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Study on the challenges and impacts to a social and inclusive Europe in the next decade

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Foreword

The European Commission's Directorate-General for Employment, Social Affairs and Inclusion (DG EMPL) awarded the Centre for European Policy Studies (CEPS) a contract to carry out the study on '**The challenges and impacts to a social and inclusive Europe in the next decade**'. The central purpose of the present Final Report is to address four main research questions pertaining to: 1) challenges, opportunities and factors determining **future needs for skills and competences**; 2) developments and potential to ensure an adequate **supply of these skills**; 3) drivers that may influence **equality of opportunity**; and 4) challenges impacting the **sustainable development of inclusive societies**. The **methodology** consisted of a series of quantitative and qualitative research activities articulated into five tasks: 1) a review of future-oriented grey and academic literature; 2) a comparative quantitative analysis of labour market forecasts and occupational automation risk scores; 3) qualitative research activities (expert interviews and a stakeholder workshop); 4) a systemic analysis of interdependencies; and 5) the provision of a refined analytical framework.

This Final Report is structured as follows. After an **introduction (Chapter 1)** providing the background, objectives and scope, and overall approach of the study, **Chapter 2** outlines the study's keystone: the **analytical framework**. This represents the compass allowing us to navigate a vast amount of existing evidence, quantitative projections, and qualitative insights on the future of work and social inclusion in Europe. The framework constitutes one of the key contributions of the study, whose main objective is not to add more information and complexity to an already dense and variegated array of existing analyses, but precisely to make sense of and structure the available insights. **Chapter 3** reports the findings of a comprehensive **review of the existing literature** to identify key drivers of change, impacts on labour market, impacts on social inclusion, and challenges to a social and inclusive Europe. The findings of the literature review laid the groundwork for the entire study and informed all the other research activities. **Chapter 4** outlines the **comparative quantitative analysis** of labour market and skills forecasts and of occupational automation risk estimates. **Chapter 5** presents the **insights drawn from qualitative interviews** with experts across multiple fields and disciplines. The qualitative analysis adds depth and context to the findings of the literature review and of the quantitative analysis, and sheds light on the potential secondary effects of the drivers of change on inclusive and democratic communities. **Chapter 6** details our approach to the **systemic analysis of interdependencies**, which highlights interactions and feedback loops between the framework elements through the identification of a series of vicious circles affecting labour market and social inclusion in Europe. **Chapter 7** reports on the outcomes of the **consultation with key stakeholders**, covering in particular their feedback on the research approach and policy-relevant insights from the discussion. Finally, the **concluding chapter** summarises the key findings by answering the research questions.

Abstract

The study examines how key megatrends – including technological, environmental, geopolitical, and demographic changes – are likely to reshape labour markets and social inclusion in Europe over the next decade. The research explores projected shifts in labour and skills demand and supply, the structural drivers influencing equality of opportunity, and the challenges these trends pose for the sustainable development of inclusive societies. The analysis draws on a review of future-oriented literature, EU and national labour market forecasts, occupational automation risk scores, expert interviews, stakeholder consultations, and a systemic mapping of interdependencies. The study anticipates major sectoral and occupational transformations, with a declining working-age population and persistent mismatches and shortages likely to exacerbate labour market pressures. Technological change, especially AI advances, is expected to alter task composition within occupations, with uneven impacts by gender, region and skill level. Beyond employment, megatrends are likely to affect job quality, access to services, and the adequacy of social protection systems, creating further risks for inclusion and equality. The study also identifies three self-reinforcing vicious cycles linked to intergenerational poverty and social exclusion, low-quality employment, and skills underutilisation, stressing the need for targeted – yet systemic – interventions. The findings aim to inform future programming of the European Social Fund Plus (ESF+).

Executive summary

As Europe navigates an increasingly complex and unpredictable socioeconomic landscape, the future of its labour markets and social model will be shaped by the interplay of technological change, environmental impacts, geopolitical shifts, demographic and migration patterns, organisational transformations, and labour market participation. Against this backdrop, this study seeks to anticipate the medium- to long-term impacts and challenges that may confront a social and inclusive Europe in the next decade, with the aim of informing the future programming of the ESF+.

Exploring the future of the labour market and social inclusion in the European Union requires conceptually separating the megatrends from their impacts.

- **Transformations are driven by interconnected megatrends** – including technological change (especially, but not exclusively, AI), environmental and climate change, geopolitical instability, and demographic shifts – which will potentially reshape labour demand and supply, and social inclusion.
- **Impacts are not predetermined but shaped by political factors, power relations, and policy**. The effects of these megatrends depend heavily on institutional settings, governance choices, distributional dynamics, and power relations within organisations and in society. These factors influence how change is managed and who benefits or loses. Inaction also constitutes a political choice with consequences for inclusion and equity.
- **Labour market and social inclusion are deeply interlinked**. Employment, working conditions, access to services, and educational trends co-evolve and reinforce each other. Policies targeting one domain must consider effects on the others.

The study examines existing labour market forecasts based on EU-level and national data, which provide insights into future trends in labour demand and supply by extrapolating historical trends from the recent past to the future. In particular, sectoral and occupational shifts in employment and a shrinking working-age population are expected to be the dominant trends in EU labour markets.

- **Replacement demand, not job growth, will dominate recruitment needs**. Over 90% of job openings in the next decade will arise from the need to replace retiring or transitioning workers, rather than new job creation, across nearly all Member States.
- **Sectoral employment shifts reflect ongoing structural transformation**. Employment is projected to rise significantly in ICT, professional services, and health and social care by 2035, driven by digitalisation and demographic change. Meanwhile, agriculture, forestry, and fishing will see steep declines due to automation, restructuring, and environmental policy.

- **High-skilled occupations will see the strongest growth, while manual and clerical roles decline**. Professionals and Technicians are set to expand, reflecting increasing demand for high-skilled labour. Occupations such as skilled agricultural workers, clerks, and craft trades are expected to shrink because of mechanisation and sectoral transformation.
- **Labour supply will most likely shrink**. The working-age population in the EU is expected to decline through 2060–2100 because of ageing and a low fertility rate. Even in scenarios that include optimistic growth rates of fertility and immigration, only sustained participation and productivity gains can stabilise the labour supply.
- **Future labour mismatches will span all education levels and regions**. Skills shortages are projected across the occupational spectrum, with significant variation by country and context. This may point to a gap between how skills needs are identified and how this information is used to prepare people for the labour market.

However, because they rely on historical patterns to project future outcomes, forecasts do not fully account for emerging or evolving trends. This is particularly evident in relation to technological change, where new developments can shift labour and skills demand in ways that depart significantly from past trajectories.

- **Occupational exposure to technology varies by task and type of technology**. GenAI primarily affects clerical and professional cognitive work, while broader automation (including robotics and software) risks affect manual and routine jobs. Regular (non-generative) AI exposed a wide range of tasks across skill levels.
- **Regional and demographic divides in technology exposure highlight inclusion risks**. Women, high-skilled and urban workers are more exposed to GenAI; men, low-skilled and rural/industrial workers to robotics.
- **AI and GenAI shift task content rather than eliminate jobs**. Their main impact lies in altering the skill mix within occupations, particularly affecting high-skilled and clerical roles. The effects on inequality depend on how AI is governed and deployed.

Beyond employment, megatrends are likely to impact job quality, social protection systems, and the accessibility, availability and quality of services, creating challenges for equality of opportunity and for labour market and social inclusion.

- **The green transition creates new opportunities but carries distributional risks**. Net job creation may mask regional losses, gendered impacts, and poor working conditions in emerging sectors such as recycling or construction unless policies ensure just transitions.
- **Population ageing will both reduce labour supply and increase care needs**. This dual pressure puts stress on social protection systems and necessitates better integration of under-represented workforce groups, job

quality improvements in the care sector, and investment in care infrastructure.

- **Migration is necessary but insufficient without support for integration**. While it can mitigate labour shortages, barriers such as unrecognised qualifications, discrimination, and job quality gaps must be addressed to ensure inclusive labour market participation.
- **Essential and enabling services are key to equitable labour outcomes**. Access to childcare, education, healthcare, housing, and transport determines whether individuals can participate in and benefit from labour market transitions.
- **Job quality is central to inclusion**. Poor working conditions, insecure contracts, and limited career prospects feed back into cycles of poverty, social exclusion, and disengagement. Improving job quality and job design is thus essential.

Finally, systemic challenges arise from the complex interaction between multiple, interrelated elements and (often far-reaching) secondary effects of megatrends. These challenges are not isolated; rather, they are deeply embedded within broader socioeconomic systems, where changes in one area can trigger cascading impacts across others, exacerbating existing inequalities and generating risks for inclusive and democratic societies.

- **Labour market and social disadvantages are systemic and self-reinforcing**. Three core feedback loops were identified: an 'intergenerational poverty and social exclusion trap', a 'low-quality job and un(der)employment trap' and a 'skills underutilisation trap'.
- **These vicious circles are mutually reinforcing**. For example, early poverty leads to poor education, which limits access to good jobs, which limits on-the-job skills development and career progression – perpetuating disadvantage across the life course.
- **Targeted yet integrated interventions along the vicious circles can reverse these feedback loops**. Leverage points include early childhood investment, service integration, improved care infrastructure, social dialogue, job redesign, and inclusive skills policies beyond employability.
- **Secondary effects pose societal and democratic risks**. Secondary effects of megatrends, alongside rising inequalities and social exclusion, may fuel support for extremist movements, weaken collective bargaining and social dialogue, undermine democratic institutions, and further limit social investment – creating a self-reinforcing cycle of instability.

1. Introduction

1.1. Background of the study

The EU's economy and social model are currently navigating rough waters as they grapple with the consequences of the 'polycrisis' (Bressanelli and Natali, 2023; Nicoli and Zeitlin, 2024) and the need to ensure equal opportunities to all citizens during the twin green and digital transitions. Since the proclamation of the European Pillar of Social Rights (EPSR) at the Gothenburg Summit in 2017 (European Union, 2017), the geopolitical and socioeconomic environment has radically changed. The emergence of new challenges (such as the disruptions caused by the Covid-19 pandemic) and the acceleration of existing ones (such as climate change, technological shifts, and geopolitical tensions) has tested the resilience and exposed the limitations of social models across Europe. Nonetheless, even as EU Member States confront economic uncertainty and the urgency of tracing an environmentally sustainable path to prosperity, the 20 principles of the EPSR are more relevant than ever.

The 2021 Porto declaration reiterated the joint commitment of the EU, Member States, and social partners to implement the EPSR, while the EPSR Action Plan set three headline targets to be achieved by 2030: **1)** at least 78 % of the population aged 20 to 64 should be in **employment**; **2)** at least 60 % of all adults should be participating in **training** every year; and **3)** a reduction of at least 15 million in the number of people at risk of **poverty or social exclusion**. One of the key tools to achieve these targets and deliver on the EPSR principles is the European Social Fund Plus (ESF+), whose current cycle started in 2021 and will end in 2027.

The La Hulpe declaration signed in April 2024 by the EU institutions, European social partners, and representatives of civil society reaffirmed the EPSR principles (Council of the European Union, 2024). In addition, a recent Eurobarometer study shows that around nine in ten European citizens consider a social Europe important to them personally (European Commission, 2024d). Yet, a social Europe is not just popular but is also closely linked to a competitive Europe (Hemerijck and Bokhorst, 2024). Both Mario Draghi's (2024) seminal report on the future of European competitiveness and the *Competitiveness Compass* (European Commission, 2025a) call for renewed policy focus on fostering a skilled workforce, quality jobs, and other EPSR elements as key drivers of productivity and competitiveness. Lastly, in line with the EPSR, the European Commission's (2025b) initiative on *The Union of Skills* aims to support the development of high-quality, inclusive and adaptable education, training and skills to foster the EU's competitiveness.

The ESF+ is the EU's primary financial instrument to improve employment opportunities, social inclusion, education, and skills development across Member States. Combining resources from the European Social Fund (ESF), the Youth Employment Initiative (YEI), the Fund for European Aid to the most Deprived

(FEAD) and the European Programme for Employment and Social Innovation (EaSI), the ESF+ has a total budget of approximately EUR 142 billion for 2021-2027. According to Regulation (EU) No 2021/1057 establishing the ESF+, the Fund aims 'to achieve high employment levels, fair social protection and a skilled and resilient workforce ready for the future world of work, as well as inclusive and cohesive societies aiming to eradicating poverty and delivering on the [EPSR] principles'.

To hold the helm steady in the face of rapidly changing realities, there is a renewed need not only to adapt the EU's instruments and investments to current circumstances, but also to proactively prepare for the challenges to and opportunities for a social and inclusive Europe likely to arise in the future. This is all the more relevant for the next ESF+ cycle, which, assuming that current financial arrangements remain in place, will start in 2028 and run until the late 2030s. Therefore, the investments supporting a social and inclusive Europe must remain relevant over the next 10-15 years, in a socioeconomic landscape that is already evolving and will continue to be shaped by demographic, climate, and technological transformations, among other factors. All the traditional areas of ESF investments, i.e. employment, education and skills, and social inclusion will be affected in one way or another.

1.2. Study objectives and scope

What are the changes and the challenges that a social and inclusive Europe is likely to face in the future? In recent years, academic researchers, international and European institutions and organisations, think tanks, foundations, research centres, and other public and private entities have produced a wealth of studies and evidence to try to answer these questions. Against this backdrop, the present study helps bridge the gap between present and future, by shedding light on the challenges and opportunities that might impact the traditional areas for ESF+ intervention. This is accomplished by systematically collating and reviewing the available information, estimates, and projections on – as well as generating new insights into – the challenges that may potentially emerge 15-20 years from now, making sense of this complex set of findings within a coherent analytical framework.

Therefore, the overarching objective of the study is to map and critically assess the existing body of material, structuring insights in a consistent and coherent manner. Rather than adding more 'noise' to the volume of existing analyses, the study provides a compass for navigating them and understanding their respective strengths and weaknesses. Its ultimate objective is to support reflection on future opportunities and challenges for a social and inclusive Europe, offering a resource that can be relied upon for future-proofing the upcoming ESF+ cycles.

More particularly, following a series of research steps (see **Annex A**) the study identifies the future challenges and opportunities to a social and inclusive Europe by exploring potential drivers of change and their impacts on both the labour market and social inclusion. Social inclusion is understood here as 'a process that ensures

citizens have the opportunities and resources necessary to participate fully in economic, social and cultural life and to enjoy a standard of living and well-being that is considered normal in the society in which they live', encompassing 'social integration or better access to the labour market' as well as 'equal access to facilities, services and benefits' (Eurofound, 2025).

With this in mind, the study devotes special attention to labour market transformations, focusing on both labour demand (jobs) and labour supply (people), as well as on their (inequitable) matching. The emphasis on the labour market is warranted by the fact that this is the primary site where social inclusion is built and achieved. Indeed, employment not only provides individuals with financial stability, but also fosters a sense of belonging and participation in society. Furthermore, as most adult learning happens in the workplace, equal access to employment opportunities is paramount for a fair and inclusive skills development. A well-functioning labour market enables diverse groups to equitably access opportunities, thereby reducing inequalities and enhancing social cohesion. However, the analysis complements this also by delving into broader issues having an impact on social inclusion, particularly the availability, accessibility and quality of essential and enabling services. Shedding light on developments and macrotrends impacting these interrelated dimensions allow us to address the four main research questions (RQs):

1. Which challenges, opportunities, and factors will shape the **future needs for skills and competences**?
2. Which developments could be expected, and which areas could be tapped into to ensure an **adequate supply of these skills and competences**?
3. What are the main drivers that could impact the **equality of opportunity** across the EU?
4. What could be the challenges that are expected to impact the **sustainable development of inclusive societies**?

To achieve its objective, the present report **a)** provides an **analytical framework** able to capture both immediate and long-term impacts of key megatrends; **b)** reviews **the existing literature** to identify likely impacts, and potential challenges and opportunities; **c)** critically reviews existing **quantitative estimates and projections** on labour market trends; **d)** discusses **qualitative insights** coming from experts and stakeholders; and **e)** identifies **interdependencies** between various elements, and explores the **ripple effects** of the drivers of change on inequality and social inclusion.

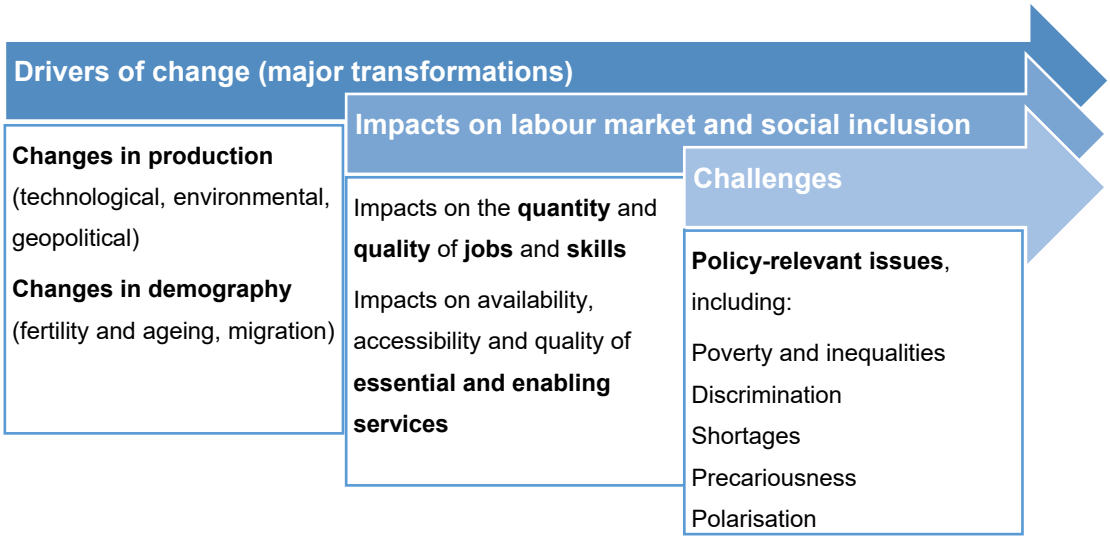
2. Analytical framework

The analytical framework adopted in this study provides a structured and hierarchical approach to understanding how major transformations impact the future of the labour market and social inclusion in the EU. By integrating social inclusion aspects alongside labour demand and supply, the framework allows for a comprehensive analysis of future skill needs, workforce participation, equality of opportunity, and the sustainability of inclusive societies.

2.1. Understanding the main elements and relations in the analytical framework

The analytical framework distinguishes between three main elements or blocks: key drivers of change, their impacts on labour market and social inclusion, and the challenges for policymaking arising from these impacts. A high-level overview of the framework is presented in **Figure 1**.

Figure 1. High-level overview of analytical framework



Source: based on the 'Policy Toolkit' of the Horizon 2020 GI-NI ('Growing Inequality: a Novel Integration of transformations research') project (Alcidi and Nurski, 2025).

The starting point of the framework is thus the identification of the **key drivers of change**, which are understood here as global trends whose impact transcends specific sectors and influences multiple aspects of human life over decades. These drivers of change are shaped by human agency, cultural factors, social relations, political and economic dynamics, and – in the medium- to long-term – policy decisions. However, their structural nature and systemic impacts tend to constrain policy options in the short term.

More particularly, changes in production systems (*technological*, *environmental*, *geopolitical*) and changes in demographic patterns (*fertility and ageing*, *migration*) influence **labour market** dynamics, in terms of labour demand, labour supply, and their matching. Shifts in production affect job quantity and quality, working conditions, employment security, and skills needs. These drivers often impact the labour market through *organisational* change (e.g. via changes in business models and division of labour, outsourcing, or off/near/reshoring). At the same time, the population age structure and migration determine workforce availability and readiness. The effects of changes on the production and demographic sides, in turn, are shaped by *labour market participation* trends and structure (e.g. occupational segregation by gender or migrant background).

The drivers of change can equally impact broader social inclusion aspects by influencing the **availability, accessibility and quality of essential and enabling services**. Essential services 'fulfil basic human needs and are key to well-being and social inclusion, especially for disadvantaged groups' (European Commission, n.d.). According to Principle 20 of the EPRS, 'everyone has the right to access essential services of good quality, including water, sanitation, energy, transport, financial services and digital communications'. Enabling services are those that are 'key for active participation in society and the labour market', including early childhood education and care (ECEC) education and training, healthcare, long-term care and social inclusion services (European Commission, n.d.).

Labour market and social inclusion dynamics can, in turn, generate **challenges** requiring policy intervention. One of the main objectives of this study is precisely to identify these challenges to a social and inclusive Europe. These include issues such as inequality, discrimination, labour or skill shortages, precariousness, polarisation, and poverty. A detailed discussion and full list of challenges are provided in the following chapters and the Conclusion.

