provision and the evolving needs of the workforce within the context of the green transition ⁽¹⁶⁾.

A key challenge brought about by workshop participants was skills volatility and knowledge gaps. Despite recent progress in the development and installation of heat pumps and solar and wind technologies across the EU, skills shortages threaten any sustained upscaling of delivery. Indeed, existing skills development initiatives may struggle to keep up with the demands of green labour markets, leaving both the current and the future workforces unprepared or underprepared to fill emerging roles ⁽¹⁷⁾. This challenge compounds the difficulty of incorporating sustainability competencies and green technical skills into education and training systems, as well as the limited awareness of the concepts of green economy and sustainable development among educators, teachers and trainers ⁽¹⁸⁾.

Such lack of skills is especially visible within the public sector. A representative from the European University Association highlighted the need for more skills in the public sector, particularly in public procurement ⁽¹⁹⁾. Green public procurement is an important tool for achieving environmental policy goals relating to the green transition, resource use and sustainable consumption and production – especially given the importance of public sector spending on goods and services. According to the European Commission, green public procurement is defined as ‘a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life-

⁽¹⁴⁾ LinkedIn’s Economic Graph, *Global Green Skills Report 2022*, San Francisco, 2022.

⁽¹⁵⁾ International Labour Organization, *Just Transition Policy Brief: Skills development for a just transition*, International Labour Organization, Geneva, 2022.

⁽¹⁶⁾ Vandeplass A., Vanyolos, I., Vigani, M. and Vogal, L., ‘The possible implications of the green transition for the EU labour market’, Economic and Financial Affairs, Discussion Paper 176, Publications Office of the European Union, Luxembourg, 2022.

⁽¹⁷⁾ Grossi, T. and Rayner, L., *The Socio-ecological Dimension of the Green Deal Industrial Plan*, European Policy Centre, Brussels, 2024.

⁽¹⁸⁾ European Training Foundation, *Skills for the Green Transition: Evidence from the EU neighbourhood*, European Training Foundation, Turin, 2023.

⁽¹⁹⁾ Bunescu, L. and Estermann, T., *Greening in European Higher Education Institutions: A governance, funding and efficiency perspective*, European University Association, Brussels, 2021.

cycle when compared to goods, services and works with the same primary function that would otherwise be procured' (20). There is a significant demand for expertise in green public procurement, where the focus extends beyond just the contract price to include techniques such as life-cycle pricing. However, there are very few individuals with this knowledge, underscoring the necessity for targeted training and education to develop these crucial skills.

The European Commission has recently reiterated its commitment to active labour market policies and training programmes with the EPSR and its ambitious action plan. Moreover, the Commission is actively supporting Member States in their efforts to modernise both VET programmes and public employment services. The goal is to equip workers and citizens with the skills necessary to support a fair transition to a green and digital economy as well as the post-COVID-19 economic recovery (21). As part of the 2023 European Year of Skills, the Pact for Skills (22) is a concrete example of how the EU is helping public and private organisations by offering funding opportunities and investments to upskill and retrain their employees. Another important example that is more oriented towards the development of digital skills is the Digital Skills & Jobs Platform (23), where many free and online training opportunities are available for workers to sharpen their skills.

Nevertheless, despite the range of training opportunities available, provided by, for instance, Erasmus+ programmes, universities or public VET providers, sustaining employee engagement throughout programmes remains a challenge. Across the EU, training uptake has been increasing steadily, but it is still considerably below the target of 60 % of the adult population participating in training each year by 2030, as required by the action plan of the EPSR. For many adults, there are barriers to participating in training, especially for those looking to learn new skills or enter new professions (24). Costs and time constraints are two of the barriers, but there is also a lack of incentive and motivation for individuals to take up training (25).

According to many of those who took part in the workshops, 'production imperatives' often overshadow training initiatives in many workplaces, meaning that training is seen as taking place only outside working hours in order not to affect productivity. Without adequate time and resources dedicated to training, employees are unable to fully leverage educational opportunities, potentially hindering efforts to upskill or reskill the

(20) European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – Public procurement for a better environment, COM(2008) 0400 final of 16 July 2008, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52008DC0400>.

(21) European Commission, *Vocational Education and Training: Skills for today and for the future*, Publications Office of the European Union, Luxembourg, 2022.

(22) Available at https://pact-for-skills.ec.europa.eu/index_en.

(23) Available at <https://digital-skills-jobs.europa.eu/en>.

(24) Güner, D. and Nurski, L., *Understanding barriers and resistance to training in the European Union*, Bruegel, Brussels, 2023.

(25) Güner, D. and Nurski, L., *Understanding barriers and resistance to training in the European Union*, Bruegel, Brussels, 2023.

workforce. Indeed, navigating work and learning remains difficult for adults who need to balance their learning with work and family responsibilities. According to a study conducted to support the Commission impact assessment on individual learning accounts ⁽²⁶⁾, most respondents have a preference for training during working hours to achieve a better work–life balance. Where there was agreement that training could happen outside working hours, the respondents suggested that this should always be through paid training leave. During the workshop, a keynote speaker highlighted the importance of reflecting on job quality in highly skilled industries, citing technology companies as an example. Despite the advanced skills and education of technology workers, the speaker pointed out that the industry frequently neglects to implement sufficient protective measures to ensure workers’ well-being and social protection. The green economy faces similar risks, with companies pushing for employing highly skilled workers to the detriment of low-skilled workers, within a dynamic known as ‘skills-biased liberalisation’ ⁽²⁷⁾ or skills-biased technical change ⁽²⁸⁾.

In addition, the discussion highlighted the importance of bio-knowledge and skills (e.g. plant and seed varieties, growing and harvesting patterns) alongside technical expertise, particularly in sectors like agriculture where incentives are currently lacking. The loss of bio-knowledge poses a threat to agricultural sustainability, underscoring the urgent need for targeted training and incentives to preserve and enhance these vital skills.

To address the already existing challenges and effectively align training programmes with the green needs of the evolving workforce, several strategies were explored by the participants. First, there is a need to foster a shift in organisational ‘culture’ towards prioritising continuous learning and skills development. Employers should acknowledge the value of investing in their employees’ professional growth and create environments conducive to ongoing learning and development. Second, integrating training seamlessly into daily work processes is essential. By incorporating training activities into employees’ job responsibilities, organisations can facilitate the acquisition and application of new skills in real-world contexts. This approach enhances the relevance of training and promotes immediate uptake and retention of knowledge and skills. Finally, improving the collaboration between employers, trade unions, national governments and educational institutions can lead to the development of flexible and personalised learning pathways, catering for diverse learning needs.

⁽²⁶⁾ European Commission: Directorate-General for Employment, Social Affairs and Inclusion, *Study to support the Commission impact assessment on individual learning accounts*, Publications Office of the European Union, Luxembourg, 2022.

⁽²⁷⁾ Diessner S., Durazzi N. and Hope D., ‘Skill-biased liberalization: Germany’s transition to the knowledge economy’, *Politics & Society*, Vol. 50, Issue 1, 2021, pp. 1–39.

⁽²⁸⁾ Organisation for Economic Co-operation and Development (OECD), *Measuring Skill Gaps in Firms: The PIAAC employer module*, OECD, Paris, 2023.

7. Facing an increasingly digital world of work

The fast-paced technological developments seen during the past decades have had both positive and negative effects in many different sectors. Positive effects include digitalisation's potential to revolutionise the labour market by creating new job opportunities, improve the productivity and the quality of labour and foster innovation. However, there are also relevant challenges linked to the digital transition. Recognising the potential positive effects of technology development and uptake, this section focuses on discussing some of the associated key concerns that emerged in the context of a stakeholder workshop organised for 16 June 2023. In outlining these, the focus will be on employment, education and humane technology development. The first obstacle that was discussed in the stakeholder workshop is the unequal digitalisation of businesses across Europe and its potential to feed into the existing digital divide. On this note, representatives from a national government pointed out the growing inequalities among companies in their country when it comes to their digital performance, and explained that it could hinder innovation, reduce productivity and feed into workplace inequalities.

This obstacle discussed in the workshop is in line with what is discussed in the *2023 Report on the State of the Digital Decade* ⁽²⁹⁾, in which the European Commission found that, out of three targets, only one has progressed sufficiently. The uptake of digital technologies and the digital intensity of SMEs are still insufficient and uneven across Europe. In contrast, the number of European unicorns ⁽³⁰⁾ seems to have slowly increased and, although still not in line with the targets, France and Germany have moved up the ranks of the Global AI Index and are now placed fifth and seventh, respectively ⁽³¹⁾.

Achieving the digital compass targets by 2030 is pivotal to the success of Europe's digital ambitions, as digital business transformation contributes to increased growth and diversification. Instead, the persistence of current trends in unequal digitalisation threatens to exacerbate regional disparities across Europe and widen the gap between SMEs, mid-caps and larger businesses. Research ⁽³²⁾ has shown that digitalisation processes self-reinforce social exclusion processes and do not contribute to democratising technology's benefits but strengthen already privileged positions. In addition, digitalisation processes can also give rise to new vulnerabilities. This is particularly relevant in the world of work, where the digitalisation of value creation can prompt changes in workforce structures and create new categories of vulnerable workers.

⁽²⁹⁾ European Commission, *2023 Report on the State of the Digital Decade*, Publications Office of the European Union, Luxembourg, 2023.

⁽³⁰⁾ 'Unicorns' is a term used to refer to private start-ups valued above USD 1 billion that are not quoted on the Stock Exchange.

⁽³¹⁾ Tortoise Media, *The Global AI Index 2024*, Tortoise Media, London, 2024.

⁽³²⁾ Ragnedda, M., Ruiu, M. L. and Addeo, F., 'The self-reinforcing effect of digital and social exclusion: The inequality loop', *Telematics and Informatics*, Vol. 72, 2022.

The social impact of digitalisation was also explored in the ERA4FutureWork workshop, where stakeholders identified four main concerns: (i) all-controlling technology in platform work, (ii) physically and mentally taxing jobs, (iii) a lack of relevant digital skills among the workforce and (iv) job displacement in the age of AI. The common dynamic underscoring these challenges is the rise of 'platformisation', which national government representatives taking part in the discussion described as 'a general organising principle affecting industry, consumption work organisation and the provision of public services'. Initially marketed as heterogeneous employment forms, platform work has now developed into much more than flexible matching of labour demand and supply aided by digital tools. It has turned into unequal and exploitative labour dynamics between employers and workers, usually matched by low wages and the absence of social protection and affecting workers in particularly vulnerable groups who lack alternative sources of income ⁽³³⁾.

One factor that has played a pivotal role in the rise and mainstreaming of this new form of work is the development of AI technologies, which has widened the power imbalances between platforms and workers and created new vulnerabilities for companies to exploit. Specifically, innovations in the field of AI have allowed the introduction of algorithmic management practices in the workplace ⁽³⁴⁾. These invasive methods essentially allow employers to collect large volumes of data from employees to maximise productivity ⁽³⁵⁾.

Other than allowing surveillance in the workplace, AI has also emerged as a 'new competitor' for human labour, which in return has reduced the bargaining power of workers ⁽³⁶⁾ and created new categories of vulnerable workers in the digital economy. This is the case for the millions of 'invisible' AI workers who train large language models, usually by carrying out repetitive tasks, sometimes while exposed to graphic and potentially damaging content.

However, fast-paced digitalisation dynamics has not only impacted the composition of jobs and employee well-being but has also prompted an increase in labour market polarisation, exposing the need for more significant action in the area of upskilling and reskilling workers. Specifically, as technological innovation advances and the uptake of AI in the workplace increases, unskilled workers are more exposed to the perils of digitalisation, while the skilled workforce reaps the benefits. This is a particularly worrying

⁽³³⁾ De Leo, A. and Grossi, T. *Regulating Platform Work: How will this impact migrant workers?*, European Policy Centre, Brussels, 2023.

⁽³⁴⁾ Hossein Jarrahi, M., Newlands, G., Kyung Lee, M., Wolf, C. T. and Kinder, E. et al., 'Algorithmic management in a work context', *Big Data & Society*, Vol. 8, Issue 2, 2021.

⁽³⁵⁾ De Stefano, V. and Taes, S., *Algorithmic Management and Collective Bargaining*, European Trade Union Institute, Brussels, 2021.

⁽³⁶⁾ Dixon-Declève, S., Dunlop, K., Renda, A. and Charveriat, C., 'Industry 5.0 and the future of work: Making Europe the centre of gravity for future good-quality jobs', ESIR Focus Paper, Publications Office of the European Union, Luxembourg, 2023.

trend, as research shows that the skilled workforce is a staggering minority, whereas workers who lack AI skills account for far greater numbers ⁽³⁷⁾.

Therefore, there is a compelling need to focus on fostering inclusive digital skills development, for example through accessible programmes such as free VET modules. In addition, it is important to promote job creation in emerging digital industries, ensuring that digitalisation contributes to the creation of high-quality, sustainable employment opportunities. In addition to demanding new technical competencies, digitalisation also underscores the importance of integrating interdisciplinary approaches into educational programmes as well as foundational skills such as critical thinking, problem-solving and digital literacy.

This long-term investigation should also focus on the sustainability of digital solutions beyond their traditional environmental aspects. Specifically, collaborative and inclusive research efforts and proactive regulatory measures should be mobilised to address the multifaceted impacts of digitalisation on the labour market and education system. These should also focus on gendered dynamics, to which digitalisation is no stranger ⁽³⁸⁾.

Finally, participants in the roundtable explored pathways for R & I to tackle the challenges posed by digitalisation in value creation. Presenters outlined six key dynamics in this process: (i) value creation systems, (ii) the role of people, (iii) business models and value propositions, (iv) resource management, (v) socio-technical and methodological innovation and (vi) the importance of networking and collaboration. As digitalisation reshapes traditional workforce structures, it can also lead to challenges such as increased mental stress and a growing shortage of skilled workers. To address these obstacles, participants highlighted the need to focus on promoting humane work design, ensuring workers' participation in technology implementation and reassessing the value attributed to human work within the evolving landscape of value creation. Furthermore, dedicated support to regional innovations (e.g. through clusters and networks) was highlighted as an instrument well suited to shaping sustainable forms of future work.

8. The twin transitions and vulnerable groups: research and innovation actions, gaps and challenges

In a workshop organised for 24 October 2023, representatives of federal agencies and public services for employment and social affairs from various Member States and the Organisation for Economic Co-operation and Development (OECD) and scholars shed light on the different vulnerabilities related to the twin transitions, such as disability, unpaid care work and regional vulnerabilities, and also the lack of data and the need to strengthen social protection systems as Europe navigates the twin transitions. These

⁽³⁷⁾ Machuel, D., *A majority of workers want AI training from their companies: We must empower them*, World Economic Forum, Cologne, 2024.