2.2. Building out the framework elements and their interdependencies

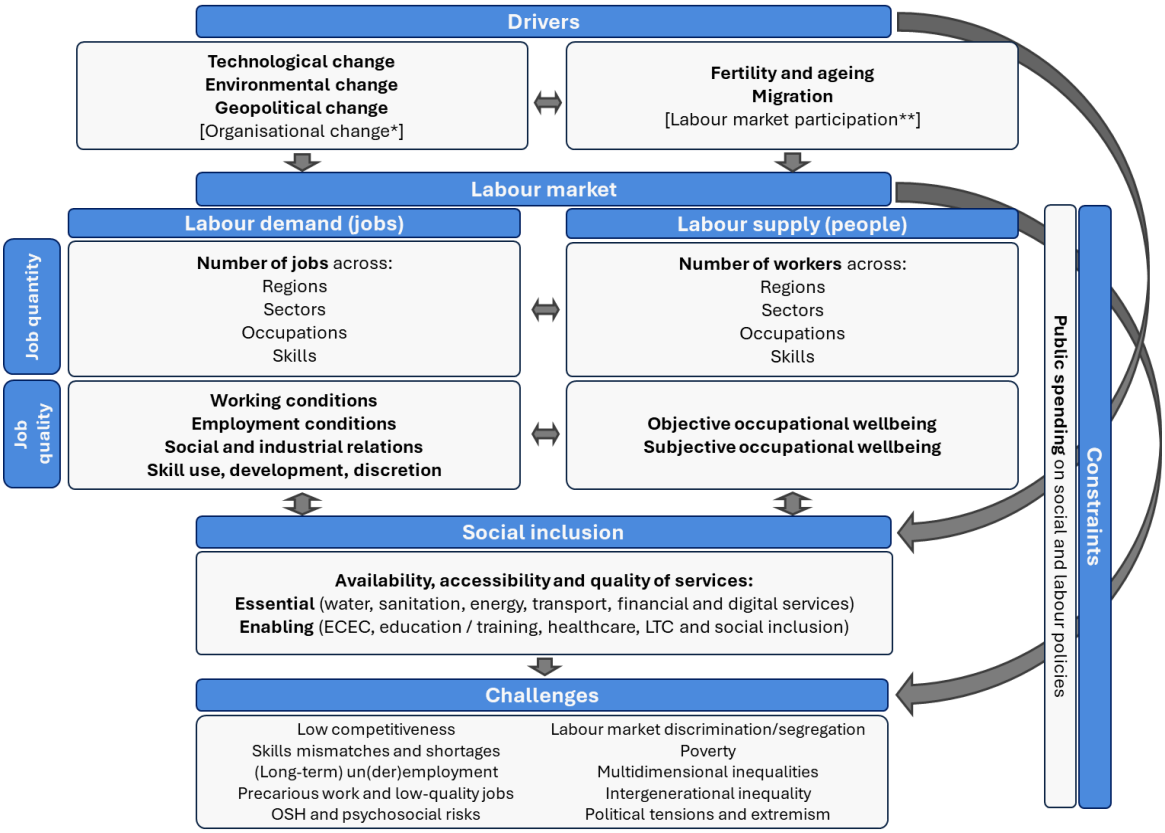
The arrows in **Figure 1** indicate a hierarchical order among the drivers of change, the impacts on the labour market and social inclusion, and the resulting challenges for policymakers. This visualisation helps to separate the conceptual elements and their position vis-à-vis each other. However, within each of these blocks and between the blocks, the relationships can be dynamic and bidirectional, effectively emerging as feedback loops. Labour market transformations and changes in social inclusion do not simply follow from drivers of change but also shape them in return.

For instance, environmental change can necessitate technology adoption, while shifts in labour market participation and access to services can impact demographic trends through migration or fertility decisions. Similarly, access to and quality of essential and enabling services affects both labour supply and demand, reinforcing or mitigating inequalities. Challenges such as inequality, mismatches, and

precariousness are not only outcomes of labour market changes but also factors that feed back into the system, for example by slowing down economic adaptation to technological or environmental shifts. The systemic analysis of interdependencies (Chapter 6) will help visualise these interdependencies and identify vicious circles and feedback loops.

Figure 2 presents the analytical framework for this study. The framework was designed before the inception phase of the research, but was continuously revised throughout the research process to integrate conceptual insights emerging from each research activity. One example here is the inclusion of **constraints** on policy intervention in the form of public spending levels on social and labour market policies. If the drivers of change intensify these constraints (for instance by prompting a diversion of public funds from social to defence spending), addressing the challenges will become more difficult, potentially generating negative feedback loops for labour market and social inclusion.

Figure 2. Analytical framework



*Technological, environmental and geopolitical impacts are often mediated by *organisational changes*.

***Labour market participation* trends and structure mediate the impacts of all the key drivers of change.

2.3. Tracing impacts and challenges

The analytical framework presented in Figures 1 and 2 allows us to address the four key RQs of this study as follows:

RQ1 – Future skill needs: the framework captures how technological, environmental, geopolitical, and demographic changes shape the demand for skills and occupations (see **Box 1**), in the context of the need to preserve the competitiveness of the EU economy. It accounts for sectoral shifts, job creation and destruction, and changing competency requirements due to the green and digital transitions, among others. The resulting change in working conditions – and job quality at large – is also captured by the framework.

RQ2 – Future skill supply: on the labour supply side, the framework considers demographic drivers such as ageing and migration. By incorporating availability, accessibility and quality of essential and enabling services (e.g. childcare, healthcare, education, digital infrastructure), the framework enables an analysis of how social policies and services shape workforce participation and skill development. This will particularly be understood in the context of the need to ensure an adequate supply of skills and competences to underpin European competitiveness. This broader perspective ensures that barriers to skills acquisition and labour market entry, particularly for vulnerable groups, are systematically addressed.

RQ3 – Equality of opportunity: the expanded framework explicitly integrates structural challenges such as inequality, discrimination, mismatches, precariousness, polarisation, and poverty, acknowledging that labour market dynamics alone do not determine equality of opportunity. By analysing how access to essential services interacts with labour market inclusion, the framework provides a more holistic perspective on barriers to economic and social mobility. It also enables the identification of feedback loops between employment, education, social protection, and inequality.

RQ4 – Challenges to inclusive societies: by incorporating broader social challenges and their interdependencies, the framework allows for a systemic understanding of how the major transformations and resulting labour market changes affect social cohesion, poverty and regional disparities. It highlights the risks of economic and social polarisation while also identifying levers and mechanisms that can mitigate exclusion. This approach ensures that labour market policies are aligned with broader societal wellbeing, sustainable inclusion, and competitivity objectives.

Box 1. Note on skill and labour supply and demand

To address RQ1 and RQ2 pertaining to future *skill* needs and supply, the analytical framework starts from future changes in *labour* demand and supply, on the assumption that skills and occupations are closely related. In particular, occupations can be conceptualised as bundles of tasks, while a skill is the ability to do a task well. Hence, occupations can be thought of as bundles of skill requirements. *Future skill needs* can therefore be broken down into:

- *Changes in labour demand for occupations*, given a constant skill mix within occupations;
- *Changes in the mix of skill requirements within occupations*, given a constant labour demand for occupations.

Similarly, people can be thought of as holding bundles of skills acquired through studies, degrees, qualifications, micro-credentials, training, or work experience. Therefore, *future skill supply* can be broken down into:

- *Changes in the supply of workers* with particular qualifications or degrees, given a constant skill mix (constant learning outcomes) of such certifications. This change can itself be subdivided into the change in the size of the working age population, change in the participation rate, and the change in the choice of degrees and qualifications;
- *Changes in the skill bundles* associated with certain qualifications or degrees (i.e. the learning outcomes) for a given supply of workers holding such certifications.

For example, the future *need* for a digital skill such as programming can be broken down into (1) a growing need for the occupation of software developer and (2) a growing need for the skill of programming within occupations such as data analyst or market researcher. And the future *supply* of programming skills can be broken down into (1) a growing supply of qualified software developers and (2) a growing emphasis on programming as a learning outcome across a range of secondary and tertiary degrees.

The framework enhances analytical depth by systematically linking labour market transformations with social inclusion factors. It recognises that workforce dynamics cannot be understood in isolation and that skills development, employment opportunities, and access to services are deeply interdependent. This holistic perspective will allow for more targeted and effective policy recommendations, ensuring that ESF+ and related policies remain future-proof and responsive to emerging challenges.

3. Key drivers, impacts, opportunities and challenges: insights from available research

What are future key drivers of change and their likely impacts? What opportunities and challenges for a social and inclusive Europe can they give rise to? This chapter provides preliminary answers to these questions by reviewing the existing future-oriented literature to establish the foundation of the study. The focus here is mainly on forecast and foresight studies produced by (or for) EU institutions and international organisations (see **Annex B** for details on the literature review process, including the list of reviewed studies).

This chapter starts by mapping future *drivers of change* potentially reshaping European societies and economies and reveals their current status and likely future trajectories. It then assesses how these drivers can potentially influence both *labour demand and supply* in European labour markets. On the demand side, it examines impacts on the number of jobs available and skills demand (*job quantity*) as well as on working and employment conditions, social and industrial relations, and skills use and discretion (*job quality*). On the supply side, it sheds light on trends in workforce availability and barriers to access the labour market (*job quantity*), as well as on workers' subjective and objective wellbeing (*job quality*). The chapter then delves into how the identified drivers of change are bound to impact *social inclusion aspects*, with particular emphasis on accessibility, availability and quality of essential and enabling services. Finally, the chapter outlines potential *opportunities and challenges* for a social and inclusive Europe deriving from these shifts.

3.1. Overview of key findings from future-oriented studies

3.1.1. Key drivers of change

The review of existing future-oriented studies confirmed as key the five drivers of change outlined in the analytical framework.

Technological change is a major and accelerating driver of transformation – particularly for *labour markets*. Data show variations in digitalisation and digital technology use across the EU27. While the use of computing devices at work is near ubiquitous in some countries, particularly in northwestern Europe (for instance, 97 % of adult workers in Finland), this is less widespread in others, especially in southern or eastern Europe (for instance, 75 % in Cyprus and 76 % in Bulgaria and Italy) (Cedefop, 2022). Similarly, there is important variety in digitalisation depending on sector and region (particularly if rural or urban). As digitalisation increases, so does the risk of a 'digital divide' (European Commission, 2023c).

Key innovations in Industry 4.0, AI, robotics, and clean energy are seen as accelerating workplace transformations (World Economic Forum, 2025). These are often mediated by *organisational change*, including shifts in how work is structured, coordinated, and governed, through, for instance task automation, the digitisation of work processes, and the algorithmic coordination of work (or 'algorithmic management') (Eurofound, 2021a). Algorithmic management is now expanding beyond platform work into more 'traditional' sectors, contributing to an 'increasing use of digital platforms for coordinating work processes in all kinds of economic organisations' (or 'platformisation of work') (Fernández-Macías et al., 2023; see also Baiocco et al., 2022). Automation, digitisation, and platformisation are thus likely to emerge as key sub-processes of technological change. However, despite general agreement on their present and future relevance, there remains significant uncertainty regarding the nature of these technological innovations, their implementation, their adoption (by firms), and their regulation (by public authorities) (OECD, 2024b; National Academies of Sciences, Engineering, and Medicine, 2024).

> **More employers – 60% – expect broadening digital access to transform their business than any other trend […]. This growing digital access is a critical enabler for new technologies to transform labour markets.**
>
> *World Economic Forum (2025, p.10)*

Key organisational changes are likely to reshape work processes in 2030-2040: increased spatial and temporal flexibility, growth of self-employment and platform work, and increased reliance on short-term projects rather than permanent positions (Asikainen et al., 2021). Although the prevalence of online platform work is notoriously hard to measure, the OECD (2024b) estimates that fewer than 10 % of workers are currently working in platforms, and often only to supplement existing income. These changes reflect both the availability of enabling technological tools and shifting employer strategies. New value creation models, such as customer co-design and localised production, suggest broader shifts in the nature of work, with increasingly blurred lines between producers and consumers (Asikainen et al., 2021).

> **Europe is the fastest-warming of all the [World Meteorological Organisation] regions, warming twice as much as the global average since the 1980s.**
>
> *World Meteorological Organisation, cited in Eurofound (2024, p.5)*

Environmental change constitutes another central transformation affecting labour markets and social inclusion in the EU in the medium to long term. It comprises two core dimensions. *Firstly*, environmental change involves more extreme weather events and their consequences, which will likely reshape European social protection systems (European Commission, 2023c). A Eurofound (2024) study notes that Europe is warming twice as fast as the global average, with Southern countries more exposed to heat stress and damage to

health and infrastructure. Extreme weather events such as droughts or flooding may also exacerbate migration with potentially as many as 216 million climate migrants by 2050 (European Parliament and ESPAS, 2024). This creates both direct and indirect labour market impacts, mediated by mitigation, adaptation, and compensation policies.

Secondly, mitigation of environmental change extends beyond clean energy production to include broader behavioural, institutional, and organisational changes (such as 'value-driven' work and companies) that affect how Europeans work and live (Asikainen et al., 2021). This second dimension is fully policy-dependent. While climate-related events are clearly shaped by long-term policy decisions (e.g. on emission reduction), in the short to medium-term they occur with relative autonomy. In contrast, the green and low-carbon transition is entirely policy-contingent, revolving around priorities and actions of decision-makers, businesses, workers, and citizens. Initiatives such as the Green Industrial Deal illustrate the scope of the anticipated shifts (Grossi and Rayner, 2023).

Finally, climate policies may drive structural change, which, if not adequately managed, may prompt a 'greenlash' (Kardaś, 2024). Uncertainty over the implementation of the green transition is therefore key to understanding the environmental driver of change. Eurofound and the EEA (2023) outline different possible transition scenarios, from a rapid and inclusive shift to climate neutrality to a fragmented or even failed transition, each with vastly different labour and social outcomes.

> **The trend towards greater global friction and competition is likely to be a defining feature of the geopolitical landscape in the period to 2040. The world seems destined to live with 'permanent instability' for the foreseeable future.**
>
> *European Parliament and ESPAS (2024, p.11)*

Geopolitical change is another major driver of change. The current era is described as one of 'permanent instability' with increasing global friction and systemic competition (European Parliament and ESPAS, 2024). Geoeconomic changes identified by the World Economic Forum (WEF) (2025) include increased use of industrial policy, rising government subsidies, and fragmentation of global trade – all contributing to slowing economic growth. These megatrends are reshaping global production networks and the geographic distribution of labour demand.

Geopolitical shifts also intersect with digitalisation and climate policy. For instance, digital infrastructure and AI have become strategic domains, with cyberspace and even outer space becoming new theatres of geopolitical rivalry (European Parliament and ESPAS, 2024), and climate change driving political instability. The overlapping nature of these domains complicates national and EU-level policymaking in employment, social protection, and education.

Demographic change, including ageing, declining fertility rate, and migration, can drive a foundational transformation of labour markets and social protection systems. In terms of ***fertility and ageing*** trends, the High-Level Group on the future of social protection and of the welfare state in the EU (henceforth High-Level Group) (European Commission, 2023c) notes a worsening of the European demographic dependency ratio from 2.9 in 2019 to 1.7 in 2070. This is fundamentally due to increased life expectancy and decreasing fertility rates, with European citizens able to enjoy longer and healthier lives. Although the population aged 65 and over is projected to increase across the EU over the next three decades, southern and eastern Member States are expected to be particularly affected, with shares of the population aged 65+ often exceeding 30 % (Grubanov-Boskovic et al., 2021; Pinkus and Ruer, 2025).

> **Experts expect labour migration to grow more rapidly than overall migration, suggesting that migrant workers will become more prominent in the future of the European Union relative to other types of migrants. This may be a result of the experts' awareness of the demographic decline of the European labour force and the growing need to attract workers to sustain European economies and social welfare systems.**
> *Acostamadiedo et al. (2020, p.23)*

Migration also plays a vital role. *Intra-EU mobility* often involves younger people and higher-skilled people. In geographical terms, migration outflows tend to concern central and eastern European countries as well as rural areas, with people moving towards northwestern European countries and urban areas (European Commission, 2023c). As for *non-EU migration*, although estimates are uncertain, an increase by 2030, especially in (high-skilled) labour migration, is a likely scenario (Acostamadiedo et al., 2020). Finally, climate-induced migration, which, as mentioned above, may involve as many as 216 million migrants globally by 2050 (European Parliament and ESPAS, 2024), shows the interrelated nature of these drivers. As in the case of ageing trends, net inward migration will likely increase unevenly across the EU, with net migration in southern, northern and western European countries generally projected to be significantly higher than in eastern European countries (Pinkus and Ruer, 2025).

All in all, although population size forecasts depend on the scenarios considered in terms of changes in fertility rate, ageing, and migration patterns, a decline in the working-age population is regarded as a likely outcome (see section 4.1). In the long run, shrinking of the working population and ageing can be mitigated and stabilised – yet not completely offset – by increased immigration and increased labour force participation.

Table 1. Findings from the reviewed literature on the drivers of change

Drivers of change	Key developments
Technological	Technological development, adoption and regulation patterns still **highly uncertain**. Increasing yet varying digitalisation levels, risk of **digital divide** across EU. Main **tech-driven organisational changes**: automation, digitalisation, algorithmic management, 'platformisation', flexibility. Rise of **platform work** hard to estimate, but <10 % population currently in platform work.
Environmental	**Southern EU countries** more exposed than northern EU countries. Green transition largely **policy-dependent** (a 'greenlash' is also possible).
Geopolitical	Wars impacting **energy prices**. Increased **global friction in trade**. Focus on **industrial policy** and **'reshoring**'.
Fertility and ageing	**Ageing** population and **declining fertility rates**. Worsening demographic **dependency ratio**.
Migration	**Intra-EU mobility** largely concerns **younger and higher-skilled workers**, mainly from **Central and Eastern Europe** to Western Europe and from **rural to urban** areas. **Non-EU migration** likely to increase by 2030, especially for higher-skilled workers. **Climate change-driven migration** may be large.

3.1.2. Impacts on labour markets

Technological change – especially AI and digitalisation – is broadly considered the most significant driver of labour market transformation (see survey results in World Economic Forum, 2025; and Cedefop, 2022). Most sources suggest that, contrary to some fears, technological change is unlikely to drive mass unemployment, and may even foster net employment growth in the medium term (World Economic Forum, 2025; OECD, 2024a; Eurofound, 2021a). However, job losses are still expected in some sectors, regions, and occupations (see also section 4.2). This potential risk of job displacement (mediated by organisational change) is already anticipated by businesses surveyed by the WEF (2025), 40 % of which expect to reduce staff numbers owing to technology adoption.

More substantial impacts are expected within occupations, where automation may render some skills obsolete while raising demand for others. The WEF (2025) estimates that 39 % of a worker's skill set could be transformed or become outdated by 2030, while Cedefop (2022) finds that 35 % of surveyed workers needed to acquire new digital skills in 2021. Some occupations are likely to be more exposed to technological change, because of a concentration of those kinds of skills and tasks within those occupations. While section 4.2 expands in greater detail on this, some sources find that occupations such as clerical and administrative workers will experience a technology-driven fall in demand, while technological or 'human-centred' occupations (e.g. care work) will experience a demand increase (World Economic Forum, 2025).

> **New technologies may act as labour substitutes or compliments. Technological progress is changing the occupational composition of the workforce, but there is no evidence yet pointing to net job destruction.**
> *OECD (2024a, p.8)*

Because technological change affects specific skills and tasks, impacts will vary by occupation. Eurofound (2021b) highlights potential concerns around future job polarisation, as technological change tends to result in higher demand for high-skilled workers. This is linked to AI's supposed 'routine bias', where routine cognitive and non-cognitive tasks are automated, increasing demand for higher-skilled, non-routine work (even though this hypothesis is increasingly under scrutiny, see Cedefop, 2022). Again, businesses surveyed by the WEF (2025) echo this concern, anticipating a large fall in demand for occupations such as clerical and administrative ones (see also section 4.2). However, it should be noted here that, unlike in the United States (US) – where polarisation was more pronounced – previous waves of technological change in Europe tended to lead to occupational upgrading, marked by limited growth in low-paid, low-skill jobs and stronger expansion in high-paid, high-skill jobs (Fernández-Macías and Hurley, 2017; Oesch and Piccitto, 2019; Piccitto and Oesch, 2020).

Cedefop (2024) expects routine cognitive tasks to be automated, but adds that some high-skill cognitive occupations may also be affected by AI, especially in finance, administration, or research and development (R&D). By contrast, manual or physical jobs are less exposed to AI, even though they can be at higher risk of automation through robots or other technologies (Cedefop 2024; see also section 4.2). Whether such shifts in skill demand will result in unemployment or transformation will likely depend on upskilling and reskilling opportunities for affected workers (World Economic Forum, 2025).

In terms of job quality, the supposed falling demand in mid-skilled occupations alongside rising demand in high-skilled occupations could lead to wage polarisation, as AI and technology-driven productivity gains accrue unevenly (National Academies of Sciences, Engineering, and Medicine, 2024). Emerging evidence also links AI to growing income inequality, though further research is needed (OECD, 2024a). Technological change may also exacerbate wage inequalities across regions, sectors, and demographic groups. Without policy intervention, the benefits are likely to largely accrue to capital rather than labour (National Academies of Sciences, Engineering, and Medicine, 2024; OECD, 2024b).

Beyond altering job types and skill needs, technology is reshaping how work is organised. Five trends related to organisational change and driven by technological change – task automation, digitalisation of work processes, telework, digital labour platforms, and the platformisation of traditional jobs – pose risks of psychosocial stress, work intensification, and work-life imbalances, particularly under AI-based management systems (Eurofound, 2021b; European Commission: Joint Research Centre et al., 2024). While these changes may offer increased flexibility in time and location, they also threaten unionisation and employment stability (Eurofound, 2021b; Cedefop, 2024). Platform work remains marginal but growing, with some evidence of deteriorating working conditions (Eurofound, 2021b; OECD, 2024b). Digital tools are more frequently used in skilled than in elementary roles, reinforcing occupational divides (Cedefop, 2022). Yet, technological change may also bring benefits, including greater autonomy and flexibility, automation of tedious or hazardous tasks, improved communication, and health support (Eurofound, 2021b; European Commission: Joint Research Centre et al., 2024).

> **Recent evidence points in the direction of some positive effects in the case of automation and digitalisation of work, coupled with potential risks in terms of mental health. Platform work is linked with […] relevant risk in terms of stress and mental health […]. Additionally, the extension to traditional workplaces of AI-based or algorithmic management […] poses a significant risk of deterioration of job quality, leading also to a number of psychosocial risks.**
>
> *European Commission: Joint Research Centre et al. (2024, p.4)*

The labour market effects of **environmental change** are multifaceted. In terms of employment effects, some forecasts project net employment gains through 'green' job creation (Cedefop, 2021). For example, Asikainen et al. (2021) anticipate up to 884 000 net job gains by 2030 under a 55 % emissions reduction scenario, primarily through transitions in electricity, transport, and renovation sectors. However, others note that demand for green jobs may fall once the transition is achieved (Grossi and Rayner, 2023). However, most workers affected by the transition will experience changes in job content rather than displacement. Eurofound (2024) estimates that 37 % of workers are in occupations expected to be directly transformed by the green transition.