⁽³⁸⁾ Organisation for Economic Co-operation and Development (OECD), *Bridging the Digital Gender Divide. Include, upskill, innovate*, OECD, Paris, 2018.

vulnerabilities include disability, unpaid care work, and regional disparities, but also highlight gaps in data and emphasise the need to strengthen social protection systems as Europe navigates these simultaneous transformations.

The twin transitions is not merely reshaping job markets but is also redefining the concept of vulnerability itself, as it introduces new risks and deepens existing inequalities. Vulnerable workers, including those in precarious employment arrangements, self-employed individuals, or those discriminated against because of personal characteristics, are likely to face heightened challenges in this new context. These challenges are not exclusive to traditional sectors but are aggravated by the transitions' impacts, such as the displacement of jobs in carbon-heavy industries or the skills gap that many workers face as industries digitalise rapidly.

While the idea of vulnerability does not correspond to a legal concept, it has been recently employed in some jurisdictions to indicate specific situations of economic and social disadvantage⁽³⁹⁾. Vulnerability is not a condition that is exclusive to job arrangements: by definition, vulnerable workers are either employed in jobs that do not guarantee minimum social standards or are individuals who are challenged with discrimination or biases or possess personal characteristics that do not match canonical and rigid working standards or criteria, such as disability⁽⁴⁰⁾.

The EU's vulnerable workers encompass a wide range of individuals, including migrant workers, often without a valid working visa, and those in non-standard or atypical employment. Vulnerability can also extend to those who are self-employed, who fall outside collective bargaining agreements and who are employed via 'false' self-employment contracts, namely those who perform tasks under supervision of the firm but do not have an employee status. These categories of workers often face challenges related to pay, working conditions, job security and access to social benefits. The income challenges faced by atypical and temporary workers are particularly significant in the current context of sluggish economic growth, high inflation rates and intensified global competition. Over the past decade, EU policies and initiatives have been implemented to address these issues, such as rules on the coordination of social security systems, the establishment of the European Labour Authority and the overhaul of rules on the posting of workers to ensure equal pay for equal work, also reflected in several principles of EPSR. Due to different welfare regimes and traditions, Member States differ in the level, priorities, composition and type of spending on social protection⁽⁴¹⁾. While some Member States focus on income support for vulnerable targets, such as elderly people, single parents, ethnic minorities or people with disabilities, others put emphasis on labour market inclusion. The implications of these measures have been closely

⁽³⁹⁾ The Spanish government approved Royal Decree-Law 11/2020 on 31 March 2020, adopting additional urgent social and economic measures to deal with COVID-19.

⁽⁴⁰⁾ International Labour Organization, *ILO curriculum on building modern and effective labour inspection systems – Dealing with vulnerable groups of workers*, International Labour Organization, Geneva, 2023.

⁽⁴¹⁾ European Parliament, *Minimum Income Policies in EU Member States*, Publications Office of the European Union, Luxembourg, 2019.

researched for decades. Traditionally, this research has tended to focus on employment, job quality and wage inequalities.

The workshop participants agreed that addressing the needs of vulnerable workers requires going beyond an analysis of traditional forms of work and contractual arrangements and adopting a forward-thinking and intersectional approach, with the goal of designing innovative solutions that better respond to the challenges presented by the twin transitions. While the most vulnerable have historically faced difficulties, the volatile economic, political and social context that compounds these transformations is likely to exacerbate existing forms of vulnerability and create entirely new challenges. More research needs to be undertaken on the interaction between the green, digital and demographic transitions, how the challenges identified are affecting people already in vulnerable situations and reinforcing existing inequalities, and if the challenges are likely to create entirely new vulnerable groups. These challenges include skills mismatch and digital exclusion, job security in the gig economy and the displacement of certain traditional industries towards greener sectors. During the workshop, participants focused on five key aspects on the intersection of the twin transitions and vulnerability, which are presented in the following sections.

8.1. Disability

One of the most vulnerable groups affected by the digital and green transitions is workers with a disability. According to a study commissioned by the European Parliament, the employment rate for people with disabilities in the EU stands at only 50.6 %, notably lower than the 74.8 % employment rate for people without disabilities⁽⁴²⁾. Unemployment rates are also disproportionately higher among young people with disabilities compared with their peers without disabilities⁽⁴³⁾. Women and young people with disabilities also encounter higher levels of workplace discrimination, which significantly impedes their access to job opportunities⁽⁴⁴⁾.

Despite this, according to scholars who have carried out research on the topic, and other workshop participants, an intersectional approach is still lacking with regard to the differentiated impact of future digital transformations on different vulnerable groups. Digital transformation must be undertaken with due awareness to the reality that people may experience different difficulties, affecting the way they work.

It is important to differentiate between visible and invisible disabilities, as each group faces unique challenges and barriers that require tailored solutions. For example, while the increased prevalence of teleworking could facilitate employment opportunities for individuals with physical disabilities by eliminating the need for commuting, the

⁽⁴²⁾ Lecerf, M., *Employment and Disability in the European Union*, European Parliament Research Service, Brussels, 2020.

⁽⁴³⁾ Lecerf, M., *Employment and Disability in the European Union*, European Parliament Research Service, Brussels, 2020.

⁽⁴⁴⁾ International Labour Organization and Fundación ONCE, *An Inclusive Digital Economy for People with Disabilities*, International Labour Organization, Geneva, 2021.

increasing digitalisation of the workspace may create new challenges for individuals with visual or auditory impairments ⁽⁴⁵⁾. Furthermore, the expansion of more manual green roles may prove to be less accessible for individuals with physical disabilities.

It is evident that visible disabilities are easier to identify and are more likely to be accommodated through the provision of accessible and modified working equipment. Conversely, invisible disabilities, such as mental health issues or chronic illnesses, may not be as easy to identify and, consequently, may result in a lack of understanding or recognition of the needs of individuals with invisible disabilities. Other challenges include the need for individuals with cognitive and learning disabilities to develop new skills to adapt to the use of digital tools, which can be demanding.

For these reasons, the process of digitalisation that many workplaces are undergoing is not always seen as a positive change for people with disabilities, especially because new technologies are not always inclusive ⁽⁴⁶⁾.

Adding to the challenges of the twin transitions is the difficulty of integrating new technologies that can effectively cater to the diverse needs of workers with disabilities, thereby exacerbating their employment situation. Principle 17 of the EPSR ⁽⁴⁷⁾ emphasises the importance of integrating people with disabilities into the labour market and society at large. It calls for the provision of supportive services and the adaptation of workplaces to accommodate their specific needs. The shift into new jobs due to the green and digital transition can exacerbate the challenges that people with disabilities face in their everyday work. Namely, digital inaccessibility can hinder their ability to successfully perform tasks and communicate in the workplace, hampering career advancement opportunities ⁽⁴⁸⁾.

8.2. Unpaid care work

The twin transitions and the future of work are far from being gender neutral. Care work, notably a gender-sensitive element, was a key aspect noted by workshop participants in their debate around the future of work. Although it is difficult to determine the full dimension of informal and unpaid care work in Europe due to lack of data, almost 92 % of women are considered regular carers and 81 % daily carers, in comparison with 68 % and 48 % of men, respectively ⁽⁴⁹⁾. It is important to consider how the digital and green

⁽⁴⁵⁾ International Labour Organization and Fundación ONCE, *An Inclusive Digital Economy for People with Disabilities*, International Labour Organization, Geneva, 2021.

⁽⁴⁶⁾ International Labour Organization and Fundación ONCE, *An Inclusive Digital Economy for People with Disabilities*, International Labour Organization, Geneva, 2021.

⁽⁴⁷⁾ European Commission, 'The European Pillars of Social Rights in 20 principles', European Commission website, 24 October 2023, accessed 16 December 2024, https://employment-social-affairs.ec.europa.eu/european-pillar-social-rights-20-principles_en.

⁽⁴⁸⁾ International Labour Organization and Fundación ONCE, *Making the green transition inclusive for persons with disabilities*, International Labour Organization, Geneva, 2023.

⁽⁴⁹⁾ European Institute for Gender Inequality, *Gender inequalities in care and consequences for the labour market*, Publications Office of the European Union, Luxembourg, 2021.

transitions will affect the care sector and what its impact on the already substantial levels of gender inequality may be.

Informal care work represents a further obstacle to women's participation in the labour market. In particular, the COVID-19 pandemic has contributed to exacerbating gender inequalities in reconciling work and family life, in addition to the already existing gender inequalities in the labour market⁽⁵⁰⁾. As highlighted by many workshop speakers, the COVID-19 pandemic has had strong spillover effects, worsening gender equality: women were caught between caring responsibilities and work, and low-skilled jobs were more easily replaced, adding to the burden of mental health risks. Even after the increase in female participation in the labour market since the last century, gendered roles at home still persist and women still assume the main responsibilities for care and housework⁽⁵¹⁾. According to the European Institute for Gender Equality's 2023 Gender Equality Index, 7.7 million women in the EU remain outside the labour market due to caregiving responsibilities, in comparison with only 450 000 men⁽⁵²⁾. Most importantly, among the employed population, care inequalities between women and men are prevalent. A study conducted by the European Institute for Gender Equality indicates that women employed in non-standard and low-paid roles bear a greater burden of care work, fuelling a vicious circle⁽⁵³⁾. In addition, women in temporary or informal employment spend twice as much time on unpaid care daily as women in permanent positions, especially if they are also responsible for childcare. This is largely attributed to their lack of the economic resources to enable them to make use of formal external services. Women in irregular and temporary employment are frequently unable to access more stable roles due to their disproportionate caring responsibilities. Despite their precarious nature, irregular and temporary roles are often the only ones flexible enough to accommodate caring duties, and these roles only perpetuate gender pay inequalities.

The caring responsibilities that disproportionately fall on women must be recognised as a top priority when assessing the impact of the twin transitions on vulnerable groups, especially as an increase in women's participation in the labour market is associated with a 10 % reduction in unemployment⁽⁵⁴⁾.

While more skilled and mobile workers are likely to reap the benefits of these transitions more easily, workers with insufficient skills and with poorer career development opportunities face increasingly precarious working conditions, dismissal or exclusion from the labour market.

Another point of concern is the skill composition of the workforce. Although women meet or exceed men's skill levels in most categories, they significantly lag behind in science,

⁽⁵⁰⁾ European Institute for Gender Inequality, *Gender equality and the socio-economic impact of the COVID-19 pandemic*, Publications Office of the European Union, Luxembourg, 2021.

⁽⁵¹⁾ Samtleben, C. and Müller, K. U., 'Care and careers: Gender (in)equality in unpaid care, housework and employment', *Research in Social Stratification and Mobility*, Vol. 77, 2022.

⁽⁵²⁾ Gender Equality Index, 'European Union in 2023', 2021–2022.

⁽⁵³⁾ Gender Equality Index, 'European Union in 2023', 2021–2022.

⁽⁵⁴⁾ Eurostat, 'Statistics explained, gender statistics', Eurostat website, https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Gender_statistics.

technology, engineering and mathematics skills. This skills gap is likely to hinder women's participation in emerging industries that are considered crucial for efficient and inclusive green and digital economies ⁽⁵⁵⁾.

Manual skills and jobs should also be considered. The green transition will trigger job displacement and job creation in traditionally male-dominated sectors such as mining, engineering, construction and energy. Some participants suggest that the impact on job availability for women is therefore expected to be mild and likely to be positive. However, historical instances of significant structural shifts, like the United Kingdom's coal mine closures, revealed spillover effects on other sectors. The gender and age distribution of employment in brown sectors, such as mines, points towards a particular impact on low-skilled men aged 25–49 years. Within these sectors, women and young people are underrepresented, particularly in blue-collar coal and lignite mining jobs. However, there is evidence that mine closures increase the numbers of male workers but decrease the numbers of female workers in typically female-dominated sectors in manufacturing, such as textiles, apparel and leather ⁽⁵⁶⁾. As a result, men can take over jobs that were predominantly held by women, leading to the displacement of female workers.

8.3. Regional vulnerability

Another important aspect raised by a speaker from the Centre for Entrepreneurship, SMEs, Regions and Cities at the OECD is the regional and geographical divides of the green and digital transitions. Regions with high shares of employment in 'polluting' sectors are at greater risk of economic disruption and potential decline, and hence are more inclined to develop pockets of vulnerability ⁽⁵⁷⁾. Researchers have developed a Regional Green Transition Vulnerability Index to measure and compare the vulnerability of European regions ⁽⁵⁸⁾. This index considers factors across six pillars: (i) fossil fuel dependency, (ii) tourism, (iii) energy, (iv) transport, (v) agriculture / land use and (vi) industry. Regions with high scores on this index are more susceptible to the negative impacts of the green transition. The analysis, also backed by additional literature ⁽⁵⁹⁾, finds that vulnerability is concentrated in certain regions (particularly in central and eastern Europe) that have high reliance on fossil fuels and emissions-intensive industries. However, vulnerability can also appear at various income levels, as some more prosperous regions may have escaped long-term stagnation by relying on polluting sectors. Importantly, the degree of vulnerability can vary depending on the weighting given to various factors like exposure, sensitivity and adaptive capacity.

⁽⁵⁵⁾ Do, T., Le Bodic, P., Martin, C. and Strengers, Y., *Championing Girls and Women in Information Technology*, Monash University, Clayton, Victoria, 2021.

⁽⁵⁶⁾ Aragón, F., Rud, J. and Toews, G., 'Resource shocks, employment, and gender: Evidence from the collapse of the UK coal industry', *Labour Economics*, Vol. 52, 2018, pp. 54–67.

⁽⁵⁷⁾ Rodríguez-Pose, A. and Bartalucci, F., 'Regional vulnerability to the green transition', Single Market Economics Papers, Publications Office of the European Union, Luxembourg, 2023.

⁽⁵⁸⁾ Rodríguez-Pose, A. and Bartalucci, F., 'Regional vulnerability to the green transition', Single Market Economics Papers, Publications Office of the European Union, Luxembourg, 2023.

⁽⁵⁹⁾ Grossi, T. and Rayner, L., *The Socio-ecological Dimension of the Green Deal Industrial Plan*, European Policy Centre, Brussels, 2024.

Regions with high unemployment and low levels of innovation are likely to be more vulnerable under equal weighting schemes ⁽⁶⁰⁾. Historical examples also provide food for thought. Trade liberalisation accelerated the reshaping of economies after the Second World War. While this has brought economic growth, since the mid 1970s, it has also impoverished some well-defined groups of the population in advanced countries, including traditionally vulnerable groups such as ethnic minorities and low-skilled workers ⁽⁶¹⁾. However, this also included a large number of middle-skilled manufacturing workers who were previously not considered vulnerable in any sense.