Analyses also explore the *types* of green jobs created. Dierdoff et al. (2011) classify them as jobs in existing sectors and occupations that will experience a demand increase (e.g. in construction), jobs that will see the skills involved enhanced to adapt to the green transition (e.g. in transportation), and jobs in entirely new or emerging activities (e.g. renewable energy engineers). Of the green job growth that Eurofound (2024) predicts, 9 % will be new and emerging occupations, 14 % will involve enhanced skills, and 15 % will see a climate-induced increase in the demand for their work.

Nonetheless, despite positive climate-related effects at aggregate level, job losses will likely be concentrated in carbon-intensive industries and regions – up to 237 000 jobs in some coal-intensive regions (Eurofound and EEA, 2023; European Commission, 2023c). New green jobs, including in the circular economy, may not emerge in these same locations, with issues in managing job transitions, and possibly regional mobility. Green sectors remain also male-dominated, posing risks of widening gender disparities unless reskilling initiatives are made more inclusive (Alexander et al., 2024).

> **Despite green jobs being a growing source of employment, women are strongly underrepresented, raising concerns about the gender-inclusiveness of the green transition.**
> *Alexander et al. (2024, p.4)*

Job quality impacts are expected to vary by green job type. Eurofound (2024) finds that workers in 'new and emerging' occupations face fewer physical risks, less strain and higher wages, while other jobs, particularly those experiencing 'increased demand', are more exposed to strain and hazards. Climate change may also worsen health risks, particularly for emergency or outdoor workers because of heat stress (Eurofound, 2024).

While direct labour market effects of **geopolitical tensions** are less documented, some studies (e.g. European Parliament and ESPAS, 2024) suggest the EU's relative internal stability could attract investment and support reshoring, with potential employment gains. The WEF (2025) links geoeconomic realignments with job creation (up to five million globally), though these benefits may depend on policy choices. Conversely, inflation and sluggish growth potentially linked to global instability may dampen job creation (World Economic Forum, 2025). Increased military spending could also indirectly affect labour markets by diverting resources from the skill development and labour market support needed to address other drivers' impacts (European Parliament and ESPAS, 2024).

Demographic change is expected to continue shaping labour markets. An ***ageing*** population will both reduce the labour supply and increase demand on social protection systems, particularly pensions, healthcare, and long-term care – where labour shortages are already widespread. A declining workforce will thus leave fewer workers to support more elderly people in need of care. According to the High-Level Group, this may prompt an increase in employment among older workers – provided there are further

> **According to Eurostat projections, the EU population aged 75 or over will increase from 43.8 million in 2020 to 75.4 million in 2050. This will lead to increased demand […] for health and long-term care – giving rise to an increased need for both financial and human resources (including well-paid care workers).**
> *European Commission (2023c, p.11)*

improvements in health and life expectancy, and a decline in physical work thanks to technological advances – as well as opportunities for female labour market participation and ***migration*** to meet the labour and skill demand (European Commission, 2023c). However, as noted in section 4.1, migration can mitigate but not completely offset working-age population decline. The OECD (2018) suggests that immigration could moderately but meaningfully increase labour supply by 2030 if supported by integration and upskilling (OECD, 2018). Some also emphasise internal imbalances and regional disparities in demographic trends with sharper population declines in southern and eastern regions potentially worsening brain drain and driving regional inequalities (European Commission, 2023c). In eastern European countries, this issue could potentially be exacerbated by lower net migration inflows (see previous sub-section). Finally, labour shortages may further hinder responses to other drivers, particularly in green and strategic sectors (European Labour Authority, 2024b).

3.1.3. Impacts on social inclusion

Technological change may deepen income inequalities across regions, sectors, and demographic groups, largely due to its potential wage and employment effects (see above). Impacts may be concentrated in certain sociodemographic groups, regions, occupations or sectors, creating risks of economic and social decline for those social groups and territories (World Economic Forum, 2025). Moreover, while Europe has seen more job upgrading than polarisation, mid-skilled workers remain vulnerable, and their displacement may strain essential services. In some cases, better-resourced displaced workers may crowd out more vulnerable groups from accessing those services (European Labour Authority, 2024b).

Digital adoption in essential services raises further equity concerns. Algorithmic decision-making can reflect biases, potentially limiting access to benefits or entitlements for vulnerable groups (OECD, 2024c). Similarly, automated systems may reinforce privacy violations, discriminations, and digital exclusion (OECD, 2024a). AI and digital technology integration into essential services could also exacerbate an emerging digital divide – by gender, age, education, migration status, or disability – where people without internet access or digital skills who are already at high risk of social exclusion are unable to access digital-only services (European Commission, 2023c; OECD, 2024b; OECD, 2024c).

> **While technology and data advances can play an important role in improving the design, delivery and coverage of social protection benefits and services, they also create complex challenges for governments, and the risks involved in adopting new digital and data technologies can be significant.**
>
> *OECD (2024c, p.98)*

However, digitalisation also creates opportunities to improve social services – in particular in healthcare – making them more effective, with delivery that is more targeted to those in need (European

Commission, 2023c; National Academies of Sciences, Engineering, and Medicine, 2024). More broadly, digitalisation may drive breakthroughs in three industries – health, education, and agriculture – that may lead to large increases in standard of living (OECD, 2024a).

As it alters work organisation and structure, technological change may also exert its effects via *organisational change*, for instance by potentially expanding non-standard forms of work such as platform work, remote work, and self-employment, often outside the scope of traditional social protection schemes (European Commission, 2023c). This shift can also affect household structures, with fewer main breadwinner and implications for access to social protection of other household members not in formal employment (especially women) (OECD, 2024b). Rising part-time work and underemployment, particularly among men, further challenge welfare systems tied to stable, full-time employment (OECD, 2024b).

Environmental change disproportionately affects vulnerable groups through both direct impacts – such as reduced access to basic needs and increased exposure to hazards – and indirect effects on health and wellbeing (Eurofound, 2023a; Eurofound and EEA, 2023). These burdens fall most heavily on those least able to relocate or invest in protections, potentially heightening social inequalities (Eurofound and EEA, 2023). The green transition may further disadvantage low-income households, who are more exposed to regressive effects of measures like energy taxes and less able to invest in alternatives (European Commission, 2023c; Eurofound, 2023a; Eurofound and EEA, 2023). While targeted subsidies could mitigate these negative distributional effects, they may face fiscal and political constraints, especially amid demographic and geopolitical pressures (Eurofound and EEA, 2023). In regions reliant on carbon-intensive sectors, transition-related job losses may trigger economic decline and local resistance, particularly where cultural legacies persist (Eurofound and EEA, 2023). However, the green transition also presents opportunities to promote social fairness through improved access to services, housing, and a cleaner environment for vulnerable populations (Eurofound and EEA, 2023).

> **[T]he impacts [of climate change] on communities and individuals across Europe and beyond will differ, […] depending on, for example, regional or sociodemographic characteristics. In general, however, it can be expected that the traditional vulnerable groups in society will be affected more, and most likely more negatively.**
>
> *Eurofound (2023a, p.11)*

Geopolitics is seen as distant from debates on European social inclusion – a gap reflected in their limited coverage in the reviewed sources. Nonetheless, two main concerns emerge. First, geopolitical tensions can disrupt energy and food supply and prices, worsening the cost of living, especially for vulnerable groups (Eurofound, 2022; European Commission, 2023a). Second, increased military and defence spending as a response to geopolitical tensions may constrain welfare budgets at a

time of rising needs linked to climate, technological, and demographic pressures (European Parliament and ESPAS, 2024). Other indirect impacts are also plausible, though less examined. For example, increased geopolitical risk can raise economic uncertainty and borrowing costs (Bottazzi et al., 2025), reducing fiscal space for social investment. Trade disruptions and protectionism (Bosone et al., 2024; Alcidi, 2025) may further affect economic performance and welfare financing. Finally, conflicts may increase forced displacement and the number of asylum seekers, raising the necessity of integrating newcomers into social protection systems.

Demographic trends such as ***ageing and low fertility*** may strain social protection and essential and enabling services, especially as climate and technological change raise demand (European Parliament and ESPAS, 2024). With fewer working-age contributors, systems may face rising demand amid shrinking resources (European Commission, 2023c; European Parliament and ESPAS, 2024). At the same time, policy responses made under the assumption of limited fiscal space and financial resources may reallocate funding away from broader social inclusion efforts, such as ECEC or training, not targeted at the elderly (European Parliament and ESPAS, 2024). This may potentially increase social exclusion of other vulnerable groups. This is particularly concerning as intergenerational inequalities deepen and younger people face growing exclusion risks due to stagnant incomes, housing pressures, and worsening health (Eurofound, 2023b).

> **Migration from outside the EU is not a 'silver bullet' that will offset the decline in fertility rates or ensure the sustainability of the pension system. But labour market policies to increase the participation of migrants in the workforce could generate significant extra tax revenue to help pay for welfare state spending.**
>
> *European Commission (2023c, p.11)*

Migratory flows – potentially intensified by conflicts and climate change – may, at least initially, increase demand on existing social systems to support the inclusive, responsible, and effective integration of migrants (European Parliament and ESPAS, 2024). At the same time, a greater number of working migrants can increase social security contributions and tax revenues, helping to ease the burden on social protection systems – even if it remains unclear whether this will be sufficient to offset ageing pressures (European Commission, 2023c; OECD, 2024b). This is especially the case given the positive fiscal position of migrants (Boffi, Suari-Andreu, and Vliet, 2024). Migration can also help alleviate labour shortages in specific key sectors such as care (European Commission, 2023c), provided that their diploma and qualifications are adequately recognised (Grubanov-Boskovic et al., 2021).

Table 2. Main findings from the reviewed literature on the *impacts*

Drivers of change	Job quantity	Job quality	Social inclusion
Technological	**Net employment effect** uncertain, but likely **displacement** in certain sectors and occupations. Changing **task content and skills**. **Routine cognitive work** more exposed to AI, **manual work** to other tech.	**Wages may fall** if productivity gains accrue only to capital. Possible **wage inequality** growth. Risks and benefits of AI for **job quality**. Organisational change may **worsen job quality**.	Possible **income inequality** growth. **Pressure on essential services** and on most vulnerable. **Less access to social protection** for new forms of work. Tech integration may **increase efficiency of services**, but also **limit access**.
Environmental	Possible **net employment gains**, but **large losses** in carbon-intensive regions/sectors. '**Greening' of job content**. **Gendered impact** of green transition.	**Wage inequalities** possible. Displaced workers likely to return **to worse-quality jobs**. Some green jobs may be of **low quality**.	Climate change may impact access to **essential goods and services** and lead to **physical and mental health problems**. **'Punitive' green policies** can hurt most vulnerable the most.
Geopolitical	EU relative stability may **attract investment** and **boost employment**. Supply chain shifts and defence spending may trigger **reshoring**. **Inflation and global economic instability** may impact job growth.	**Potential diversion of funding** away from labour market support for transitions to quality jobs.	Increased **energy prices** and increased **inflation** and **cost of living**. **Potential diversion of social funding** towards defence spending.
Fertility and ageing	**Labour supply decline**, particularly in some countries/regions. **Labour demand** increase in specific sectors (e.g. **care**). More opportunities for **women and migrants**.	**Care sector work** might be of **mixed job quality**.	**Declining social security contributions** might put social spending under pressure. Need to support elderly may be used to **justify de-prioritisation of youth support**.
Migration	**Labour and skill supply increase** in countries and regions of destination. **Workforce, brain and skill drain** in countries and regions of origin.	Migrants more likely to be employed in **precarious and low-quality jobs**.	Migrant workers can **contribute to fiscal and social protection systems**. Migrants often more vulnerable and **in need of greater social support**.

3.2. Opportunities and challenges: insights from the literature

Realising the benefits of **technological changes** depends on complementary investments in skills, organisational change, and labour regulation. While AI can create new jobs and sectors, its advantages may be delayed or unevenly distributed without widespread and responsible adoption across workplaces and the population (OECD, 2024a). Ensuring this requires broad development of digital and AI skills. A key challenge thus lies in the potentially uneven AI deployment across sectors and regions, which risks deepening economic divides. This also reinforces the need for redistributive policies to compensate displaced workers. Additionally, as worker involvement in technological adoption remains limited, the legitimacy and effectiveness of these transformations may be reduced, worsening outcomes for wellbeing and job quality (European Commission: Joint Research Centre et al., 2024).

Technological change is also enabling growth of non-standard work, posing major challenges for welfare eligibility, regulatory enforcement, and collective representation. Platform work and some forms of self-employment are often associated with low-quality and precarious work, and limited social protection (European Commission, 2023c; European Commission: Joint Research Centre et al., 2024). Existing legal frameworks are poorly adapted to new forms of remote and decentralised work, weakening enforcement and representation (European Commission: Joint Research Centre and Aloisi, 2025). Moreover, increased surveillance and monitoring in the workplace also raises psychosocial and occupational health risks. Yet, AI and technological advances may allow for the automation of hazardous, physically demanding and tedious work, as well as offering opportunities to automate hazardous or tedious tasks, thereby improving working conditions and wellbeing.

Environmental change also presents challenges and opportunities for a social and inclusive Europe. Extreme weather and rising temperatures are likely to increase pressure on public services, health and care systems, and infrastructure, thereby amplifying investment needs. The green transition may generate new employment in emerging and existing sectors, but risks reinforcing inequalities and regional divides if not carefully managed. Job losses in coal-dependent regions, with limited prospects for new green employment locally, could lead to persistent unemployment – especially among young people. While ‘green’ jobs may improve pay and conditions, some may still be precarious. Distributional concerns remain central: the ‘triple injustice’ (European Commission, 2023c) highlights how those least responsible for emissions often face the worst impacts of climate change and may also bear a disproportionate cost of transition measures. This could fuel social and political tensions and weaken public support for the green transition (Eurofound and EEA 2023).

While underexplored in the reviewed literature, the impact of **geopolitical shifts** may constrain EU fiscal space and complicate coordination on labour and social policy. Relaxed state aid rules and rising defence spending risk deepening regional disparities if industrial policy benefits are unevenly distributed. Redirecting funds to defence could limit social investment, though this outcome is not inevitable. The experience of (Western) Europe in the post-World War II period illustrates that high defence spending can coexist with the expansion of modern welfare states. Whether increased defence budgets come at the expense of social investment will ultimately depend on political choices, policy priorities, and the broader socioeconomic context. At the same time, the EU's relative geopolitical stability and renewed focus on industrial policy (and manufacturing) may open up new opportunities for employment and investment.

The High-Level Group (European Commission, 2023c) warns of a 'double challenge' in terms of **demographic change**: ***ageing*** populations are expected to increase demand for social protection systems just as shrinking workforces reduce available funding. Without investment or policy changes, long-term care and pensions may face mounting pressure, heightening the risk of poverty and exclusion among older people. A combination of policies – including tax and welfare financing reforms, active labour market policy coupled with care support, and increased migration – can mitigate this double challenge. However, extending working lives and the (already ongoing) increase in the share of older workers (Eurofound, 2023b) can also give rise to challenges related to training and reskilling to ensure skill sets remain relevant. The ageing challenge may also offer job creation potential in expanding sectors such as care, though policy choices could divert resources from social investment in younger cohorts towards old-age spending. Risks to intergenerational mobility – via stagnant wages, weak labour shares, and limited access to housing and education – may deepen. Uneven ageing patterns across the EU risk exacerbating regional labour and skill imbalances.

Rising ***migration*** can help mitigate this vicious circle by improving the demographic and economic dependency ratios and by filling chronic shortages in care sectors. However, inclusive policy design is needed to effectively integrate people with a migrant background, as these are often those most at risk of poverty and social exclusion because of their 'more fragile ties to the labour market' (European Commission, 2023c).

Table 3. Findings from the reviewed literature on *opportunities and challenges*

Drivers of change	Opportunities	Challenges from labour market impacts	Challenges from social inclusion impacts
Technological change	**Job creation** in emerging occupations and sectors. **Health and safety benefits** from task automation.	(Long-term) **unemployment** and **underemployment**. **Low-quality** and **precarious work**. **Occupational health and psychosocial risks**.	**Limited access to social protection** for precarious workers.
Environmental change	**Job creation** in traditional and new occupations and sectors. **Higher wages** and **better working conditions** in some 'green' jobs.	(Long-term) **unemployment** and **underemployment**. **Low-quality** and **precarious work** in some 'green' jobs.	Strain on **care and public services and infrastructures**. Rising **inequalities**. **Societal and political tensions**.
Geopolitical change	**Job creation** in manufacturing and defence.	**Uneven benefits** from industrial policy and job creation across EU.	Potential **diversion of social spending** towards military and defence.
Fertility and ageing	**Job creation** in care sectors.	**Labour market and skill shortages**, especially in care. **Regional inequalities** in labour and skill supply.	Older people more exposed to **poverty and social exclusion**. **Care sector and pension system** under pressure.
Migration	Increase in **labour and skill supply** in shortage occupation and sectors. Higher **tax revenues** and more **social security contributions**.	Migrants over-represented in **low-quality, precarious jobs**. **Regional inequalities** in labour and skill supply; workforce and brain drain.	Higher risk of **poverty and social exclusion**.

4. Future labour market trends: a comparative quantitative analysis

Analyses of the future are often accompanied by some form of prediction. While no prediction can ever be entirely accurate, they play a crucial role in shaping how we think about what lies ahead. This chapter examines two distinct approaches to predicting labour market trends: **labour market forecasts** (4.1) and **occupational automation risk assessments** (4.2). Forecasts rely on past trends to project which sectors and occupations are likely to expand or contract, assuming continuity in economic and technological developments. In contrast, automation risk assessments take a task-based approach, estimating which occupations are most susceptible to technological disruption based on their task composition and the capabilities of current and emerging technologies.

By comparing these two approaches, we can better understand the range of possible labour market developments. Relying on projections from EU, national and regional skill forecasts as well as automation risk estimates from academic and institutional sources, this chapter provides a structured comparison of anticipated job growth and decline. For both types of predictions, we compare data sources, methodologies and results and provide a synthesis in a structured way.

While forecasts and automation risk studies provide useful insights, they have limitations – mainly in assuming continuity of trends or full realisation of technology. They may overlook the impact of policy, strategy, and social factors. Instead of treating predictions as certainties, the chapter uses them to explore various future scenarios and better understand the uncertainties and policy options affecting the future of work.

4.1. What do labour market forecasts say?

Labour market forecasts are key in anticipating changes in the labour market and ensuring that demand and supply, including the respective skills, align in the next decade. They convey essential information for many target groups. Young individuals, faced with the decision about further education, can make informed decisions based on the labour market prospects offered by different study programmes in the medium term; employers may adjust their recruitment strategies accordingly. Employment intermediaries and adult learning providers can adapt their retraining programmes. Lastly, the forecasts are intended to inform labour market policy in a broad sense. In this context, we aim to emphasise the different sources and their characteristics, observed both at the EU level and in a selection of Member States that implement forecasting methodologies for labour demand and supply, pinpointing potential common outcomes and trends alongside distinct elements (further methodological details in **Box C1** in **Annex C**).

The remainder of this section examines existing labour market forecasts based on supranational and national data, which are complementary – the former offer strategic coherence, while the latter provide the depth and flexibility needed for tailored national responses. An example of comparison between the methodology adopted by Cedefop and that adopted by the Bulgarian national authorities is provided in **Box C2 (Annex C)**.

4.1.1. Cross-country analysis based on supranational data

The descriptive analysis of the forecast utilising Cedefop data[1] encompasses 2022 to 2035. A brief overview of the variables utilised, and their interconnections, is provided hereafter. The starting point is the employment level and its growth rate for both the EU27 and the 27 Member States. The outcomes derived from these indicators are initially analysed at an overall level, subsequently progressing to a detailed examination of sectors and occupations. For a more detailed examination, the 'Future Employment Needs' indicator is considered, offering a breakdown of labour demand into its components: expansion demand, replacement demand, and total job openings. On the labour supply side, we exploit the data on the working-age population and labour market participation provided by Eurostat (2023) and the JRC (Lutz et al., 2019). Additional information about mismatches is derived from the Labour and Skills Shortage Index (LLSI) which is designed to provide a standardised measure of employment shortages, useful for making decisions about workforce and training needs in the European Union[2].

4.1.1.1. Labour demand forecasts

The projected level of overall employment from 2022 to 2035 exhibits a **steady upward trend**, indicating a strong and sustained recovery and growth following 2020. This could reflect the post-pandemic economic rebound and ongoing structural expansion.

Employment growth projections indicate a positive trend in most EU27 Member States. Between 2022 and 2035, Malta, Ireland, and Luxembourg exhibit the highest projected growth rates, which exceed the EU27 average. However, Bulgaria, Lithuania, Slovenia, Greece, Hungary, and Germany are expected to show negative employment growth.

Future recruitment needs (total job openings) at the EU27 level are mainly **driven by the replacement demand** that constitutes a crucial element of opportunity, even when expansion demand is limited. Specifically, it can be noted that between 2022 and 2035:

[1] Cedefop 'Skills Forecast' 2025 release.

[2] For a more detailed definition of all these indicators, see in Table C1 in Annex C.

- *Job openings* are projected to decline from 2022 to 2026, followed by a recovery and moderate growth from 2027 to 2035.
- The *expansion demand* pattern from 2022 to 2035 shows a constrained generation of new employment opportunities in the initial years (up to 2026), potentially attributable to post-Covid adjustments, automation, or demographic changes. Following 2026, the need for expansion is expected to recover gradually by 2035. Nonetheless, the trend persists at a rate below one million new jobs annually, indicating a sluggish increase in employment.
- The *replacement demand* is projected to increase consistently from 2022 to 2035. This indicates the need to replace departing or retiring employees, despite limited new job creation (expansion demand). Particularly significant shares of replacement demand arise in certain Member States[3]. These countries predominantly depend on substituting existing employees, resulting in minimal to no net job growth. In Bulgaria, for example, job replacement maintains employment circulation.

Growing and shrinking sectors

At the sectoral level, in the EU27, **employment in ICT services** is anticipated to increase significantly between 2022 and 2035. For almost two-thirds of the Member States, the ICT sector accounts for the primary or second-highest growth rate in employment. This phenomenon, according to Cedefop (2023), is driven by digital transformation, emerging technologies, and the shift to remote work, especially after Covid-19. Additionally, integrating ICT in sustainability initiatives and evolving business models fuels demand for skilled professionals. The second and third most significant growing sectors at the EU27 level are the 'Professional services' and the 'Health and social care sector'. The situation among Member States is more varied, with 'Electricity, gas, steam, and air conditioning supply' frequently ranking highest (seven Member States).

In the '**Agriculture, forestry, and fishing sector**', both at the EU27 level and in 12 Member States, the employment growth rate is not just negative but also the lowest among all sectors. According to Cedefop (2023), this decline is attributed to several factors, including i) technological advancements: enhanced automation and improved technologies have augmented productivity, diminishing the necessity for labour in these sectors; ii) structural economic shifts: a transition from primary sectors to service-oriented industries has resulted in decreased employment in traditional sectors such as agriculture; iii) policy and environmental factors: sustainability initiatives and environmental regulations may restrict certain activities within these sectors, affecting employment.

[3] High Replacement Share (≥95 %) is observed in Bulgaria (where expansion demand is foreseen to be negative), Hungary, Germany, Greece, and Slovenia.

Taken together, these two observations project a continuation in the short term of past structural trends of de-agrarianisation and a shift to knowledge-intensive services.

Growing and shrinking occupations

Turning to occupations, at the EU27 level employment growth between 2022 and 2035 shows **the highest increase among 'Professionals', driven by a strong demand for highly skilled workers**. This is followed by 'Technicians and associate professionals' with consistent growth, and 'Plant and machine operators' experiencing moderate growth, likely owing to industrial stability. 'Service workers and sales roles' show slight but fluctuating growth, while 'Legislators and senior officials' see minimal, stable growth. While there is some cross-country heterogeneity, the employment growth of 'Professionals' ranks first in 17 Member States, 'Technicians and associate professionals' ranks first in three Member States and second in eight Member States.

Occupations experiencing negative growth between 2022 and 2035 align with the overarching trend toward service-oriented and knowledge-driven economies. 'Skilled agricultural and fishery workers' exhibit the most significant decline, plausibly indicative of persistent structural transformations in agriculture and mechanisation. This occurs both at the EU level and in 17 Member States (except three Member States where they rank either first or second). 'Clerical support workers' and 'Craft and related trades workers' exhibit a milder decline – probable consequences of automation and digital technologies replacing conventional administrative functions and industrial processes.

4.1.1.2. Labour supply forecasts

Labour supply forecasts are typically proxied by population projections. These include, for example, mostly JRC (Lutz et al., 2019) and Eurostat (2023) analyses. Both reach similar conclusions while using two different forecasting methodologies and slightly different scenarios. The JRC also adds projections on labour market participation based on modelling possible labour and social reforms. Different scenarios provide a range of potential demographic futures, helping policymakers understand the implications of a variety of demographic changes and develop strategies to address the associated socioeconomic challenges.

Based on JRC's work, the main results on working-age population and labour market participation for the EU, which extend up to 2060, are as follows:

- The working-age population (20-64) projection depends on the kind of scenario[4] considered in the forecasting methodology, and either a 'fertility of

[4] The different scenarios are better depicted in Table C1 in Annex C.

50 % scenario' or a 'high immigration scenario' provides a more optimistic outlook in terms of maintaining the workforce and mitigating the effects of an ageing population (see also **Table C2** in **Annex C**). More specifically:

- Under the *'Central' scenario*, the EU's population is expected to increase slightly to around 521 million by 2060, meaning a growth of about 2.5 %. However, the number of people of working age is expected to decrease because of the significant rise in the share of older adults (aged 65 and over), from 19 % to 32 %.
- Conversely, under the *'Zero International Migration (ZIM)' scenario*, the EU population would shrink by about 9 % by 2060 – bringing the population closer to its 1980s level. In this scenario, the number of working-age people would drop by nearly 30 %.
- A '*Significant Increase in Fertility (25 % increase)' scenario*, namely reaching the replacement fertility rate, can stabilise population size, but does not lead to substantial growth.
- Only under a *'High Increase in Fertility (50 % increase)' scenario* can the projected population decline be fully offset, although this scenario is less realistic (see **Table C1** in **Annex C** for more detailed data).
- Under a *'High Immigration' scenario*, while increased immigration first boosts the working-age population and helps offset the drop, migrants themselves age with time. Consequently, immigration does not permanently address the issue of an ageing population, even if it can stabilise the workforce size in the short to medium term. Therefore, the long-term demographic balance would still require sustained immigration or significant changes in fertility and participation rates to remain stable.

- **An approach relying on domestic policy changes rather than on immigration is the so-called *'Swedish' scenario***, which significantly stabilises the workforce by increasing participation rates among women and older adults, thereby reducing the dependency ratio.
- Furthermore, **longer, healthier working lives combined with higher productivity can make it possible for fewer workers to support a larger elderly population**. If workers become more productive, they can compensate for the reduced number of employees with the total economic output remaining stable or even increasing. This is possible by focusing on improving skills, education, and workplace efficiency.
- **The future EU labour force is projected to become smaller, yet more educated**. The number of people with low education levels is expected to shrink significantly, from 50.7 million to 14 million over the next four decades. This trend reflects a shift towards higher education and skills among younger generations.

Based on Eurostat data, the following is forecast for the working age population up to 2100[5]:

- **A relevant decline in the working-age population (15-64 years old)** to reach 54.4 % in 2100. This corresponds to a decrease of approximately 9.5 percentage points compared to the current level. Furthermore, the decline is expected to be continuous, reaching 56.6 % by 2060, followed by a decade-long plateau, and then a further decline until 2100[6].
- **An increasing dependency ratio**: as the working-age population declines, the old-age dependency ratio (number of elderly compared to working-age individuals) is expected to increase significantly. By 2100, there will be nearly two elderly persons for every three working-age individuals, indicating a growing economic burden on the labour force.
- **Migration is projected to be the only factor mitigating the decline in the working-age population to some extent**, as migrants often include a higher share of working-age individuals. Member States with positive net migration may experience a slower decline in the working-age population compared to those with negative migration trends.
- Based on alternative scenarios[7], the above-mentioned results may change, but **the higher migration scenario is the only one that results in a population increase by 2100 compared with the present.** The other scenarios (especially lower fertility and zero net migration) lead to a faster decline and ageing of the EU population. Cross-country heterogeneity is a factor to take into account as well. Indeed, Member States with traditionally higher immigration would be more affected by changes in migration assumptions.

4.1.1.3. Mismatches and shortages forecasts

At the EU27 level, labour and skills shortages are expected to affect a wide range of occupations across the skills spectrum by 2035 (Cedefop, 2025). Among the high-skilled occupations[8], 'Legal, social, and cultural professionals' have the greatest shortages, together with other associate professionals. High-level professionals are in great demand owing to employment growth and replacement needs. Associate

[5] Baseline scenario of the EUROPOP2023 projections.

[6] While Member States may present some heterogeneity, the general trend is that of experiencing a decrease in the share of the working-age population. The most significant decreases are projected for Malta, Luxembourg, Spain, Lithuania, and Slovakia. The smallest decrease is projected for Sweden, France, and Czechia.

[7] The different scenarios are better depicted in Table C1 in Annex C.

[8] ISCO major occupational categories: 1 (Managers), 2 (Professionals), and 3 (Associate professionals).

professionals have substantial employment growth, but lower replacement needs because of their younger age profile. Supply-demand mismatches in higher-level professions are relatively low. Future health professional shortages are anticipated because of significant job growth and high replacement demands, posing issues in filling positions. Personal service and care workers have the greatest labour shortage indices among skilled non-manual occupations. Low shortages are anticipated in most clerical positions, save for customer service clerks. Shortages are most prevalent in skilled manual occupations, particularly in the building sector, including trades workers (excluding electricians), assemblers, drivers, and mobile plant operators. At this level, the supply-demand imbalance becomes more pronounced because of lower-qualified people filling positions anticipated to be scarce.

Forecasted shortages are widespread **across all skill levels**:

- *Labour shortages* are anticipated for high-skilled (e.g. legal, social, cultural, health professionals), medium-skilled (e.g. service workers, shop and market sales workers), and low-skilled occupations (e.g. elementary occupations).
- For *high-skilled*, the primary factors contributing to shortages are employment growth and replacement requirements, but the imbalances between supply and demand are relatively low.
- For *medium- to low-skilled*, shortages are frequently caused by replacement requirements, particularly as workers retire or transition to other professions.
- For *low-skilled*, there may be a shortage caused by an over-qualification mismatch, in which more educated workers assume roles that do not completely leverage their skills.

The severity and nature of expected shortages exhibit substantial variation across Member States. Shortages are primarily concentrated in high-skill positions in countries such as Italy, Poland, Slovakia, and Czechia. In contrast, countries such as Ireland and Bulgaria are experiencing shortages in lower-skilled occupations. Certain countries, such as the Netherlands, Spain, and Greece, see shortages across the entire skills continuum. Country-specific economic structures, demographic trends, and local education systems significantly influence the prevalence of shortages. This suggests the necessity for targeted strategies to address skill mismatches and shortages, rather than implementing a uniform solution throughout the EU.

4.1.2. Selected Member State projections based on national data

Member State forecasts offer greater granularity, contextual specificity, and methodological variation (see **Annex D**). Some, including Belgium (Flanders), France, and Italy, conduct detailed sectoral and occupational projections using tailored economic models or alternative growth scenarios, while others have a

narrower focus (e.g. Finland on labour supply, Latvia on demand-supply alignment). National approaches often explore additional variables – such as age-specific mobility (Belgium), educational mismatches (Bulgaria), or skill foresight (Finland) – and tend to integrate regional disparities more explicitly. Some countries (France, Latvia) include scenarios based on digital or green transitions, while others (Italy, Bulgaria) emphasise demographic and migration dynamics. Time horizons also vary, ranging from 2030 (France) to 2050 or beyond (Italy, Finland).

In terms of results, there is broad alignment between EU and national forecasts regarding demographic challenges, the shift towards knowledge-intensive services, and the dominance of replacement demand. However, national forecasts provide richer nuance. For example, Belgium finds that young worker turnover outweighs retirement as a driver of replacement demand; France anticipates regional labour shortages in manual work; and Latvia projects surpluses in some education fields despite overall shortages. These findings highlight the importance of national institutional and demographic contexts in shaping labour market dynamics.

4.2. What do automation studies say?

The previous section examined efforts to predict future labour demand by identifying growing and declining occupations based on historical employment trends, i.e. through *forecasting*. This section takes a different approach. Rather than extrapolating from the past, it compares studies that estimate how technological change, particularly automation and AI, may transform occupations by assessing the *technological exposure of occupations*.

Since the seminal study by Frey and Osborne (2017), a growing body of research has emerged that estimates the exposure of occupations to automation, augmentation, or broader technological disruption, using a variety of data sources and methodological approaches. We selected **12 studies** for inclusion in our review of occupational exposure to technological change (see **Annex E**). The final selection consists of three studies by international institutions (ILO, OECD, and JRC), seven academic studies, and one collaborative effort between academic researchers and a private company (OpenAI). Of these, five were published in 2024, five between 2020 and 2023, and two prior to 2020.

4.2.1. How is occupational automation risk calculated?

Estimating the exposure of occupations to technological change typically requires two types of input data. *First*, we need to understand which tasks, skills or abilities occupations consist of. *Second*, we need to understand the capabilities of current technologies. Combining these two inputs involves a mapping process that links technological capabilities to occupational content, resulting in an exposure score for each occupation. Different studies make different choices in each of these steps.

This section compares how the twelve selected studies operationalise these components.

What do occupations consist of?

The 12 studies use different sources to identify occupational content and use different analytical levels applied in the calculations – tasks, skills, or abilities – (see **Annex E**). Our analysis reveals the following findings:

- **US-biased data sources**: the O*NET database (and its predecessor DOT) is by far the most frequently used source, underpinning 10 out of the 12 studies. These databases are compiled by the US Department of Labor and offer detailed job descriptions based on expert analysis and worker interviews. Only two studies rely primarily on international standard classifications such as ISCO-08 and NACE Rev.2. The uptake of specifically European sources remains limited: ESCO and EWCS data are included by only one study each.
- **No variation within occupations**: most studies rely on fixed job descriptions per occupation. Only one combines these with worker-level survey data, which would allow for capturing variation within occupations. Allowing for variation within occupations is important, as workers with the same job title may perform different tasks depending on the sector, firm, or national business context.
- **Dominance of task-level approaches**: most studies adopt a task-based approach to describe occupational content. That is, they assess technological exposure at the level of tasks or task-related constructs. Three studies instead focus on the occupational level as a whole, assigning an overall exposure score to each occupation based on its bundled task content. A minority of studies directly assess skills or abilities rather than tasks, which may capture more transferable aspects of work, but are further removed from the concrete processes of daily work activities.

What is technology capable of?

After having identified the content of occupations, the next step is to assess the capabilities of current technologies. Authors use different approaches to assess this potential and map it to occupational content (see **Tables E2 and E3** in **Annex E**). Our analysis reveals these key insights:

- **Patents, benchmarks or human/AI annotators:** half of the reviewed studies rely on annotators to directly evaluate the technological exposure of jobs or tasks, including domain experts (2 studies), crowd workers (1), large language models (LLM) (2), or a mix of human and LLM annotators (1). The other half use external indicators of technological progress, such as patent databases (3 studies) or algorithmic performance benchmarks (3).

- **Mapping technologies to occupations**: for patent-based studies, mapping is generally conducted through natural language processing techniques, such as measuring the semantic similarity between patent texts and job descriptions. For benchmark-based studies, mappings are made manually by technical experts or crowdsourced workers. Notably, while technical experts often bring deep knowledge of AI or robotics, they typically lack expertise in work organisation or job design.
- **Occupations as weighted averages of tasks**: some studies assign a score directly to each occupation, treating the job as a holistic bundle of tasks. More commonly, however, scores are assigned at the task or ability level and aggregated into an occupation-level measure. This is typically done using weighted averages, with weights based on the importance or prevalence of tasks in a given job. A few studies move beyond simple averages by incorporating measures of variance in task exposure or explicitly modelling the interdependence of task and their networked structures within jobs, allowing them to reflect complementarities and trade-offs between task types.

4.2.2. Main features of occupational automation scores

Based on the above methodological differences, the occupational exposure scores exhibit different features. The key characteristics of the reviewed scores differ along these lines (see **Table E4** in **Annex E**):

- **AI, generative AI or wider technological change**: the studies differ substantially in how they conceptualise technological change. Four studies include a broad range of technologies – such as robotics, software, and AI – while six focus more narrowly on AI or machine learning. Three studies specifically analyse the impact of generative AI (GenAI).
- **Fixed or varying technological capabilities**: only the studies using externally updated sources – patent data or AI benchmarks – can account for evolution in technological capabilities over time, allowing scores to be updated as technology advances. Among the six patent/benchmark-based studies, only three provide time-varying estimates of exposure. Studies relying on human or LLM annotation would need to re-label data periodically to reflect new technological developments.
- **Level of occupational detail**: most studies use granular 6- or 8-digit SOC codes, which are sufficiently detailed to be mapped to ISCO classifications. Some studies work directly with ISCO, often at the 3- or 4-digit level, depending on data availability and the scope of the analysis.
- **Exposure, automation or augmentation:** seven studies measure general exposure – whether the tasks in an occupation resemble tasks that technology can perform – without specifying whether the effect is complementary or substitutive. Two studies go further to estimate

automatability – the likelihood that a task can be fully automated. Three studies distinguish between automation and augmentation.

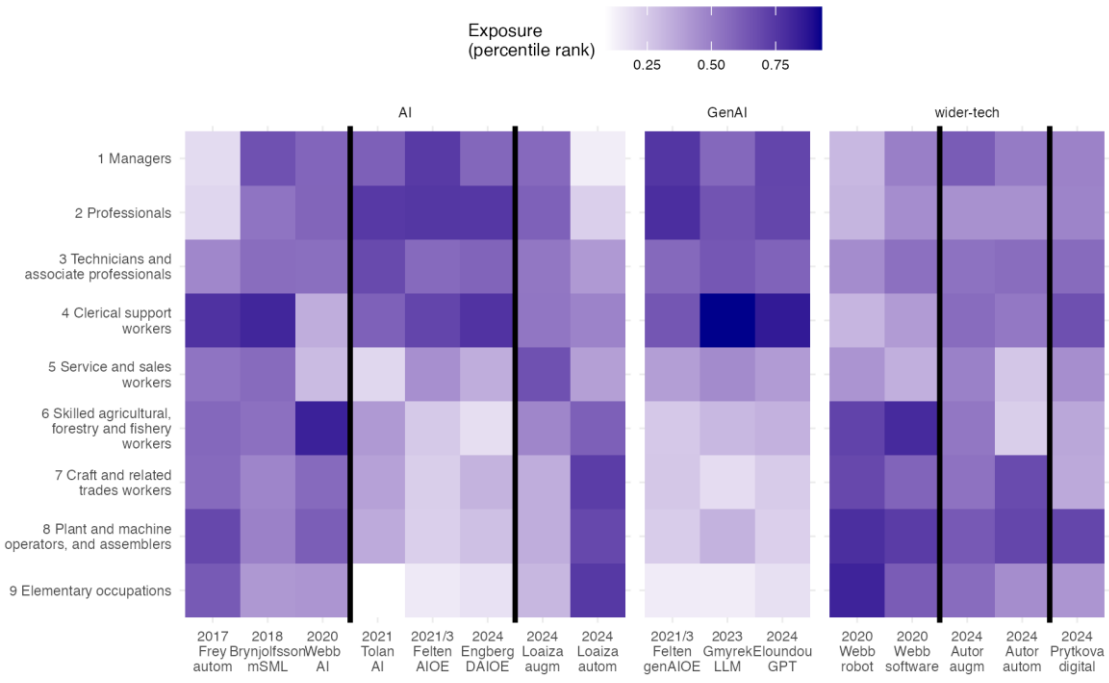
- **Independent or interdependent tasks**: most studies (9 out of 12) treat tasks or skills as independent analytical units, ignoring how they interact or are bundled in real work processes. Only one study explicitly models task interdependence, using pairwise co-occurrence data to identify constraints to task substitution. Two others implicitly account for task interdependence by labelling the occupation as a whole (and thus the whole task bundle) rather than individual tasks.

4.2.3. Which occupations are most exposed?

Given the substantial differences in how the exposure scores are constructed, it is not surprising that they yield divergent conclusions about which occupations are most affected by technological change. **Figure 3** provides an overview of the results by 1-digit ISCO occupation group (see 2-digit exposure in **Figure F1** in **Annex F**).

To make the scores comparable across studies, each one is converted to a *percentile rank* within its original distribution. **The colours in the figure thus reflect relative impact**: darker shades indicate occupations with higher exposure or risk according to that score, while lighter shades indicate lower exposure.

Figure 3. Exposure to technology by ISCO 1-digit occupation



Source: See full list of sources in Annex E.

Figure 3 shows distinct patterns by occupation and by type of technology:

AI exposure converges on high-skilled occupations: early studies up until 2020 showed considerable divergence in their assessments, but from 2021 onwards, a consensus began to form around the finding that AI primarily affects higher-skilled occupations. Specifically, exposure is concentrated in ISCO groups 1-4, which include managers, professionals, technicians, and clerical support workers. A notable exception is the recent study by Loaiza and Rigobon (2024), which distinguishes between automation and augmentation: they also find the highest *augmentation* potential among high-skilled jobs, but *automation* potential is more pronounced in low-skilled occupations.

GenAI exposure even higher for clerical support: from 2023, several studies have focused specifically on GenAI. These studies broadly confirm the earlier AI consensus, namely that exposure to GenAI is highest among mid- and high-skilled occupations, particularly clerical support workers, but also professionals and managers. This suggests that GenAI capabilities, such as text and image generation, align closely with the tasks performed in these roles.

Wider technological exposure impacting low-skilled occupations: importantly, (Gen)AI is only one type of technology. Studies that consider a wider range of technologies – such as robotics, software, and automation tools – tend to find greater exposure among lower-skilled, manual occupations. These include plant and machine operators, craft and trade workers, and elementary occupations. When the focus is on augmentation or general exposure (rather than automation), the effects appear more evenly distributed across occupational groups. For example, Prytkova et al. (2024), which considers 40 distinct technologies, identifies peak exposure among both clerical support workers and machine operators – reflecting the dual trend of cognitive and manual routine task automation.

Further correlational analyses (**Figure F2** in **Annex F**) reveal that **GenAI exposure scores are remarkably consistent across studies**, with the three GenAI-focused scores showing strong mutual correlations and forming a clear cluster. These scores also align closely with recent general AI exposure scores, indicating a growing consensus on which occupations are most affected by AI and GenAI. However, these newer studies diverge significantly from older ones, such as those by Frey and Osborne and by Brynjolfsson, Mitchell, and Rock, reflecting shifts in both technology and methodology. Finally, **broader technological change tells a different story**: exposure to robotics and software (Webb, 2020) is negatively correlated with GenAI scores, and the comprehensive multi-technology studies by Autor et al. and Prytkova et al. show low correlation with any single-tech scores, indicating that broader technological exposure follows a distinct occupational pattern.