European Commission co-funded research undertaken by the OECD has documented the trends towards increasing pressures on the middle class and decreasing social mobility ⁽⁶²⁾. The transitions towards a greener, more sustainable economy and a digital society hold promise for innovation and progress, full employment and prosperity for all those living and working in Europe. However, they also present significant challenges, particularly for those social groups that are already marginalised within the workforce and for some sectors that risk being phased out or left behind. The lessons from trade liberalisation are understood and efforts have been made to incorporate them in the twin transitions. No transformation can happen if a fair transition is not ensured. The effects on workers in energy-intensive / fossil fuel-dependent industries and the regions that depend on them must be acknowledged and policy developed to ensure that their challenges are addressed.

8.4. Lack of data

The impact of longer-lasting crises, particularly the climate crisis, but also the COVID-19 pandemic, have proven that monitoring the socioeconomic effects and distributional impact of both the emergency and the necessary adaptation measures is needed. The integration of this approach into the design of policies, social programmes and interventions would help mitigate the negative effects of crises on vulnerable groups. However, a key concern highlighted in the workshop was the lack of data on vulnerable groups of workers across Europe, as well as the marked difference in available datasets between northern European countries and southern Member States.

Data are essential for monitoring the impact of crises in real time, and administrative data, in particular, were valuable during the pandemic to provide a broader picture of the situation of different vulnerable groups across sectors. However, data on well-being would be beneficial in improving understanding of the impact of the transitions on the ways in which people work. A further issue raised by stakeholders and policymakers is the need to build trust in the data collected. Ensuring transparency in data collection and analysis is a fundamental foundation of ethical research analysis.

⁽⁶⁰⁾ Grossi, T. and Rayner, L., *The Socio-ecological Dimension of the Green Deal Industrial Plan*, European Policy Centre, Brussels, 2024.

⁽⁶¹⁾ Stiglitz, J. E., *Globalization and its Discontents*, Norton, New York, 2002.

⁽⁶²⁾ Organisation for Economic Co-operation and Development (OECD), *Under Pressure: The squeezed middle class*, OECD, Paris, 2019.

Furthermore, it is also important that data do not become privatised in order to ensure continuity of research in the future. Data collection and monitoring has also been shown to be important for foresight analysis and anticipation of future events and also for R & I. However, stakeholders believe that there is currently a lack of homogeneous data available in the EU in relation to vulnerable workers. This gap hampers the ability to track and monitor changes in the sector, anticipate future job structures and define the skills required by the workforce.

8.5. Strengthening social protection

Workshop participants and speakers agreed that R & I can anticipate how societal trends, demographic shifts and economic developments may provoke the development of new vulnerable groups or shape the employment landscape by adopting a forward-looking approach. Understanding these trends allows policymakers to proactively design interventions and policies that foster resilience and inclusivity in the workforce. By aligning with the principles of the EPSR and strengthening social protection programmes, R & I can contribute to creating a future of work that is not only sustainable but also prioritises the well-being and security of all workers, particularly those at risk of being left behind.

9. The future of work in EU public administrations: research and innovation actions, gaps and challenges

In the past few years, the European Commission has been taking concrete steps to develop digital solutions for the delivery of public services and guarantee cross-border interoperability among public administrations ⁽⁶³⁾. The concept of digital public services, or e-government, is part of the EU's strategy for a more digital single market. The digitalisation of public services will allow EU citizens to move more freely in the EU, while also dealing with public services outside their home country.

The digital transformation of the EU's public administration also represents a way of delivering faster services to citizens while maintaining their quality and transparency. Many European public administrations have already digitalised their services and have adopted new technologies such as AI, blockchain and other digital tools. The idea of e-governance goes hand in hand with improving the accessibility and efficiency of public services, giving citizens user-friendly access and reducing the risk of corruption. It also represents an opportunity to involve more citizens, enterprises and organisations in political life at a lower cost. New technologies include the creation of European interoperable platforms like the common framework for citizen's electronic identity management ⁽⁶⁴⁾ and other digital tools that improve data sharing and coordination across different sectors in public administration.

⁽⁶³⁾ European Commission, 'e-Government and digital public services', 2022.

⁽⁶⁴⁾ European Commission, 'Electronic identification', European Commission website, 28 October 2024, <https://digital-strategy.ec.europa.eu/en/policies/electronic-identification>.

Nevertheless, as also stated by many workshop participants working in the public sector, the attractiveness of work in public administration has strongly been undermined in the last decade, especially for younger generations. Public administration employs 21 % of the EU workforce ⁽⁶⁵⁾, but the economic crisis has had a significant impact on public sector reform, particularly in terms of job quality and social protection. This has led many highly skilled young workers to prefer the private sector over the public sector, which is often perceived as rigid and burdensome. In addition, the needs of workers have changed in the aftermath of the COVID-19 pandemic, with new priorities emerging, such as better work–life balance, teleworking, greater flexibility and the development of new skills. These priorities are not always compatible with the demands of employment in public administration ⁽⁶⁶⁾.

The disruption and transformation of business models towards a digital and greener transition has not spared the public sector, where new challenges have been added to existing ones. New and different skills are required of public servants to keep pace with the digital transformation. The need for upskilling and reskilling is crucial to overcome skills shortages in the workforce and bridge the digital divide.

A key challenge to upskilling and training within public administration, as highlighted by a representative of the DG Structural Reform Support, is the volatility of skills and the presence of knowledge gaps. As a consequence, many outdated public administrations are unable to provide effective training to their staff, making them a less attractive employer in the labour market ⁽⁶⁷⁾. Traditionally, the public sector is the single largest employer in the country, representing approximately 15–20 % of employment ⁽⁶⁸⁾. At the same time, while public sector employment can be competitive for certain positions, providing, for instance, a stable job with a long-term contract and good benefits for employees, it may not be as competitive as the private sector in terms of the number of applicants. This is because public sector jobs often have specific requirements and need qualifications that limit the pool of eligible candidates. In addition, demographic shifts and the ageing of the workforce pose a greater challenge to the public sector workforce. Other challenges include the increasing complexity of policies and the growing demands on public sector human and financial resources to cope with these changes. Furthermore, local administrations located in remote and rural areas are often not well equipped to deal with the negative spillovers of the transitions, for example job displacement and phasing out of sectors, widening the gap between regions, levels of government and the public and private sectors.

⁽⁶⁵⁾ European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – Enhancing the European Administrative Space (ComPAct), COM(2023) 667 final of 25 October 2023.

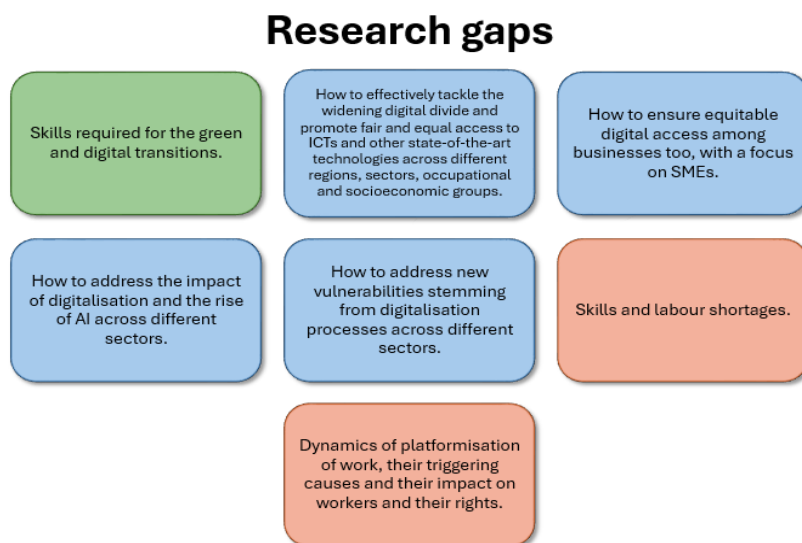
⁽⁶⁶⁾ Organisation for Economic Co-operation and Development (OECD), *Public Employment and Management 2021: The future of the public service*, OECD, Paris, 2021.