As a last step, we contrast findings from the two studies that estimate both automation and augmentation potential by occupation in **Figure F3** (**Annex F**). Autor et al. (2024) find a **positive correlation** between automation and augmentation, suggesting that the same occupations may be both automatable and

augmentable, depending on the technology applied. In contrast, Loaiza and Rigobon (2024) observe a **negative correlation**: occupations at high risk of AI-driven automation tend not to be the ones where AI offers augmentation potential. *These contrasting results highlight the need to understand how scores define automation and augmentation, as different concepts lead to different conclusions.*

4.2.4. Exposure of sectors, regions and workers

We now analyse how technological exposure varies across sectors, regions, and demographic groups, by applying occupational exposure scores to employment data from the EU Labour Force Survey (EU-LFS).

To improve the legibility of the figures without losing analytical depth, we limit the number of scores in this analysis. Selection is based on the correlation patterns discussed in the previous section, prioritising recent, representative, and methodologically diverse scores. For the sectoral and demographic analysis, we retain the following:

- **AI**: Tolan et al. (2021), Felten, Raj, and Seamans (2021), Engberg et al. (2024), and Loaiza and Rigobon (2024);
- **GenAI**: Felten, Raj, and Seamans (2023), Gmyrek, Berg, and Bescond (2023), and Eloundou et al. (2024);
- **Wider technological change**: Webb (2020), Autor et al. (2024) and Prytkova (2024).

4.2.4.1. Exposure of sectors

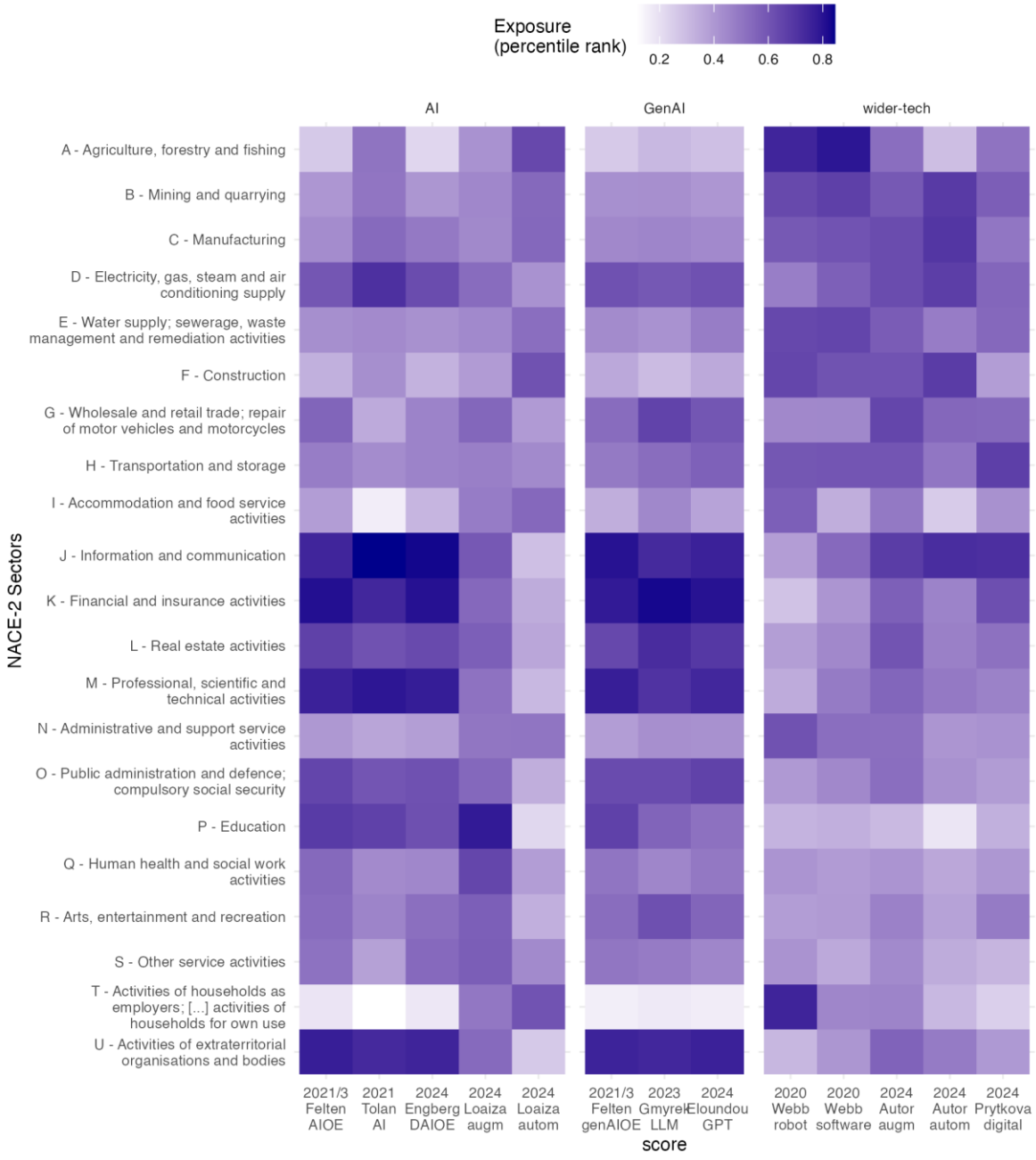
Figure 4E.

 shows distinct sectoral patterns in the exposure to AI and GenAI (through their occupational composition). The impact of these technologies appears most concentrated in **knowledge-intensive sectors** such as information and communication (J), financial services (K), and professional, scientific and technical activities (M). This aligns with findings from task-based research suggesting that AI and GenAI are particularly suited to cognitive and information-processing tasks.

However, a broader perspective reveals that **few sectors are entirely shielded** from technological transformation. While the primary and secondary sectors (A through F), and especially agriculture, are relatively less exposed to AI and GenAI, they display significantly higher exposure to other technologies, such as robotics and software-based tools. Conversely, public administration, education, and health (O, P, Q) – typically less affected by mechanisation – show notable exposure to AI-driven technologies, reflecting their reliance on structured cognitive work and information handling.

These patterns suggest that different technologies impact different areas of work. Whereas GenAI may displace tasks linked to information synthesis, documentation, and decision-making, broader automation technologies tend to affect routine manual work in manufacturing, agriculture, and construction. The analysis reinforces an important caveat: **results based on a single technology cannot be generalised to the entire labour market**. Technological change is heterogeneous, and different waves of innovation may target different tasks, occupations, and sectors.

Figure 4. Exposure to technology by NACE Rev2 1-digit sector



Source: See full list of sources in Annex E.

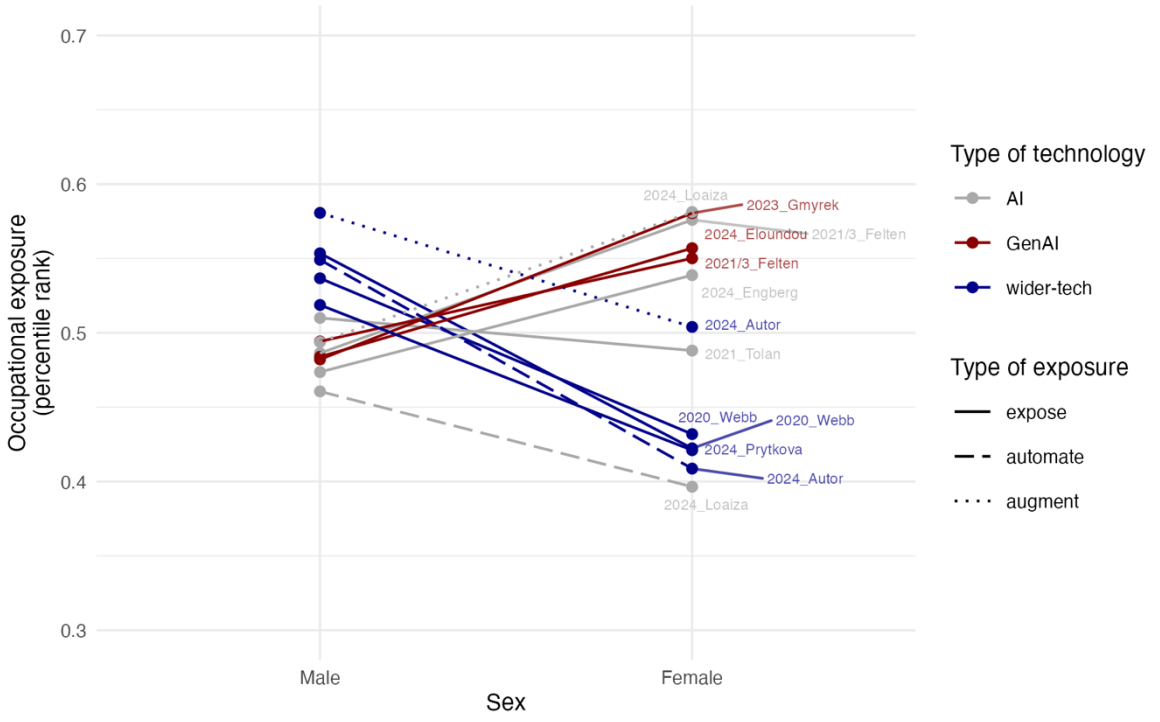
4.2.4.2. Exposure by gender, age and education

A similar pattern is visible when comparing exposure across demographic groups: the nature and extent of occupational exposure varies significantly depending on the type of technology under consideration.

Reading guide: In the following graphs, the **colour** reflects the type of technology (grey for AI, red for GenAI and blue for wider range of technologies) and the **line type** reflects the type of exposure (dashed for automation, dotted for augmentation and solid for mere exposure).

- *Automation* refers to the potential for technology to fully or partially replace human tasks, removing the need for human involvement;
- *Augmentation* captures how technology might complement human work by enhancing productivity or enabling new capabilities without substituting the worker;
- *Exposure* is a broader concept that indicates whether a job is likely to be affected by technology, without specifying whether the effect is substitutive or complementary.

Figure 5. Occupational exposure by gender



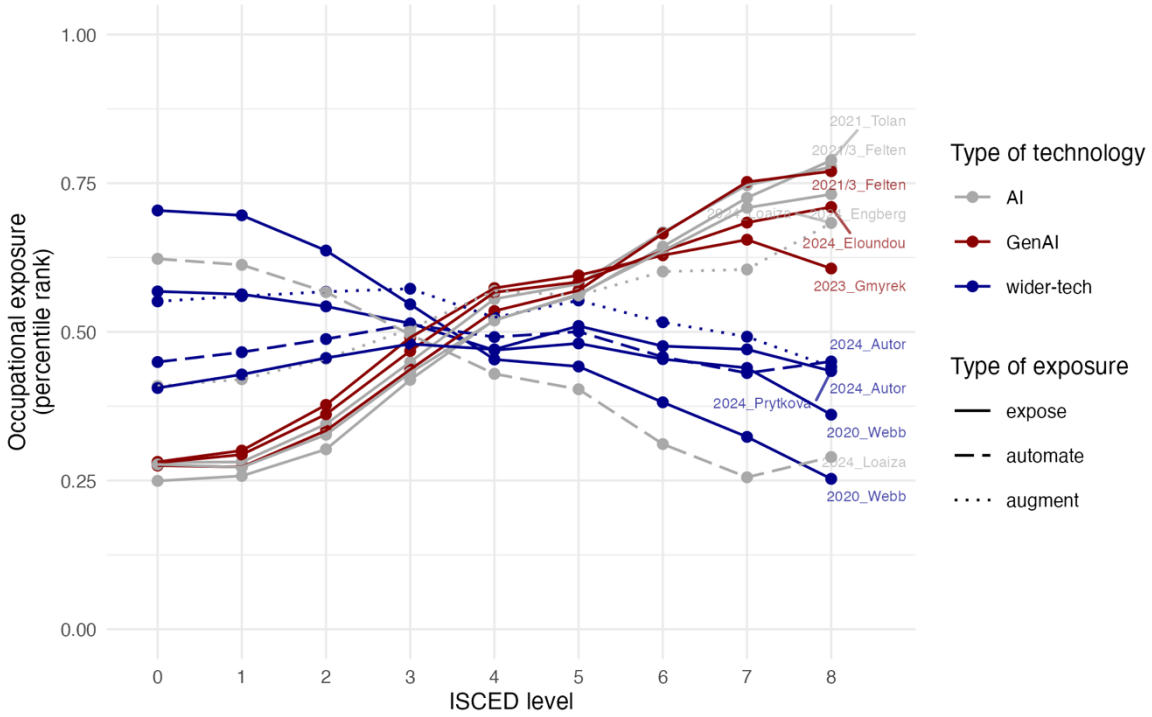
Source: See full list of sources in Annex E.

Figure 5 shows occupational exposure to technological change **by gender**. Two clear patterns emerge. First, **women appear more exposed to GenAI** across all three GenAI studies. Second, **men appear more exposed to broader technological change** in studies covering robotisation, software, or multiple digital technologies beyond AI.

For general AI, the picture is more mixed. Exposure scores for men and women vary noticeably across studies, and no consistent pattern emerges. The same is true when comparing the type of exposure (automation vs augmentation): studies differ on whether men or women are more exposed, with no clear directionality across the literature.

These trends are driven by gendered occupational segregation. Men are more likely to work in manual or industrial occupations and sectors such as construction, manufacturing, or transport, which are more exposed to robotics and other forms of physical automation. In contrast, women are more concentrated in occupations and sectors such as health, education, and administration, where non-routine cognitive tasks dominate and exposure to GenAI is higher. As the technological domains target different task types, the exposure scores reflect these underlying labour market patterns.

Figure 6. Occupational exposure by education



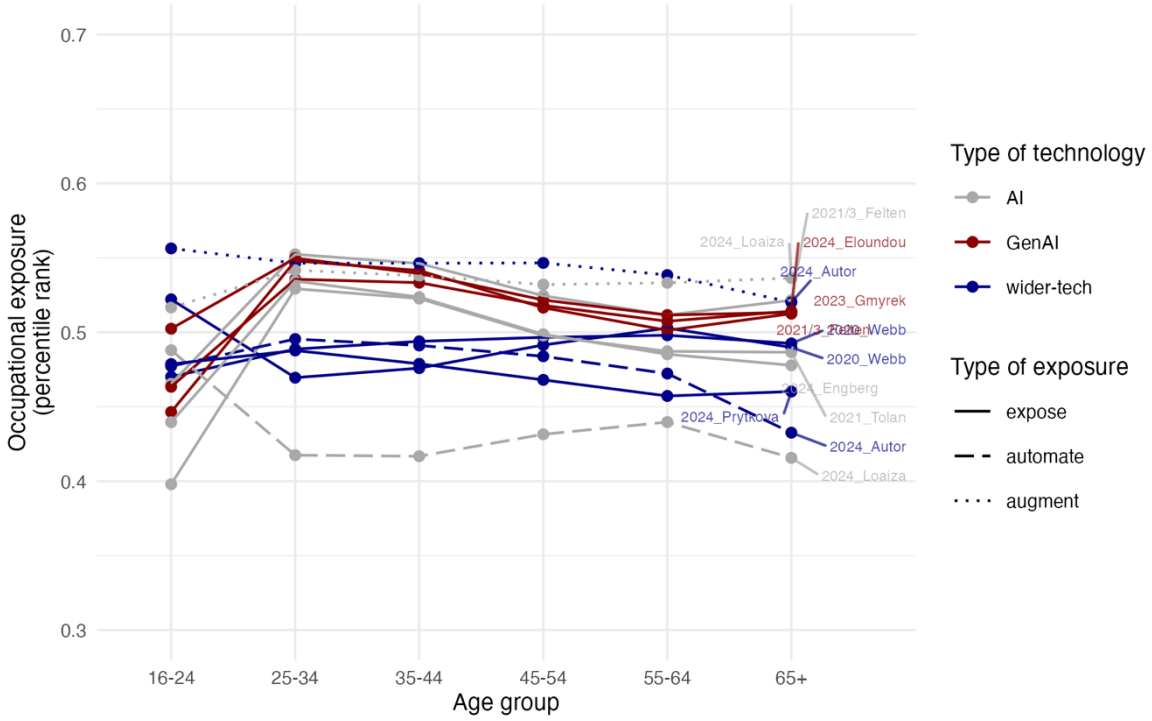
Source: See full list of sources in Annex E.

Figure 6 displays occupational exposure to technology **by education level**, measured using the ISCED classification. Distinct patterns emerge depending on the type of technology. **Exposure to GenAI increases steadily with education**, with higher exposure concentrated among workers with tertiary education, reflecting the more cognitive nature of their work.

By contrast, **exposure to a broader set of (automation) technologies is generally higher among lower-educated workers**, reflecting the more manual nature of their work, though this finding varies across studies.

Exposure of workers to AI also tends to increase with education, largely following the same pattern as GenAI. One notable exception is again the study by Loaiza and Rigobon (2024), which shows lower automation exposure among more educated workers. In their methodology, high skilled workers perform tasks in which AI is still flawed, thus leading to low automation risk and high augmentation potential.

Figure 7. Occupational exposure by age



Source: See full list of sources in Annex E.

Figure 7 Figure 6 displays occupational exposure to technology **by age group**. Overall, **age-related differences in exposure are relatively small**, especially when compared with the patterns observed for gender and education. However, some subtle trends can be observed depending on the type of technology considered.

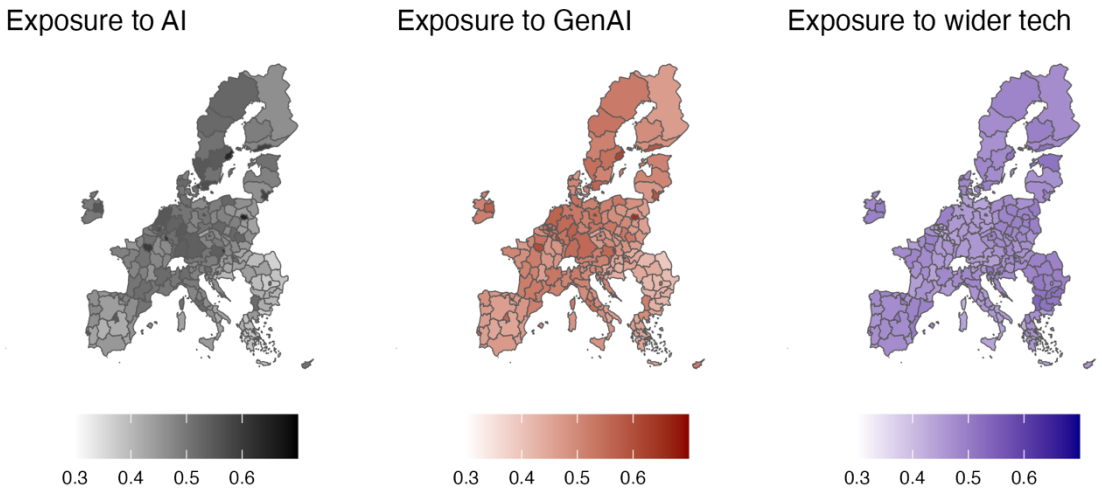
Exposure to both AI and GenAI appears slightly higher among workers aged 25 to 44, with a small decline in older age groups. In contrast, exposure to wider technological change shows a more stable pattern across age groups, with a slight downward trend for older workers. It is worth noting that these results reflect the occupational structure of each age group (i.e. mid- to high-skilled cognitive roles in administration, education, and professional services), rather than direct interaction of these workers with technology.

4.2.4.3. Geographical patterns

For the **geographical analysis**, we retain one representative score per category to plot exposure on the European map:

- **For AI**, we selected *Engberg et al. (2024)*, a recent and unidimensional exposure measure based on a broad set of AI subdomains;
- **For GenAI**, we used *Eloundou et al. (2024)*, a widely cited and up-to-date study offering occupational exposure to large language models;
- **For wider technological change**, we included *Prytkova et al. (2024)*, which captures exposure across 40 digital technologies which we aggregate into a single metric.

Figure 8. Occupational exposure by region



Source: Engberg et al. (2024), Eloundou et al. (2024) and Prytkova et al. (2024). See full list of sources in Annex E.

The maps in **Figure 8** (see larger versions in **Annex F, Figures F4 to F6**) show regional patterns of technological exposure across Europe, reflecting the different occupational and sectoral structures of their labour markets. Several distinct patterns emerge:

- ***Exposure to AI and GenAI show a clear North-West vs South-East divide***. Nordic countries, Benelux, and parts of Germany and France exhibit the highest levels of exposure, reflecting the higher prevalence of white-collar, knowledge-intensive employment. By contrast, much of southern and eastern Europe, including Portugal, Spain, Greece, Bulgaria, and parts of Poland and Romania, show lower relative exposure, likely because of occupational structures more focused on manual or routine tasks. Higher exposure can also be detected in urbanised and innovation-intensive areas, such as capital regions in western Europe (e.g. Paris, Stockholm, Berlin, Madrid).

- ***Exposure to wider technological change reveals a distinctly different pattern*.** Notably, the dispersion of the scores is narrower, with most regions falling within the 0.4-0.55 range – compared with the broader 0.3-0.7 range for (Gen)AI. Highest exposure is observed in parts of central and eastern Europe (including the Czech Republic, Slovakia, and parts of Poland and Hungary) as well as some southern countries. This suggests a concentration of jobs exposed to automation via industrial technologies (e.g. robotics, software), often tied to manufacturing-intensive regions.

4.2.5. Main takeaways on occupational automation risk

This section reviewed and compared twelve prominent occupational exposure scores that estimate the impact of technological change on different types of work. These scores vary substantially in their construction, reflecting different methodological choices in how occupational content is described, how technological potential is measured, and how the two are linked.

Methodologically, most studies draw on the **US-based O*NET database** for occupational content, though some include international sources such as ISCO or ESCO. The vast majority rely on fixed **expert-assessed job descriptions**, while only a few allow for within-occupation variation through worker surveys. Technological potential is either assessed directly by human annotators (experts, crowds, or LLMs) or inferred from external sources such as patents or AI performance benchmarks. The latter approach allows for exogenous variation in technological progress over time, as demonstrated by the **dynamic indicators** of Autor et al (2024), Engberg et al (2024) and Prytkova et al (2024). Only one study, by Loaiza and Rigobon (2024) explicitly models **task interdependence**, though this is a crucial determinant of how technology reshapes occupations. The scores differ in scope – some focus on general AI, others on GenAI, and a few on a broader set of technologies, including robotics and software. Some scores aim to capture exposure in general, while others distinguish between automation (replacement) and augmentation (complementarity). These conceptual and methodological choices lead to notable differences in outcomes of exposure studies.

Despite these differences, patterns begin to emerge when the scores are grouped by technology type. **GenAI scores consistently show higher exposure for middle to high-skilled occupations** in clerical, professional, and managerial roles. In contrast, plant operators, machine assemblers, and skilled manual trades, i.e. **low-skilled occupations, are more exposed to wider technological change**. When applied to EU-LFS employment data, these differences manifest in distinctive sectoral, demographic, and regional patterns. Women and more highly educated workers are more exposed to GenAI, while men and less-educated workers are more exposed to broader automation technologies. AI and GenAI exposure is concentrated in more urbanised, high-income, service-oriented regions, while broader-technology exposure is more prominent in manufacturing-intensive areas, often in central and eastern Europe. These patterns highlight the importance of

differentiating between types of technology and methodologies when interpreting occupational exposure scores.

4.3. Do labour market forecasts and automation scores agree?

Comparing labour market forecasts with occupational exposure studies reveals several noteworthy patterns. First, while **clerical occupations** are only projected to experience a mild decline, clerical workers are among the most exposed to AI and GenAI, and their core tasks (e.g. routine cognitive activities) are among the most automatable. This suggests that the relatively modest forecasted decrease may underestimate the potential displacement risks from AI and GenAI, particularly in roles with high incidence of automatable tasks.

Conversely, strong growth is forecasted for **ICT professions**, despite these also being among the most exposed to AI. This reflects the role of AI as both a productivity-enhancing tool and a driver of increased demand for digital services and infrastructure. GenAI-driven productivity increases in software development could lower prices and increase demand, which in turn can drive up labour demand (rather than reducing it) for ICT professionals.

A similar dynamic appears to hold more widely for **professionals and technicians**, whose numbers are also expected to rise despite relatively high exposure levels. In this case, AI may be complementing rather than substituting their skills, shifting task profiles but not necessarily reducing demand, at least in the short run. However, since input data for forecasting models is always delayed to some extent, these forecasts may not yet capture the full impact of the newest AI developments.

Health and social care occupations are also expected to grow significantly, even though the health sector appears among those with higher AI exposure. This suggests a likely segmentation between automatable administrative functions and less automatable interpersonal or procedural tasks, which continue to require human presence and judgement.

Mild projected increases in **plant and machine operator** roles contrast with their higher exposure to broader forms of technological change. This points to ongoing shifts in industrial production processes – such as increased automation or the adoption of advanced manufacturing technologies – that may require upskilling but do not necessarily reduce overall employment levels in these occupations. Finally, projected declines in agricultural work are fully in line with their high exposure to wider automation technologies.

5. Insights from experts: emerging labour markets and social inclusion challenges in the EU

The previous chapter compared quantitative forecasts of future labour market trends. As already hinted at above, while these approaches offer valuable insights into potential future trends, their in-built assumptions are a source of limitations, particularly in relation to the role of political, organisational, and societal changes in shaping labour market outcomes. Against this backdrop, this chapter complements the quantitative insights with a qualitative analysis of interviews with a number of academic and non-academic experts. Expert interviews are a particularly well-suited methodological tool to identify plausible future scenarios and trajectories, since experts are able to draw on and synthesise historical patterns, emerging signals, and systemic interdependencies. Experts across labour economics, sociology, political science, and demography were interviewed for this study in order to capture multidisciplinary perspectives essential for understanding future challenges in European societies (see **Annex G**).

The goal is to gather a deeper understanding of the impact of the key drivers of change, as well as on the way political and societal shifts and policies interact with these megatrends. More particularly, the primary objectives of the interviews are to: a) pinpoint and explore in more depth the **future megatrends**; b) examine the distinct pathways through which these drivers influence **labour market developments and social inclusion**; c) help identify potential **interdependencies and feedback loops**; and, therefore, d) facilitate a nuanced understanding of **challenges** to a social and inclusive Europe.

The next section briefly sheds light on the importance of political factors and policy choices in shaping impacts and challenges, while the subsequent sections present the key insights from the interviews around the main areas impacted by the drivers of change: labour market (job quantity and job quality) and social inclusion. The final section summarises insights on interactions between drivers and secondary effects.

5.1. Why political factors and policy choices matter

Before delving into the impacts of the key drivers of change on labour markets and social inclusion, one broader consideration emerging from the interviews deserves attention. All the interviewed experts – either directly or indirectly – argue that both the impacts of the drivers of change and the drivers of change themselves are shaped by political and economic factors, power relations, institutions, and policy choices. This point emerges, for instance, when experts discuss how demographic change or the green transition affect job quality or essential and enabling services. One expert equally notes that ‘even non-response as a policy also has its own impact’, highlighting that inaction can itself be a political and policy choice.

A social policy expert reinforces this by comparing current debates on impacts of megatrends with earlier debates about how globalisation and technological change contributed to inequality:

> **…if there's one big message I think I want to convey today is that still institutions and policies matter a lot. So if you try to trace back in those countries where you did see a big increase in inequality […] that had more to do with institutional change and policy change than with these kinds of exogenous universal trends like technological change, globalisation and so on. […] And of course, all these trends […] are, real, real trends and having a real, real impact. But how institutions respond to that is of the essence that is in many ways the crux of the matter.**

Similarly, as reported below, one future of work expert emphasises that the impact of AI will be shaped not only by its ownership, control, development, and governance, but also by the broader political-economic context and existing inequalities influencing its emergence and deployment.

Hence, the key takeaway from these reflections is that the megatrends identified in this study should not be seen as unfolding in a vacuum. While in some cases (such as climate change or population ageing) political choices and policies may have limited influence on the drivers of change in the short to medium term, in others, policy interventions are likely to shape the drivers themselves as much as respond to their impacts (see also section 2.1). Moreover, the impacts of these drivers will vary depending on political factors, institutions, and policies, highlighting the fact that policy interventions can actively shape outcomes upstream and should not only be regarded as passive responses in reaction to external forces.

5.2. What impacts can we expect on the labour market?

5.2.1. Job quantity: jobs and skills

Technological change[9] and AI are expected by the interviewed experts to have a differentiated impact on employment across skill levels, regions, sectors, and demographic groups – thereby confirming the findings of the analysis of existing sources (section 3.1) and the occupational automation risk scores (section 4.2). Although there is consensus that AI will not lead to widespread job losses and may even contribute to net job creation, the automation potential of certain occupations is still subject to debate. For some, AI is likely to continue the trend in skill-biased technical change, predominantly benefiting higher-skilled workers while, at the

[9] The impacts of organisational change are not treated separately in this chapter, as experts on technology and future of work largely considered this driver to be intertwined with (and not easily discernible from) technological change.

same time, changing the task content of their jobs. According to a future of work expert, this is likely to drive a wedge between higher-skilled and lower-skilled workers:

> **Mostly it's high-skilled people who will be exposed to AI technologies. And I don't think their jobs will disappear. I think their jobs will change significantly. […] Mostly, not all, but mostly high-skilled people will benefit from AI technologies. And I think low-skilled people still are at risk of automation much more than others. So I expect, again, like most technologies, increasing gaps appearing between low-and high-skilled workers.**

Administrative, clerical and office support roles, which are more frequently occupied by women, are said to be particularly exposed to automation driven by AI, especially GenAI. In particular, as confirmed by a future of work expert, the impact of AI and technological change on gender is 'a complex story', as men and women are 'similarly exposed to AI', while men are traditionally over-represented in occupations at higher risk of automation beyond AI – again confirming the quantitative findings in section 4.2. In terms of skills, administrative and clerical occupations may not completely disappear, but demand for related skills – such as project management, budgeting, accounting, and word processing – could decline. One expert also shares concerns about the 'dehumanisation' potential of AI, which is sometimes found to reduce demand for social and emotional skills.

However, opportunities are also highlighted on the side of labour supply, particularly when it comes to AI's potential to facilitate labour market participation for people with disabilities and extend 'working lives by making jobs better and easier and more enjoyable' (see section 5.4).

Nonetheless, one crucial point made by one expert is that AI's actual impact will broadly depend on its development model. More particularly, if AI's ownership is distributed and its development open source, it could enable a 'simultaneous cognitive upgrade' of all workers and shared benefits. However, if turned into a corporate asset and controlled by few corporations, it could lead to a devaluation of expert skills, labour replacement, and rising inequalities.

Environmental change is also widely expected to impact labour market and employment levels. Investment in renewable energy, adaptation of built environment, and circular economy is seen by some as having positive employment effects. However, others warn that the net employment effect may be negative or that the new jobs will be difficult to fill, leading to shortages. Social policy and green transition experts converge in highlighting the negative impact on employment of the green transition in carbon-intensive regions and industries. One expert points out that even industrial reconversion may not be enough to reabsorb displaced workers, as 'green' production (e.g. electric vehicles) is expected to be less labour-intensive. Additionally, the importance of considering negative employment effects in supply chains and satellite industries and services was also emphasised. These

effects will be particularly acute if the transition is not accompanied by *both* reskilling initiatives and creation of new jobs tailored to the skill profiles of displaced workers:

> **We need to think, OK, these businesses like mining, for example, are going to disappear. […] we cannot expect that these people will abandon their places and will go somewhere else. Now we need to think how we bring the investor that can absorb these types of skills. With maybe some retraining, some upgrading. […] I often use this image of a limping horse, which is trying to catch up with demand on the labour market. It would be naive. We need to think also in terms of which skills are there, how we create jobs for them.**

The gendered impact of the green transition is also confirmed as a concern, with women likely to benefit less from new job opportunities (because of persistent gender gaps in STEM and technical roles) and potentially being more exposed to job losses. However, one expert expresses confidence that the expansion of the circular economy could generate employment opportunities for women. Young workers, by contrast, are expected to benefit from job creation associated with both the green and digital transitions. Finally, some experts note that climate change itself may affect labour supply, as environmental disruptions could drive migration from regions outside Europe, thereby impacting local labour markets in receiving countries.

Geopolitical developments are also viewed as potential drivers of change in labour markets, particularly through their influence on investment and trade policies. All interviews were conducted in a context marked by rising geopolitical tensions and in the wake of the European Commission's proposal for a *ReArm Europe Plan* and a new financial instrument to support increased defence spending (European Commission, 2025c), followed by the publication of a *White Paper for European Defence – Readiness 2030* (European Commission, 2025d). At the same time, an escalation of protectionist measures in the US after the election of President Donald Trump featured prominently in public debates.

In this context, one expert anticipates that rising defence expenditure could generate new manufacturing employment, particularly in heavy industry and related sectors. Moreover, potential de-globalising trends could redirect investment and job creation towards strategic sectors, such as semiconductor production. However, another expert warns that these shifts may also result in job losses in other sectors, such as pharmaceuticals, while broader economic downturns triggered by trade disruptions may erode investor confidence and further reinforce negative employment trends.

Finally, **demographic change** is viewed by virtually all experts interviewed as a major driver of change for labour supply and, to a lesser extent, labour demand. The most immediate effect of ***low fertility rates and ageing*** in European societies is the likely decrease of the working-age population. Most experts confirm that, even accounting for the most optimistic forecasts in migration inflows, these are unlikely to fully offset the decline in labour supply due to low fertility and ageing (see section 4.1). Another likely effect of population ageing is a rise in demand for care work,

increasing reliance on both formal and informal care. The latter, which is often performed by undocumented migrant workers, also raises concerns about job quality and working conditions (see below).

Although the direction of future ***migration*** policies is uncertain, given the recent political shifts in many EU countries, the share of migrant workers in EU labour markets is expected to increase in the coming decade – partly fuelled by increased demand in care sectors (where migrant workers are often over-represented) and possible labour shortages. Experts point out that both intra-EU mobility (including via posting of workers) and non-EU migration (including via family reunifications) could increase in coming years. While rising migration can benefit EU economies and labour markets, some emphasise a) the importance of adequately managing these shifts and helping migrants develop the skills (including language skills) needed to enter the labour market; and b) the risk of workforce and brain drain in the countries of origin. Furthermore, one expert argues that the need to tackle shortages can also provide opportunities to increase labour participation and employment rates among the existing migrant population and second generations:

> **…that, of course, […] also means that workplaces are becoming more diverse. […] So, there may also be a change in mentality, there may be a change in perceptions, in people's attitudes. […] You have to be well aware that there's already a lot of migration in Europe and that there is a lot of untapped potential there. That if people get proper schooling and luckily, if you look at universities and higher education, […] they are becoming more diverse at a rapid pace. That's a very good thing.**

5.2.2. Job quality

As with reflections on the future impact of **technological change** on job quantity, experts in this field view AI ownership, development, and governance as significant factors shaping its impact on job quality. For instance, if ownership is distributed and the tools are widely accessible and developed in an open manner, the benefits for job quality (especially in terms of automation of routine tasks and augmentation of human capabilities) are likely to largely outweigh the risks. However, if AI is treated as a corporate asset and a form of capital, its use (especially in AM tools) is more likely to pose risks related to workplace surveillance, privacy, autonomy, and increased work intensity.

> **…using AI systems […] controlled by employers or […] a few big corporations globally […] necessarily implies a reduction of [workers'] autonomy […] because these are systems that can themselves implement functions of management... It's a reduction in terms of privacy, […] [but] it's probably [also] a dis-improvement in terms of intensity of work, because this increase in efficiency implies that probably the systems will force you to work more intensively...**

Deskilling can occur in some occupations but is not expected to be widespread. A labour market expert equally recalls that, in creative industries, AI-generated content raises concerns about copyright infringement and income loss for creative workers. All these risks are compounded by the potential negative effects of AI and AM on industrial relations. One interviewee emphasises the beneficial effect of social dialogue on AI adoption in the workplace, while, at the same time, recognising that the threat of automation and extensive workers' data collection can shift the balance of bargaining power in favour of employers.

On the opportunity side, AI can enhance work efficiency and improve health and safety by automating dangerous and physically demanding tasks. Moreover, one interviewee argues that AI is expected to create more high-skilled jobs, which tend to offer better working conditions, while another notes that productivity gains can be translated into a reduction in working hours. There is also agreement that AI can automate routine tasks. However, as occurred with past waves of technological innovation, increased routinisation through standardisation and reliance on performance metrics is also a possibility. Furthermore, the intersection of technological and organisational change may potentially lead to centralisation of power within management structures in the workplace, even though alternative scenarios of more flexible and horizontal work organisation remain possible.

When it comes to **environmental change**, its impact is again said to largely depend on policy design, employer responsibility, and the incidence of social dialogue. A green transition expert argues that jobs in green sectors or in the circular economy often are low-paid and lack adequate occupational health and safety standards. Sectors such as recycling and construction expose workers to hazardous substances, particularly when protective equipment is not adequately provided. Moreover, the risks related to the sectoral transitions are exacerbated by the risks posed by climate change itself. For instance, rising temperatures are said to increase heat stress, especially in certain countries and regions.

Some socio-demographic groups are more likely to suffer from these adverse effects than others. In particular, those with lower educational attainments and migrants can be more likely to be employed in precarious jobs in green sectors and industries, which may in turn exacerbate inequalities. Additionally, if these jobs remain unattractive to native workers, they may be increasingly filled by migrants and posted workers, who will be left bearing the brunt of poor working conditions. Finally, the expert highlights that loss of employment among main breadwinners may drive other household members (usually women) into the labour market under precarious conditions:

> **…the primary and the major sectoral impacts […] will also, I think, generate other, […] secondary effects for the family members or their social entourage… Like if the main breadwinner is losing the job […] maybe the other person in the household will be obliged to participate in the labour force. […] But […] because maybe they have not been in the job market […] for a long time, and […] because of need or emergency, […] oftentimes the working conditions [they find] are quite poor. And [we are often] talking about women who have to step in to support the household.**

In terms of **demographic changes**, implications for job quality can potentially arise by delaying the retirement age in response to population ***ageing***. Some experts point out that people are generally healthier for longer and that extended working lives can even have beneficial effects on their social inclusion and subjective wellbeing. But another expert challenges this point, noting how longer careers may lead to increased health issues, such as musculoskeletal disorders and chronic illnesses. In the latter case, disruptions in labour markets and work organisation may arise as a secondary effect of prolonged absences, while healthcare systems may face additional pressure.

As people age, as people live longer lives, there's a higher probability that they will fall sick at some point in their lives. And most of the time, this illness […] is a chronic illness of a long-term nature. […] People live longer, but do they live longer in a healthy way? Not really, because these healthy life years are also decreasing a bit with all these diseases.

Migration trends can also have implications, with significant gaps in job quality and wages likely to persist between migrant and native workers. A hierarchical structure is said to exist, with native workers generally having better job conditions than EU migrants, who in turn fare better than non-EU workers.

5.3. What impacts can we expect on social inclusion?

Technological change and AI adoption can have mixed impacts on social inclusion and on essential and enabling services. On the one hand, according to a future of work expert, AI can facilitate access to job opportunities and improve workplace participation for people with disabilities, mitigate discrimination (if biases are properly checked and addressed), and strengthen education systems and vocational training, especially for those with learning difficulties. Additionally, AI-driven advances in areas such as diagnostics and treatment can improve healthcare services. On the other hand, reliance on AI for decision-making in social policies can have drawbacks, with automated benefit allocation and algorithmic profiling for fraud detection leading to exclusionary practices if not properly regulated:

There are plenty of ways in which AI presents huge risks when you are deciding on outcomes for people in an automated way. […] But hopefully, I think we're understanding what the risks are and we're understanding better what people's rights should be. […] Because there are benefits there. And we all know that we are coping with a lack of resources and challenges in that area. So we will need some element of automation in all this. The question is how far do we go in all this and how do we make sure that we minimise the risks?

It is also argued that technological advancements can indirectly create more space for income redistribution by boosting productivity and creating opportunities for

reinvestment in the economy – on condition that tax systems are aligned with this objective.

The transition to a green economy prompted by **environmental change** is said to carry a number of risks for income inequality, particularly if mitigation policies disproportionately affect lower-income households. Without adequate buffers, rising energy costs and structural shifts in carbon-intensive industries may worsen poverty and exclusion. Absent policy changes, the financial demands of the green transition risk coming at the expense of social spending precisely when vulnerable populations require increased support. Energy poverty and social exclusion may intensify if impacts on lower-income groups are not cushioned.

> **The impact on social protection will be immense because, on the one hand, the cost related to climate change and policies […] for rich countries […] will put pressure on social spending. […] And on the other hand, the need for social protection will increase because households, poor households, low-middle class households, do not have the capacity to invest in electric cars, in solar panels, etc. So they need support. They need subsidies. So there is a pressure on the budget and at the same time, increasing needs for social protection and […] to raise the bottom.**

Additionally, climate change itself poses direct threats to essential public services such as healthcare and education infrastructure, particularly in regions prone to extreme weather events. This impact will likely be unevenly distributed, with certain groups (including women, older individuals, ethnic minorities, and people with disabilities) being more exposed to adverse effects. According to one interviewee, addressing these disparities requires an intersectional approach that considers the cumulation and amplification of vulnerabilities, such as those faced by migrant women with weak ties to the labour market and who could be disproportionately affected by rising living costs.

Most experts agree that rising **geopolitical** tensions could also lead to a diversion of public resources towards defence spending, placing further pressure on social expenditure, potentially impacting availability of services. One interviewee also points out that, in times of budgetary constraints, education funding is often the first to be reduced, while, at company level, spending on human resource development is often the first victim. While some stress the necessity to frame investments in social policies as complementary to national security, others point to the increasing reliance on the social economy and third-sector organisations to fill service provision gaps, leading to a more community-driven model of social support.

Finally, social policy and labour mobility experts confirm that the possible net effects of **demographic change** on poverty and social inclusion are complex to grasp. An ***ageing population and declining fertility rates*** are said to pose challenges for pension systems, with large projected increases in pension and old-age spending. In this context, social policy experts warn that political choices favouring pension spending cuts could exacerbate income insecurity among retirees. Balancing future increases in old-age spending with investments in younger generations (as well as

spending demands in other areas) are likely to prompt reflections on changes to taxation systems and social security contributions. An ageing workforce presents additional risks, with rising illness rates affecting not just individuals but entire households, creating further strains on social security and healthcare systems. Low fertility rates could also raise incentives to reduce investment in education in rural areas with declining student populations, potentially reinforcing inequalities in educational access.

Underfunding of education may occur at a time when education and training systems face mounting pressure to accommodate increasingly diverse student populations as a result of ***migration***. A failure to invest in the skills of migrants (including language skills) can have a ripple effect on sectors such as care, which are chronically affected by labour shortages. Migration also presents specific social inclusion challenges, with a potential rise in social segregation if not adequately addressed.

5.4. Cross-driver interactions and ripple effects

The expert interviews generated insights not only on the impact of each driver of change on labour market and social inclusion, but also on potential interactions and interdependencies between the drivers as well as on secondary effects that might influence the future development of inclusive societies in Europe. Regarding *interactions and interdependencies*, the following were mentioned by at least one interviewed expert.