⁽⁶⁷⁾ European Commission, *ComPAct – Pillar I – Skills for public administration systems*, European Commission, Brussels, 2024.

⁽⁶⁸⁾ Garibaldi, P. and Gomes, P., *The Economics of Public Employment: An overview for policy makers*, Banca d'Italia, Rome, 2020.

10. The future of work: research gaps and opportunities

Figure 1. Research gaps



Source: Authors' own compilation.

Urgent action is required to meet the EU's ambition for a achieving just digital and green transitions. In sketching future areas of strategic priority for R & I, it is necessary to address the knowledge gaps highlighted by the national stakeholders and experts consulted in the workshops (Figure 1). Key challenges and research gaps to address with future research are as follows.

- Identify the skills required for the green and digital transitions, understanding how to provide effective and future-fit training and retraining of workers across all levels, as existing skills development initiatives are struggling to keep up with labour market demands, worsening labour shortages, particularly in the fields of automation and AI and green technologies.
- Identify ways to effectively tackle the widening digital divide and promote fair and equal access to ICTs and other state-of-the-art technologies across different regions, sectors, and occupational and socioeconomic groups.
- Explore and identify solutions to ensure equitable digital access among businesses, with a focus on SMEs.

- Address the impact of digitalisation and the rise of AI across various sectors. Promote new initiatives to mitigate the negative effects of technology uptake and, in doing so, focus on professional and higher education institutions – particularly in the context of changing demographics – and their impact on the labour market and changing industrial work environments.
- Adopt a holistic approach to researching new vulnerabilities stemming from digitalisation processes across different sectors. In doing so, focus on the potential for community well-being to counter individualisation processes and promote innovative, inclusive educational pathways for both the current and future workforces.
- Address skills and labour shortages by researching geographical and labour mobility, in particular in relation to the interplay between the increase in remote working, urbanisation, brain drain and labour market polarisation.
- Investigate the platformisation of work, including issues such as faults in the digital governance infrastructure, algorithmic management without human oversight, and lack of transparency. Focus on regulatory needs to protect workers and their rights, and stress the importance of workers' participation in technology implementation.
- Address SMEs' concerns about access to skilled labour and stability in the labour structure and also technical issues arising from advances in AI.
- Promote co-production in research to ensure usability and real-world impact, and encourage collaborative approaches in which stakeholders, policymakers, workers and industry are actively involved in the research process. This helps ensure that research findings are practical, relevant and more likely to be translated into effective policies or practices.

11. Opportunities for innovation action

Moving forward, innovation actions should prioritise the proactive integration of future work trends with the policy efforts for the green and digital transitions. This integration holds the key to unlocking their capacity to significantly shape employment patterns, skill requirements and workplace dynamics in European cities and regions. Emphasising the potential of innovation actions for fostering sustainable employment, upskilling and reskilling initiatives, and leveraging digital technologies, is essential to make the transitions successful, preventing a rise in the numbers of vulnerable workers. To achieve this, this study suggests designing and prioritising innovation actions aimed at:

- providing adequate, innovative and accessible upskilling and reskilling programmes;

- promoting innovative and inclusive educational pathways;
- understanding labour mobility patterns and the impact of their changes;
- ensuring that the development of remote work promotes employee well-being and productivity;
- analysing the potential future trajectory of platform work and the possible implications for workers, businesses and society at large;
- assessing the development of levels of inequalities in relation to the labour market, with attention given to social protection coverage in the context of new forms of work.

12. Portfolio of proposed actions

The objective of the ERA4FutureWork collaboration is to exchange data, good practices and information about priorities and research ideas to establish a common priority list of transnational R & I actions that can progress activities around the future of work domain.

European R & I policy has a role to play in empowering R & I actors and involving all relevant actors, including private and public knowledge institutions, whose independence needs to be safeguarded for them to be able to evolve and experiment with cutting-edge and out-of-the-box ideas. A set of innovation actions is introduced and proposed in this chapter.

12.1. Providing adequate, innovative and accessible upskilling and reskilling programmes

In a context of dynamic and complex labour markets, gathering intelligence on current and future skills needs can support better matching of training and jobs, which is of paramount importance at the national and European levels. The EPSR points out that R & I could support a just transition through development of innovative forms of work and flexible learning pathways, and, as emphasised by the Commission's 2023 European Year of Skills, streamlining the provision of relevant skills to the labour force across different sectors is of key importance, not only in light of the green transition and digitalisation but also in the context of demographic trends in the EU, such as increased migration and the ageing population. With industries rapidly evolving and traditional employment structures undergoing transformation, foresight and innovation, skills intelligence plays a crucial role in anticipating and addressing the vulnerabilities that may arise across social groups, and the fragilities that may impact sectors, productivity and competitiveness.

Innovation in skills creation and skills intelligence is essential in this context. As industries evolve and new technologies emerge, the demand for specific skills and competencies changes accordingly. Adopting a forward-looking approach can enable R & I to anticipate future societal trends, demographic shifts and economic developments, providing insights into the changing nature of work.

First, R & I should focus on providing more and better knowledge on how to design skills strategies. Skills strategies that are fit for the future need to be based on high-quality, innovative research on skills forecasts, skills adaptation and skills development, with the support of relevant research and education and training institutions. This should involve conducting R & I to develop and refine digital learning platforms, designing and testing personalised learning pathways, creating and validating competency-based assessments, and exploring methods for recognition of prior learning and microcredentials. Evidence⁽⁶⁹⁾ shows that these methods enhance employability and also empower people to navigate economic uncertainties and mitigate vulnerabilities associated with changing labour markets, reducing the risk of being left isolated or unprepared to cope with market forces, changes in industrial relations and general economic volatility.

Second, research should be carried out on how to strengthen and modernise public employment services, VET systems and active labour market policies. As highlighted by the European Centre for the Development of Vocational Training⁽⁷⁰⁾, economies and societies require robust skill anticipation methods and reliable skills intelligence to transform data into actionable insights. The anticipation of skills and fostering innovation should not occur as a one-off activity, but rather as a sustained and ongoing effort. This approach enables the development of methodologies for generating skill forecasts or foresight, facilitates an understanding of how to effectively apply the findings derived from these forecasts⁽⁷¹⁾ and would help curb the brain drain that the EU is currently facing. This is an issue for most eastern and southern European countries, such as Greece, Italy, Hungary and Poland, for which the outflow of researchers from Europe has outstripped the inflow of researchers from the rest of the world into Europe during the last 20 years⁽⁷²⁾. Since the success of skills strategies is linked to their design, R & I activities should encompass a broader stakeholder involvement, with social partners contributing strongly in the design process.

R & I can also help identify and address transversal skills needs, often referred to as T-shaped skills. These are the combination of deep expertise in a particular area with a broader set of cross-disciplinary skills, such as adaptability, problem-solving and digital literacy, which are crucial for the workforce in a green economy. By researching these skill requirements, R & I initiatives can inform education and training programmes to prepare workers more effectively.