Environmental change and migration: as noted in section 5.2, climate change and extreme weather could potentially lead to an increase in non-EU migration. Another way these two drivers interact is through the intersection of migration with the impacts of the green transition on labour market and job quality. One expert notes that, without policy interventions, there might be a risk that posted workers are hired to fill low-quality jobs that are not attractive for native workers, potentially resulting in inequalities and uneven distribution of the cost of the transition.

> **…there are a lot of dynamics […] that push people to migrate, but clearly climate is one of them, […] so separately these two mega trends will have their impact, but I think they will also interact with each other and trigger additional mobility and with potential impacts in their own region [of origin], but also where they go. So it's going to be […] a salient issue.**

Geopolitical change and migration: the migrant flows from Ukraine and the Polish-Belarusian border crises are recalled by a demography expert to illustrate how geopolitical shifts can influence migration patterns.

Geopolitical change and environmental change: a social policy expert observes that pressures on public finances stemming from the prioritisation of military and

defence expenditure could potentially divert resources not only from social spending, but also from investments essential for the green transition.

Technological change and geopolitical change: according to a technology expert, technological advances support reshoring efforts and the expansion of industrial capacity in the defence sector in response to geopolitical challenges.

Technological change and ageing: for future of work and social policy experts, if adequately managed, technological change and AI-driven task automation can alleviate some skill and labour shortages due to population ageing.

> **My feeling is that we will try and use technological change to our advantage given the challenges that we have. […] I don't think it's the answer, but it will help. […] I think the biggest challenge is, first of all, getting people to work longer and getting increased labour force participation. […]. I think [technology] can help extending working lives by making jobs better and easier and more enjoyable. […] I think AI will do two things. It will alleviate some of the skill shortages by automating some tasks. And it will […] increase labour force participation.**

Additionally, a number of *secondary effects* of drivers of change which may generate wider political, economic and societal consequences in the EU emerged during the conversations with experts. The following should not be interpreted as deterministic effects but reflect expert views on potential future scenarios.

Growing support for extreme political forces and feedback loops affecting social inclusion: a recurring theme in interviews with social policy experts is the concern that geopolitical shifts, demographic pressures, and a green transition unaccompanied by adequate social safeguards may undermine social inclusion by reducing the availability, accessibility, and quality of social protection and services. These developments are seen as potentially fuelling political and societal tensions, and driving support for extreme political forces, particularly on the right. Against this backdrop, some warn that such movements could: a) weaken Europe's political and democratic foundations; and b) introduce welfare chauvinist measures which draw a line between those deemed deserving of protection (natives) and those excluded (migrants), thereby further eroding social inclusion.

> **The challenge is obvious in the sense that you're seeing a rise of welfare chauvinism. […] [T]here is a growing tendency to make that distinction between them and us, and good social rights for us and not necessarily for them, unless they integrate and unless they conform and assimilate. […] [I]f we become more restrictive in who gets social housing and who gets support for the education, and who gets child support and so on, that risks being self-perpetuating, because then children – especially new-born migrants – grow up in poor circumstances, they will find it hard to do well at school and so on. So there's a very real danger there.**

AI algorithms and political polarisation: related to the above, the integration of AI-powered algorithms into social media platforms to maximise user engagement could contribute to the creation of echo chambers, favouring extreme political polarisation. One interviewee points out that this outcome may result from the systems' effectiveness in promoting content that provokes emotional reactions, often leading to radicalisation and misinformation. This could undermine the health of public opinion and erode democratic norms.

AI and corporate power concentration: one technology expert warns that the centralisation of AI ownership and development could in turn lead to centralisation not only of power within workplaces but also of information flows within the digital economy. A small number of companies could gain significant control over economic systems, translating into greater power over both workers and other businesses that rely on their technology.

> **[W]hat you tend to have is that there are some kind of companies that […] control the flows of information in the digital economy. That ends up *de facto* […] having increasing levels of control of the entire system. And this is not only about worker versus employer, it's [also] company versus company. […] [T]he whole system is a purely pyramidal system in which the level of centralisation of power of the entire system is absolutely enormous. […] It doesn't matter so much whether you are a small company […] or you are an employee…**

AI and socioeconomic inequalities: related to the above, the same expert highlights that AI, just like any powerful technology, has the potential to either exacerbate or reduce socioeconomic inequalities, depending on how it is distributed and governed. As technology enters an already unequal world, it often strengthens existing power dynamics, as those who are already privileged are better positioned to use new tools to maintain or reinforce their status. In this context, AI could deepen inequality if access remains limited to a few actors. However, the interviewee also notes AI's potential to be a more democratising force, given its relative ease of use and accessibility.

Migration restrictions, labour shortages, and competitiveness: according to a social policy expert, excessive migration restrictions could exacerbate shortages of care workers, potentially leading to more people, particularly women, leaving the labour force to provide care for elderly or sick relatives. This in turn can further worsen labour shortages in the whole economy, hindering productivity, economic performance, and competitiveness in the process.

Migration, evolving social attitudes, and social inclusion: another social policy expert emphasises that greater labour market participation of migrant workers may foster public recognition and openness to diversity, supporting long-term social inclusion and cohesion. But another expert argues that increasing diversity can also pose challenges if social inclusion is not ensured, thereby leading to societal tensions.

Low job quality and enabling services: as highlighted by a demography expert, negative consequences for social inclusion may stem from the persistently low quality of jobs in enabling services such as education and care, where unattractive employment conditions and limited career prospects contribute to ongoing staff shortages. These shortages, in turn, undermine the availability and quality of such services.

> **[W]ith the level of wages in [the care] sector, […] we do see the problem that it's even difficult to find workers to do that kind of work formally, […] and a lot of informal workers, especially migrants, that are doing that job but without access to social protection. […] So in a way, these shortages in the care sectors that we have are actually reinforced by the worse quality of their job and also the lack of social protection. So that can be an interdependency, a negative synergy…**

5.5. Opportunities and challenges: insights from the experts

The expert interviews highlight the interconnected impacts of technological, environmental, geopolitical, and demographic changes on job quantity, job quality, and social inclusion in the EU, giving rise to a series of challenges for policymakers.

In terms of ***job quantity***, while the net employment effects of the digital and green transitions and of geopolitical shifts are still unclear, opportunities for **job creation** can arise as technological advancements and the shift to a low-carbon economy can expand employment in new and existing sectors. However, **job losses** and displacement in certain sectors and regions are also likely to occur, while labour and skill mismatches can potentially lead to **shortages**. Demographic changes could also exacerbate these labour shortages, including in the care sector. Although labour market polarisation has not been the overarching trend in Europe in the past (see Chapter 3), if not adequately governed, automation and the green transition could still drive **labour market polarisation** in the future, while also deepening existing inequalities and **segregation** by disproportionately affecting women as well as mid- and low-skilled workers. The share of migrant workers in European labour markets is expected to rise, which provides with an opportunity to **mitigate worsening dependency ratios** and **fill labour shortages**, especially in the care sector. Nonetheless, this also brings challenges related to **workforce and brain drain** in certain countries and regions.

These megatrends also give rise to opportunities and challenges to ***job quality***. AI has the potential to enhance **productivity and safety** in the workplace by automating routine, dangerous and physically demanding tasks. This is, however, counterbalanced by concerns over **poor working conditions** (e.g. surveillance and work intensification) and **imbalances in bargaining power and industrial relations**. Similarly, the green transition, if not accompanied by adequate measures and protections, risks creating jobs with **poor working conditions** and **precarious**

employment conditions. At the same time, while extending working lives can bring benefits in terms of **workers' wellbeing**, it also raises issues related to **physical and mental health** and return to work for those who experience long-term illnesses. Finally, although migration offers a potential (if partial) relief to labour shortages, migrant workers will be more likely to be at the receiving end of **wage disparities and job precarity**, as they tend to be overrepresented in low-wage occupations in the care sectors and in sectors involved in the green transition (e.g. construction, recycling).

The key drivers of change can enhance opportunities for ***social inclusion***. For instance, technological advances could make it possible for previously excluded or marginalised groups (e.g. people with disabilities) to be **integrated in the labour market**, and could improve the **quality of public services**, especially healthcare. However, without adequate social protection and investment, the combination of technological, ecological, geopolitical and demographic changes could increase **poverty and exclusion** of already vulnerable groups. The risk of worsening social exclusion is particularly pronounced among low-skilled workers, women, older people, and migrant populations, highlighting the importance of addressing vulnerabilities and inequalities through an intersectional lens. Similarly, geopolitical shifts, climate change and green transition policies can disproportionately affect low-income groups and certain regions, potentially leading to rising **poverty** (including **energy poverty**) and **regional and income inequalities**. One key concern is the potential **deterioration of essential and enabling services** such as education and training, healthcare, childcare, and long-term care, particularly if public resources are diverted or reduced in the context of rising defence spending or other fiscal pressures.

The ***secondary effects*** of these drivers of change are equally significant. Experts warn that geopolitical shifts, demographic pressures, and a green transition without sufficient social safeguards could exacerbate political tensions, potentially boosting support for **extreme political forces**, particularly on the (far) right. AI use in social media platforms may fuel extreme political **polarisation**, further impacting democratic norms. Additionally, AI development and ownership could lead to **concentration of power** both within the workplace and broader economic systems. Finally, migration restrictions could worsen **labour shortages** and **hinder productivity and competitiveness**, while increased migration could promote **social inclusion** through greater workforce diversity. These secondary effects could amplify the challenges policymakers face in managing social and economic transitions.

6. Breaking vicious circles in the labour market and social inclusion

The previous chapters presented a series of analytical building blocks: the *megatrends* driving change, the gaps revealed by *forecasts and exposure* assessments, and the challenges identified by *experts*. Each of these blocks adds important insights, yet they necessarily look at only one part of the future. To understand how exclusion and inequality persist in EU labour markets and societies, it is essential to move beyond isolated issues and consider how different problems interact and reinforce one another over time.

Social and labour market disadvantage rarely stems from a single cause. Instead, it emerges from the interaction of multiple factors that reinforce each other in **vicious circles**. These feedback loops are self-reinforcing: disadvantage in one domain increases the risk of disadvantage in another, setting in motion cycles that are difficult to escape and hard to address through fragmented policy responses.

A **systems approach** allows us to map and understand these dynamics. Rather than asking what the *causes and effects* of exclusion are, we ask how *patterns of interaction* sustain exclusion and inequality. This helps us identify feedback loops – places where disadvantage reproduces itself. Systems thinking is especially important in complex contexts shaped by long-term trends where change in one part of the system can have cascading effects elsewhere.

This approach aligns closely with the mission of the ESF+. Many of the Fund's goals – improving employment opportunities, reducing poverty, promoting skills and inclusion – extend beyond siloed interventions. By revealing these systematic connections, systems thinking makes the case for **integrated and coordinated interventions.**

In this project, a systems perspective was applied through a structured **systems mapping workshop** (see **Annex H**) The focus was on three core **vicious circles** that were consistently highlighted in our earlier research. The workshop brought together CEPS experts from different disciplines and units to explore the nodes and relationships within these circles, the role of major drivers of change, and the potential leverage points where policy intervention could break the cycle.

Importantly, these leverage points are not necessarily large-scale reforms. They may be targeted changes that interrupt one or multiple parts of the feedback loop, shifting the system towards a more inclusive equilibrium. **Annex I** discusses implications of a systems approach for policy and ESF+ programming.

The following three **vicious circles** reflect challenges at different stages of the lifecycle that take place at distinct analytical levels:

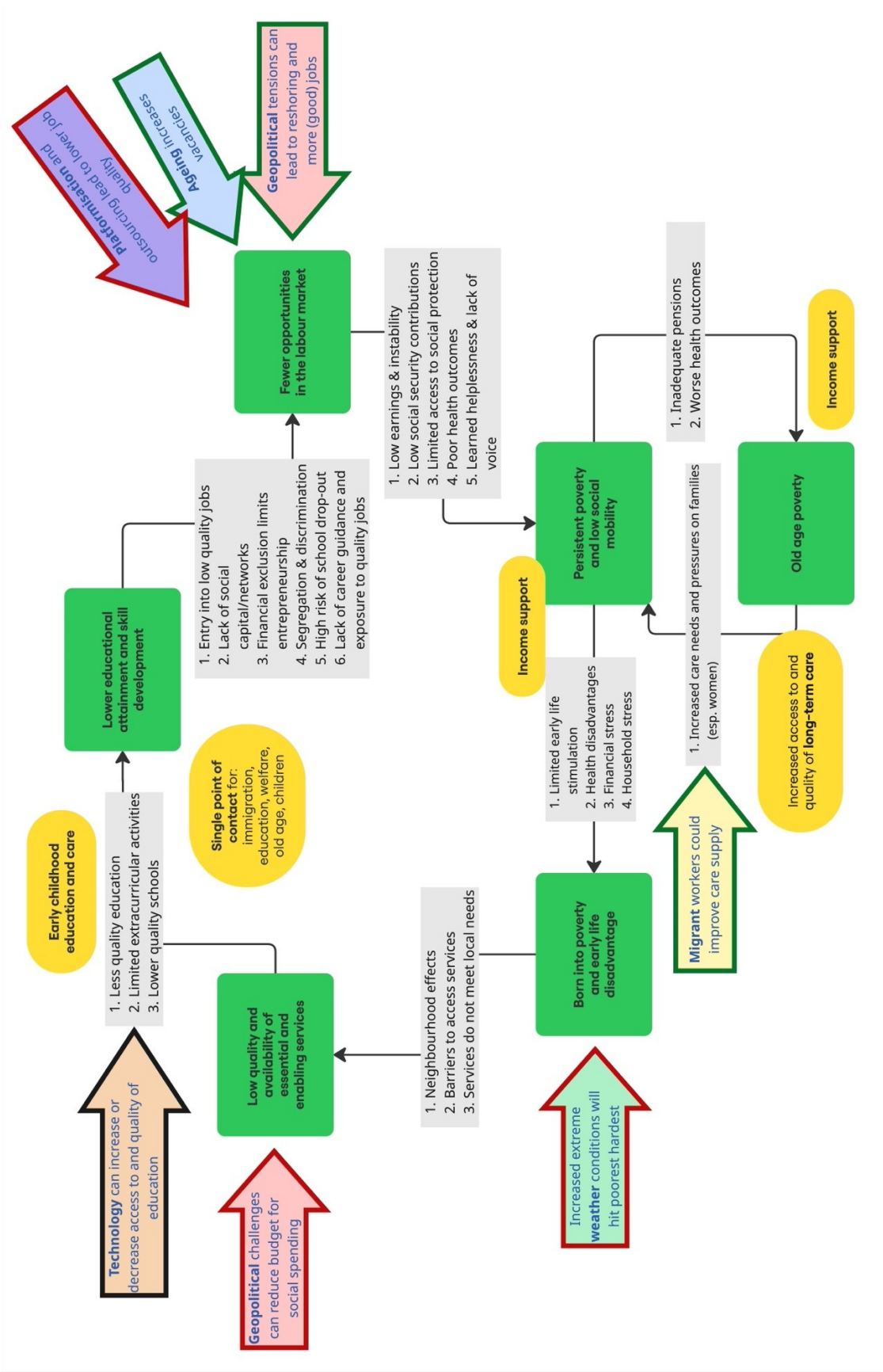
- the *intergenerational poverty and social exclusion trap* at the level of households focuses on early-life challenges that threaten social inclusion across generations
- the *low-quality job and un(der)employment trap* at the level of individual workers sheds light on challenges in adulthood that limit access to quality employment
- the *skills underutilisation trap* at the jobs level targets the challenges that arise during a working life that limit career progression and skills development.

Reading guide: To facilitate interpretation of the figures below representing the vicious circles, it may be useful to begin by observing the elements in the following order:

- **Green boxes:** the nodes or 'situations' of the vicious circles
- **Small black arrows and grey boxes:** the causal relationships between these situations
- **Large coloured arrows:** the impacts of the drivers of change. Please note that the border of the large arrows changes colour depending on the nature of the driver's impact on the node or relationship: positive (green), negative (red) or mixed (black)
- **Yellow boxes:** the leverage points of intervention.

As these circles are highly abstracted visualisations, in reality some nodes may be connected in a non-circular nature, or connections may skip a node.

Figure 9. Vicious circle #1 'The intergenerational poverty and social exclusion trap'



6.1. Intergenerational poverty and social exclusion trap

Key nodes and causal relationships

The intergenerational poverty and social exclusion trap (**Figure 9**) describes how disadvantage is reproduced across generations through mutually reinforcing mechanisms. At the core of the trap is the experience of being born into poverty and early-life disadvantage, which sets in motion a sequence of disadvantages that extend into adulthood and old age. Children born into poverty are more likely to experience limited early stimulation, health disadvantages, financial stress, and household instability. These early deficits reduce the quality of early childhood education and care, with lower-quality schools and fewer extracurricular or developmental opportunities. As a result, children from low-income backgrounds tend to experience lower educational attainment and limited skill development.

This education gap feeds into the labour market, where those with low qualifications or fewer networks are more likely to enter low-quality jobs. These jobs are often precarious, low-paid, and offer limited prospects for advancement, reinforcing financial stress and limiting access to social protection. Care responsibilities, especially for single mothers, also limit labour market opportunities, causing financial strain. For those unable to access stable employment, this translates into persistent poverty and low social mobility – a state associated with poor health outcomes, learned helplessness (i.e. a state where individuals stop trying to change their situation because they believe their actions have no effect), and limited participation in society. All of these factors limit motivation for re- and upskilling, life satisfaction, and wellbeing. Over time, this can also lead to poverty in old age, particularly when inadequate pensions and reduced access to healthcare compound the effects of a lifetime of disadvantage.

One of the key reinforcing mechanisms in this loop is the availability, affordability and quality of essential and enabling services. These include education, healthcare, care provision, social housing, and transportation – services that shape opportunities from early childhood to working age, as well as over the entire life cycle. When these services are inaccessible or poorly adapted to local needs, they deepen existing disadvantages. For people with care responsibilities, especially single mothers, affordable and accessible childcare is an essential factor in this. Neighbourhood effects – where areas with high concentrations of poverty suffer from degraded services and low social capital – further entrench this cycle. Beyond services, the lack of affordable housing and access to financing limits opportunities to escape poverty, as low-income workers are compelled to spend most of their income on housing costs.

Influence of key drivers of change

Several drivers of change interact with and influence the poverty trap, often in contradictory ways. Technological change can either improve or undermine access to quality education and care, depending on how equitably digital infrastructure and digital literacy are distributed. Environmental change and climate shocks tend to disproportionately affect low-income groups, worsening financial situations (e.g. through increased energy poverty) and health outcomes. Geopolitical instability may reduce national budgets for social spending, while also shifting labour market dynamics through reshoring and changes in global supply chains. Increased migration can help address critical labour shortages, especially in long-term care. However, having a migrant background is also associated with a higher risk of poverty and intergenerational disadvantage, resulting as it can from limited opportunities in the labour market (e.g. due to lack of work permit, lack of qualification or diploma recognition, or discriminatory hiring practices) or from other factors (e.g. limited or no language skills and fewer social networks in the destination country).

As labour market opportunities are a key node in this circle (connecting it to the next vicious circle of (under)employment), several drivers impacting the labour market also appear here. Platformisation (see section 3.1.1) and outsourcing tend to increase the prevalence of low-quality jobs, especially in service sectors, reducing mobility prospects for disadvantaged groups. Conversely, workforce ageing can open up job opportunities as older workers retire – although these may not align with the skills of those trapped in poverty.

Leverage points for intervention

The workshop identified several promising intervention points to disrupt the cycle that address three of the core reinforcing mechanisms: lack of quality employment, the mental load of poverty, and limited or low-quality services. While some of these interventions require mobilisation of significant public and private financial resources (such as investment in childcare and healthcare), others require more modest resources and a shifting approach by public authorities (such as establishing single points of contact for citizens and simplifying access to support).

Non-funding-based leverage points include:

1. **Integrated local services**: establishing single points of contact at the local level that bring together support for education, welfare, housing, and employment (particularly for families) could reduce barriers to service access and improve coordination.
2. **Governance**: improving the alignment at the local level of social and labour market policies with regional development tools under the ESF+ is essential. This includes reinforcing local partnerships and empowering municipalities to respond to multidimensional needs. That would require the involvement of

municipalities and local actors in the planning – not just execution – of EU-funded interventions usually planned at the national or regional level.