⁽⁶⁹⁾ Organisation for Economic Co-operation and Development (OECD), *Recognition of Prior Learning: A practical guide for policy makers*, OECD, Paris, 2023.

⁽⁷⁰⁾ European Centre for the Development of Vocational Training, *Next generation skills intelligence for more learning and better matching: Skills anticipation trends, opportunities and challenges in EU Member States*, Publications Office of the European Union, Luxembourg, 2024, <http://data.europa.eu/doi/10.2801/180485>.

⁽⁷¹⁾ European Training Foundation, European Centre for the Development of Vocational Training and International Labour Office, *Developing skills foresights, scenarios and forecasts: Guide to anticipating and matching skills and jobs*, European Training Foundation, Turin, 2016.

⁽⁷²⁾ European Commission, *Horizon Europe Strategic Plan 2025–2027 Analysis*, Publications Office of the European Union, Luxembourg, 2023.

12.2. Promoting innovative and inclusive educational pathways

The promotion of innovative and inclusive learning pathways aligns with the European skills agenda, which emphasises the need for forward-looking upskilling and reskilling initiatives to ensure high-quality education for all in Member States. Recognising the need for education systems to promote equal opportunities and meet the demands of a globalised labour market, there should be a focus on developing learners' cognitive and social skills. The use of digital devices and content for educational purposes is encouraged, with a strong emphasis on ensuring the physical and psychological well-being of learners. In this context, higher education institutions can play a key role in educating teachers in various other sectors, such as VET and continuous education, including through the establishment of microcredentials. R & I actions should therefore be directed towards the exploration of the need for strengthening continuous education, while ensuring inclusive access to it, in line with the changing needs of the labour market.

Inclusivity should extend to vulnerable groups, such as people with disabilities, while recognising the potential of open educational resources to widen access and diversify education. Research actions should focus on finding solutions to promote universal digital literacy, including the production of open educational resources in different languages and by various stakeholders.

R & I actions should thus involve experimenting with and evaluating new digital tools and educational methods, such as social media, games and simulations, to determine their effectiveness in enhancing learning outcomes. For instance, research could explore how virtual worlds can simulate real-world work environments to help learners acquire job-specific skills. Investing in such R & I initiatives would allow governments to adopt and promote proven measures to ensure equal access to education and training for all, regardless of social background or geographical location, including rural areas. Furthermore, an increased investment in such R & I solutions would encourage collaboration across Member States and sharing of ideas, resources and infrastructure, and thus helping to create a more inclusive education system. Balancing the quality and accessibility of education remains essential. New technologies must be tailored both to the demands of the labour market and to the diverse needs of learners, including those with disabilities. This approach includes ongoing research to continually improve and validate these innovations, ensuring that they meet the evolving needs of the workforce and educational standards.

Considering the complementarities between the proposed actions arising from this study and some of the already funded Erasmus+ actions, another important R & I objective should be an improved exploration of potential synergies and research on the impact of various educational practices in addressing future skills needs. In particular, further research should inform the future design of EU programmes such as Erasmus+ and digital Europe.

12.3. Understanding labour mobility patterns and the impacts of change

Increasing research on labour mobility patterns would help policymakers make informed decisions regarding labour market regulations, immigration policies and social protection systems. Research into these patterns can provide insights into the factors driving mobility, such as economic conditions, skills gaps and demographic trends.

While labour mobility can contribute to economic growth by facilitating the efficient allocation of skills and labour across different regions and sectors, research is needed to identify potential barriers to movement and help identify mismatches between the skills demanded by employers and those possessed by workers. Research should also focus on understanding how labour mobility and demographic trends, such as urbanisation, can influence the green transition and, conversely, how the green transition affects these dynamics. This includes understanding how job concentrations in specific locations or sectors are impacted by shifts towards a greener economy.

To protect and strengthen the four freedoms associated with its single market, the EU should identify barriers to labour mobility, as well as promoting best practices and facilitating the recognition of qualifications and credentials across Member States. Failure to understand the impact of labour mobility across Europe can result in significant social implications and affect community cohesion, cultural diversity and social integration. Further exploration of the social effects of mobility can help identify related challenges and serve to underpin the development of strategies to promote inclusion.

Similarly, the ability of researchers to move to different types of jobs can be key for knowledge transfer and diffusion. If researchers and scientists can move smoothly from academia to the private and public sectors (and vice versa), competencies and rare skills can flow through the economy easily and at low cost⁽⁷³⁾. In most Member States, however, researchers choose to leave the EU for non-EU destinations⁽⁷⁴⁾. As researchers' mobility is a positive feature of a research ecosystem, instead of disincentivising outflows, it is important to increase the attractiveness of the R & I ecosystem (competitive wages, cutting-edge infrastructures, fair promotion processes) to obtain a more balanced flow of researchers in the EU by increasing the inflow. Smaller countries and/or those performing better in R & I have a relatively high inflow of researchers and a higher share of researchers who have obtained a PhD degree abroad. Overall, countries performing better in R & I have higher levels of job-to-job mobility.

12.4. Understanding the development of remote work

Considering the rapid development of remote work in the EU, expanding R & I endeavours to explore both the drivers of and barriers to remote work, as well as its

⁽⁷³⁾ European Commission, *Science, research and innovation performance of the EU 2022 – Building a sustainable future in uncertain times*, Publications Office of the European Union, Luxembourg, 2022.

⁽⁷⁴⁾ European Commission, *Horizon Europe Strategic Plan 2025–2027 Analysis*, Publications Office of the European Union, Luxembourg, 2023.

impact on labour market dynamics and well-being, should be a priority for the next EU research agenda. Its implications for employment patterns, job creation and unemployment rates, as well as job quality, income inequality and access to employment opportunities, has already significantly altered the employment and social landscape in the EU and will continue to do so in the years ahead.

Factors such as infrastructure, connectivity, economic development and urban–rural divides will shape the adoption and impact of remote work across different regions. A better understanding of how factors such as technological advances, demographic shifts, regulatory changes and societal attitudes could shape the trajectory of remote work in the coming years will allow the design of policy responses that will maximise its benefits.

The strengths and weaknesses of existing policies regulating remote work, many of which have been speedily introduced in the wake of the COVID-19 pandemic, need thorough assessment and further work to identify what additional measures could be implemented to support adoption and ensure that the benefits are equitably distributed across the EU. For this reason, the EU R & I agenda should prioritise research topics that explore future implications of remote work on the productivity and well-being of workers.

Specific R & I actions should include conducting longitudinal studies to evaluate the long-term efficacy of existing remote work policies, developing and testing best practice frameworks for remote work implementation, researching technological innovations that can enhance remote work capabilities, and examining how organisational culture and management practices influence remote work success. In addition, pilot projects should be initiated to experiment with innovative remote work models, and collaborative efforts should be made with technology developers to understand what tools can support remote work efficiency and the well-being of workers.

12.5. Understanding the trajectory of work platformisation

Given the growing prevalence and impact on labour markets of platform work, an important strand of R & I development in the coming years is to monitor and assess these rapidly changing dynamics. Exploring the ways in which governments and regulatory bodies have responded to the rise of platform work, and the strengths and weaknesses of existing regulatory frameworks, provides a foundation for the development of future policy interventions.

As well as looking back, exploring the potential future trajectories of the platform economy and the subsequent impact on labour markets and inequality will help ensure that policies are designed in a manner that shapes developments in a way that avoids exacerbating inequalities, undermining employment rights and infringing privacy rights. The implications for labour regulations, social protection and collective bargaining have already been significant, and the long-term consequences of the lack of – or limited access to – social protection coverage for platform workers are likely to be stark, highlighting the need for more research efforts in this field.

Furthermore, regulatory needs arise from the way in which algorithmic systems used by platform companies manage workers. Further research into faults in the digital governance infrastructure and overreliance on algorithmic management without human oversight would better pinpoint what policymakers need for establishing ethical, fair and transparent algorithmic management practices. R & I action in this field would also help better understand workers' participation in the adoption of technology in the workplace.

Finally, gaining a more detailed understanding of the prevalence and nature of platform work and how and why it varies across different sectors of the economy would allow more accurate prediction of its future pathway.

12.6. Development of inequalities in relation to the labour market

As inequalities in the labour market stem from a multitude of different factors, R & I activities in this field should adopt a transdisciplinary approach, not least covering areas such as education, social protection, taxation, immigration and regional development. To do so, networks, consortia and collaborative research projects bringing together diverse perspectives and expertise should be fostered.

To better support this research, comprehensive, disaggregated data on inequalities in the labour market, including disparities based on gender, ethnicity, age, disability, socioeconomic background and geographical location, are needed. Developing and using advanced data analytics and machine learning techniques to identify trends, patterns and root causes of inequality can allow more responsive policy decisions.

R & I in technology can also help address barriers to employment and promote inclusive hiring practices. Improving AI-driven recruitment platforms to overcome existing biases and support the development of accessibility technologies for workers with disabilities would be beneficial.

Allowing the implementation of experimental studies and pilot programmes that test innovative interventions for reducing inequalities in the labour market, such as targeted training programmes, job placement initiatives, wage subsidies, diversity and inclusion initiatives and flexible work arrangements, could also allow the development of new ideas and approaches. In this context, relevant R & I initiatives – such as the development of a comprehensive network for social enterprises or the evaluation and enhancement of cooperative ownership models – could be pivotal to the creation of new models of employment and economic participation that prioritise social inclusion.

Finally, rigorous impact assessments of existing and proposed labour market policies in order to evaluate their effectiveness in reducing inequalities are important. Using experimental designs, quasi-experimental methods and econometric modelling to measure the causal impact of policy interventions on different demographic groups and socioeconomic indicators can offer new insights, but greater exploration of qualitative assessments of the effectiveness and utility of policy interventions should also be undertaken. It is crucial to explore how stakeholders can collaborate to integrate social aspects into product and service design. This involves considering social dimensions in the stages of design, production development and user experience. Effective collaboration among stakeholders, including businesses, policymakers, designers and social partners, is key to ensuring that social considerations are embedded in the development of sustainable products and services.

13. Conclusions and future outlook

This report highlights some of the challenges facing Europe, from transitioning to a carbon-neutral economy and embracing human-centric digitalisation, to safeguarding emerging vulnerable groups such as skilled workers in transition industries. These trends are shaping the continent's businesses and its workers, which in turn adapt and redefine what work is and what the future of work will look like.

Although the future of work is a well-established field of research, important gaps in understanding remain. These include issues like the mapping of future skills, drivers and repercussions of the digital divide, the impact of digitalisation and AI on labour markets and the workplace, and the new challenges faced by vulnerable groups such as erosion of the social safety net, increased care work or access to digital technologies. However, these social problems and research gaps also provide opportunities for innovative actions in areas such as upskilling and reskilling, promoting inclusive and innovative educational pathways, and ensuring technology development in a human-centred manner.

The aim of this document is to identify future changes and challenges that Europe will face as its labour markets and businesses adapt to and shape the digital and green transitions. It outlines objectives for future research, sketches impact areas and describes expected outcomes. These areas of study should be viewed as long-term systemic challenges and addressed with clear principles, logical impact pathways and the flexibility to adapt to uncertainty and new developments.

Public and private actors, including public authorities, non-governmental organisations and civil-society organisations, that are engaged in shaping and researching the future of work should reflect on how to address these research gaps and work towards capitalising on the opportunities for innovative action. Member States, associated countries and regions with funding powers should use this document to inform and shape their funding strategies in the coming years, prioritising impactful research on the future of work. While connecting policymakers, researchers and stakeholders from research, innovation, education and employment policies remains a challenge at the national and EU levels, it is important to continue engaging in a dialogue across these sectors, to bridge the gap between research on the future of work and the uptake of such scientific outcomes in policymaking. R & I communities in the social sciences and humanities will ultimately be the ones responsible for strengthening the evidence base on this area, and they should be consulted when developing funding strategies.

At the EU level, their findings could inform future topics under the remaining 2026–2027 work programmes of Horizon Europe, as well as priorities for the upcoming 10th framework programme for R & I.

The European Commission, together with Member States and associated countries, is working to continue the dialogue on the future of work in the European research area. One example of relevant funding initiatives includes a new co-funded Partnership on Social Transformations and Resilience (STR), which is planned to be launched under

the 2024 work programme of cluster 2 (i.e. culture, creativity and inclusive societies) of Horizon Europe. The Commission proposed ⁽⁷⁵⁾ the STR Partnership in July 2023 and it has since then been included as one of the nine new candidates under the 2025–2027 Horizon Europe strategic plan ⁽⁷⁶⁾.

The STR Partnership aims to create a 7- to 10-year R & I programme, leveraging the potential of the social sciences and humanities to build resilience, ensure fairness and inclusiveness, and foster social cohesion in response to changes in climate, technology, demography and unexpected shocks, like the COVID-19 pandemic or Russia's war on Ukraine.

The partnership's R & I actions will focus on four interconnected impact areas: (i) supporting the modernisation of social protection systems and essential services, (ii) fostering education and skills development, (iii) contributing to a fair transition towards climate neutrality, and, most importantly for our context, (iv) shaping the future of work.

If sufficient commitment is secured from Member States and associated countries, the STR Partnership will be included in the 2026 work programme of cluster 2 of Horizon Europe, with activities starting in 2027.

National research funding organisations and research ministries, which are driving the development of the STR Partnership proposal, are encouraged to use this report in developing the strategic R & I agenda ⁽⁷⁷⁾, which translates the partnership's long-term vision into a concrete roadmap of activities. The ideas, gaps and challenges presented throughout this report could be built on, and further enriched, by this upcoming initiative.

⁽⁷⁵⁾ Available at https://research-and-innovation.ec.europa.eu/document/download/04162ca0-b5db-4773-bd47-d75ff1af1723_en?filename=ec_rtd_candidate-list-european-partnerships.pdf.

⁽⁷⁶⁾ Available at <https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/6abcc8e7-e685-11ee-8b2b-01aa75ed71a1>.

⁽⁷⁷⁾ Available at <https://www.era-learn.eu/support-for-partnerships/cross-cutting-issues-and-additional-activities/strategy-and-foresight/what-is-a-sria>.

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The twin green and digital transitions will have both positive and negative effects on work and working conditions throughout Europe. Recognising the need to involve all relevant stakeholders in discussions surrounding potential vulnerabilities, the European Commission launched an ERA4FutureWork initiative to foster stakeholder dialogue to identify research and innovation (R & I) priorities. Under this framework, the Commission organised four workshops to discuss key areas: the green transition and working life, the digital world of work, the twin transitions and vulnerable groups, and the future of work in EU public administrations. This policy brief builds on the insight of the workshops and highlights gaps in the current R & I agenda.

Research and Innovation policy