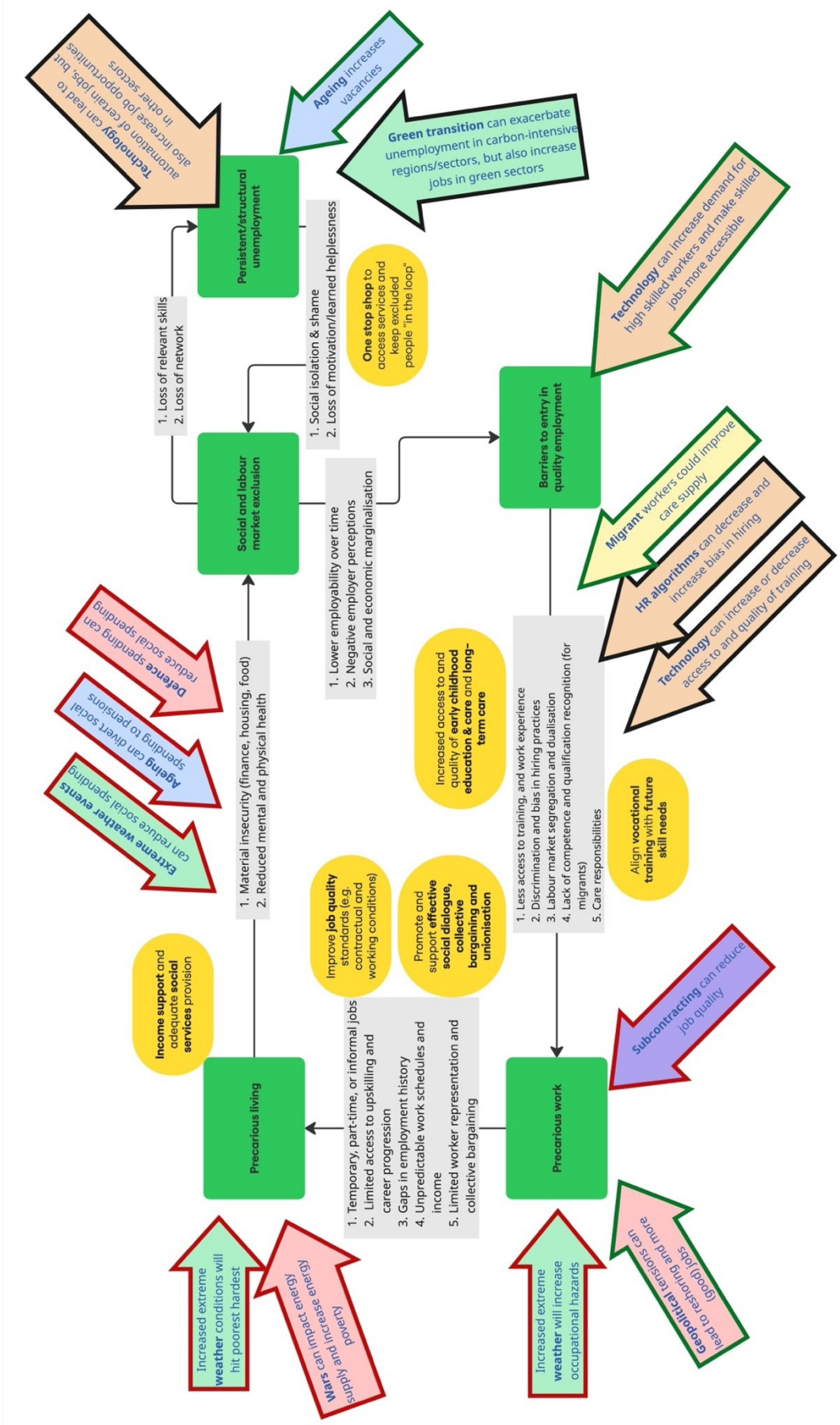
3. **Simplified access to support systems**: facilitate access to existing safety nets and support instruments by simplifying administrative requirements, improving clarity of eligibility criteria, and streamlining application procedures.
4. **Community-based outreach and awareness**: strengthen the dissemination of information through local networks, community organisations and trusted intermediaries to ensure that potential beneficiaries are aware of available support and how to access it.

Funding-based leverage points include:

1. **Targeted early childhood investment**: improving access to high-quality early education and care is a well-documented driver of long-term mobility, with multiplier effects on both educational and labour market outcomes.
2. **Job quality and career guidance**: providing exposure to a broader range of job opportunities during schooling, along with strong career guidance and adult learning pathways, can help break the cycle of low-quality employment.
3. **Health and care infrastructure**: addressing old-age poverty and the care burden – particularly for women – requires expanding access to long-term care services and supporting care work as a viable and respected employment path.
4. **Income and housing support**: alongside measures that promote access to quality employment and essential services, addressing poverty equally requires forms of income and housing support that are adequate, accessible, and tailored to different life situations.

Together, these leverage points aim not only to alleviate poverty but to interrupt the mechanisms that sustain it, shifting the system towards a more inclusive and opportunity-rich configuration.

Figure 10. Vicious circle #2 'The low-quality job and un(der)employment trap'



6.2. Low job quality and un(der)employment trap

Key nodes and causal relationships

The 'low job quality and un(der)employment trap' (**Figure 10**) captures how exclusion from stable and meaningful employment is both a result and a cause of precarious work and living conditions. It begins with barriers to entering quality employment. These include lack of access to training and work experience, discrimination and bias in hiring practices, labour market segmentation and dualisation, lack of recognition of foreign qualifications, and care responsibilities that limit the ability to work or take up training. These barriers are particularly acute for vulnerable groups such as women, migrants, people with disabilities, and the long-term unemployed.

When individuals are unable to access and maintain good-quality jobs, they are often pushed into precarious work – characterised by temporary, part-time or informal jobs, limited access to upskilling and career progression, gaps in employment history, limited access to worker representation and collective bargaining, and unpredictable work schedules and income. Over time, these poor job conditions reinforce precarious living: a state of material insecurity (financial, housing, food), and deteriorating physical and mental health.

This, in turn, deepens the risk of structural social and labour market exclusion, triggering a second or sub-loop of persistent or structural unemployment. Long periods of insecure or no employment can lead to a loss of relevant skills, weakening of professional networks, social isolation, and a sense of shame or learned helplessness.

Finally, negative employer perceptions and self-perceptions about people with fragmented careers or marginalised backgrounds compound the problem, making reintegration into quality work more difficult. As a result, even those who return to employment are often confined to the same low-quality, insecure work – restarting the cycle.

Influence of key drivers of change

Several structural drivers interact with and shape this trap. Technological change has contradictory effects: it may reduce barriers to employment by improving access to training and increasing demand for certain skills, but it can also deepen exclusion through algorithmic discrimination or displacement of middle- and low-skilled roles. Labour market dualisation and subcontracting – often accelerated by digital platforms – reinforce segmentation and weaken social dialogue and industrial relations, keeping some workers in a cycle of unstable, low-quality jobs.

Demographic trends are also significant. Population ageing increases demand for labour, particularly in care and personal services, potentially offering re-entry points into the labour market. However, this trend can only lead to activation of currently non-active people, if their care responsibilities are addressed or relieved. The effect of green transition on job opportunities is mixed, as it could both exacerbate unemployment in some regions or sectors and increase job opportunities in others.

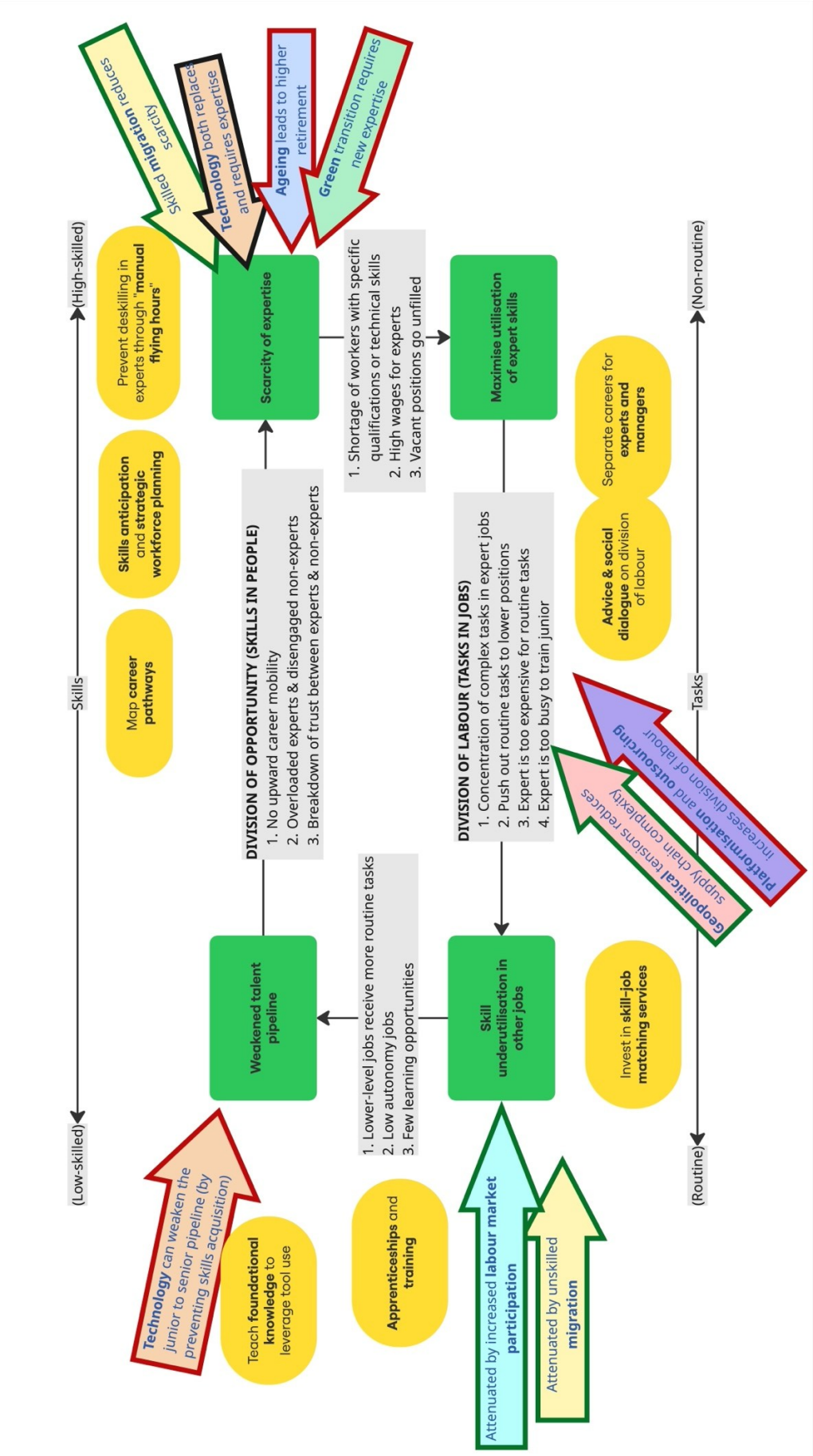
Environmental and geopolitical developments can aggravate the situation. Energy poverty and occupational hazards are expected to rise with climate change and extreme weather, especially in low-wage sectors. Fiscal strain linked to demographic ageing, rising defence expenditure, or economic crises may limit the resources available for public employment services, training programmes, or income support.

Leverage points for intervention

Several areas for policy intervention were identified during the workshop to address relevant reinforcing mechanisms.

1. **Job quality improvements**: improving the quality of jobs, including wages, contracts, social dialogue and working conditions, to reduce moving from unemployment to precarious employment. It also includes better access to unemployment benefits, pensions and health insurance for atypical workers and vulnerable groups. This can be achieved both through employment regulation and by involving social partners, supporting unionisation rates, and promoting collective bargaining.
2. **Income support**: as in the intergenerational poverty and social exclusion trap, income support is crucial to alleviate the adverse effects of un(der)employment and precarious living on material conditions and physical and mental health.
3. **Inclusive vocational education and training (VET)**: enhancing access to VET, particularly for excluded groups, and ensuring that training provision is aligned with future skill needs.
4. **Care infrastructure:** expanding access to affordable and high-quality care services, including early childhood education and long-term care, to ease the care burden and increase labour market participation.
5. **Integrated service delivery**: developing one-stop-shop service delivery models that can support individuals holistically, by coordinating access to job counselling, training, housing, health services, and care.
6. **Antidiscrimination safeguards**: addressing discrimination and bias in hiring processes, including the regulation of algorithmic recruitment tools, to reduce barriers for disadvantaged groups.

Figure 11. Vicious circle #3 'The skills underutilisation trap'



6.3. Skills underutilisation trap

Key nodes and causal relationships

The 'skills underutilisation trap' (**Figure 11**) captures a systemic imbalance in how tasks are allocated within organisations and how skills are built across the workforce. At its core is a mismatch between the concentration of expertise in a small group of senior workers high up in the hierarchy (the '*experts'*) and the limited use of skills in the broader workforce at the bottom of the hierarchy (the '*non-experts'*).

The trap begins with a scarcity of expertise, due to high demand for workers with specific qualifications or technical capabilities and a lack of employees capable of filling the gap. This scarcity drives up expert wages and leaves key positions unfilled. In response, organisations attempt to maximise the utilisation of expert time by concentrating complex, non-routine tasks in expert roles and reallocating more routine tasks to lower-level positions. This division of labour reduces the autonomy, discretion, and learning opportunities in non-expert roles, creating low-skill, low-mobility jobs that fail to develop new expertise.

The result is a weakened talent pipeline. Employees lower in the hierarchy, stuck in narrowly defined jobs, have fewer opportunities to learn by doing or gradually take on more responsibility. At the same time, higher-up experts become overloaded, and too busy to mentor junior staff. Over time, this contributes to skill underutilisation in the broader workforce and an overburdening of experts, reinforcing the initial scarcity of expertise.

The resulting division of opportunity – a growing gap between the experts and the non-experts – reflects the underlying division of labour in the economy. Experts face pressure and burnout, while non-experts disengage and stagnate. The lack of upward mobility erodes trust between occupational groups and reduces the system's overall adaptability and resilience.

Influence of key drivers of change

Multiple structural drivers reinforce this vicious circle. Demographic change, particularly ageing, increases retirement rates and further depletes scarce expertise. Technological change plays a dual role: it can both reduce the demand for certain expert tasks and increase demand for new technical skills. Crucially, if adopted without accompanying training, technology can prevent lower-skilled workers from developing the competencies needed to progress, weakening the junior-to-senior pipeline. Also at the expert level, unguided technology use can lead to skill loss if expert tasks are automated.

The green transition creates demand for new types of expertise, exacerbating bottlenecks in already scarce domains (e.g. energy, industrial transformation). Skilled migration can help reduce these scarcities, while unskilled migration may fill lower-level roles without addressing expertise gaps.

Global economic pressures also affect task design. Platformisation and outsourcing increase the fragmentation of work and contribute to excessive task specialisation. However, geopolitical risks may lead companies to reduce the complexity of their supply chains (reshoring or nearshoring), creating opportunities for broader job designs and career paths locally.

Leverage points for intervention

Leverage points for improving skills utilisation and development were identified at the *organisational* level, but they could be promoted or subsidised by policy[10]:

1. **Organisation and job redesign**: promote broader job designs that allow for on-the-job learning by doing, autonomy, cross-disciplinary collaboration and skills development across occupational levels.
2. **Career progression pathways**: develop transparent internal pathways from junior to senior roles, and encourage mentorship, internal mobility, and shared task ownership.
3. **Apprenticeships and work-based learning**: expand quality apprenticeship programmes and on-the-job training in routine occupations to build capabilities.
4. **Strategic workforce planning**: improve forecasting and planning to match skill development with evolving task requirements, especially in green and digital domains.
5. **Optimise technology use for experts and non-experts**: teach foundational knowledge alongside tool use to ensure non-experts build transferable skills rather than perform isolated tasks. At the same time, safeguard skill retention in expert workers by maintaining opportunities for manual practice (‘flying hours’) in critical tasks.
6. **Worker participation on job design**: structurally involve workers and their representatives on skills development through job designs, task allocation and shaping internal career paths.
7. **Support for intrasectoral mobility**: develop public schemes that facilitate transitions between firms within sectors, including portable training entitlements and recognition of prior learning.

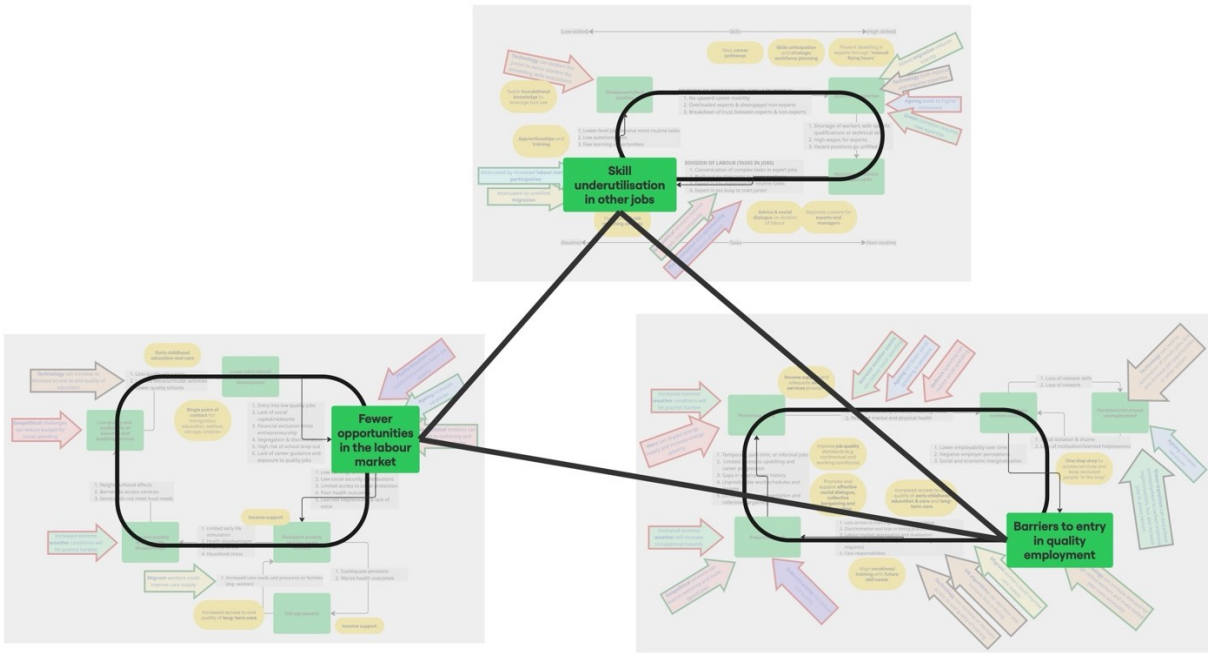
[10] See Flemish ESF+ initiatives on work organisation (Werk & Sociale Economie, 2024) and the AI job redesign guide from Singapore (Lee Kuan Yew Centre for Innovative Cities, 2024).

6.4. Interconnections between the vicious circles

While each vicious circle targets a different analytical level – households, workers, and jobs – they are deeply interwoven (**Figure 12**). The **intergenerational poverty and social exclusion trap** provides a starting point: being born into poverty increases the risk of lower educational attainment and fewer opportunities in the labour market. This disadvantage continues into adulthood, translating into unstable work, and poor job quality – key mechanisms in the **low-quality job and un(der)employment trap**. These patterns are reinforced at the level of the job itself, where organisational responses to skill shortages lead to suboptimal task allocation and limited opportunities for learning and career progression on-the-job. In the **skills underutilisation trap**, routine tasks are pushed down into low-autonomy roles, weakening skill development and reducing upward mobility for workers in precarious or low-quality jobs – many of whom are already affected by poverty or long-term unemployment.

The systemic effects are cumulative: fragmented and segregated job design contributes to worker disengagement and stagnation; low-quality employment reinforces poverty and exclusion; and poverty reduces the capacity to access learning and navigate transitions. Together, these interlocked feedback loops explain why exclusion persists across time, despite active policy efforts, and why siloed interventions often fall short. Intervening in one part of the system is insufficient if feedback effects in another continue to reproduce disadvantage.

Figure 12. Interconnections between the vicious circles



The workshop preparation also considered three additional vicious circles operating at higher structural levels, which we briefly discuss in **Annex J**.

7. Stakeholders' views on challenges to a social and inclusive Europe and on policy responses

An important part of the research process – and of the identification of future impacts and challenges to a social and inclusive Europe – was the involvement of key stakeholders. The rationale for engaging with stakeholders was twofold. First, given their more direct knowledge of skills needs and skills development, social inclusion, and inequality issues – as well as their active involvement in intelligence gathering and policymaking processes – stakeholders were well placed to identify analytical and empirical '**blind spots**' of the research, and to validate or challenge preliminary findings. Second, their involvement offered the opportunity to generate **additional policy-relevant insights** for the study.

Hence, a stakeholder workshop was organised in Brussels on 27 March 2025 that included representatives of EU bodies, employers' organisations, trade unions, and civil society organisations (see **Table K1** in **Annex K**). The stakeholder selection ensured engagement with a variety of perspectives, reflecting diverse interests and viewpoints. Prior to the workshop, participants received a short briefing document outlining the analytical framework of the study, key preliminary findings of literature review and expert interviews, and the three vicious circles from the systemic analysis of interdependencies. This helped frame the discussion, making sure participants were able to prepare in advance. All these elements were further presented and explained by CEPS researchers at the beginning of the workshop. The discussion followed the Chatham House Rule and was organised around three topics for reflection: 1) main **hopes and fears** for the next 10-15 years in relation to employment, job quality and social inclusion; 2) potential **elements missing** from the analytical framework; and 3) potential **relationships missing** from the vicious circles.

The remainder of this chapter summarises the stakeholders' feedback on the research (**Box 2**) and presents the main insights generated during this interactive session.

Box 2. Stakeholders' validation and feedback on research 'blind spots'

Stakeholders found the preliminary findings of the research – particularly the vicious circles – to be both highly relevant and thoughtfully constructed. At the same time, they also offered critical feedback and highlighted some missing elements. These inputs were integrated into the revised analysis presented in the previous chapters. The following are a few examples:

- a clearer **definition of key drivers of change** and the criteria used to consider a phenomenon as such
- the importance of **social dialogue and strong collective bargaining** as a dimension to consider in any policy intervention addressing the vicious circles
- the negative impact of **low job quality** on social security contributions, with implications for pension systems' sustainability and old-age poverty
- the importance of **qualification and diploma recognition** for migrants as a prerequisite for their effective integration into the labour market and society
- the need for a careful framing and assessment of the **role of migration** in the labour market. Some noted that, while migration is often perceived as increasing job competition, especially for low-skilled jobs, this is not supported by evidence. Instead, stakeholders warned that such perceptions risk fuelling negative public attitudes towards migrants.

7.1. Insights on impacts and challenges

Similar to the observations in section 5.1, one participant stressed that the impacts of the drivers of change 'are not predetermined' but are shaped by power relations and institutions. In particular, a cross-cutting theme emerging from the discussion – and relevant to impacts, challenges and policy intervention (see below) – was the **role of social dialogue and the strength of social partners**. Depending on whether and how social dialogue is conducted and on the (im)balance of power between employers and trade unions, the effects of the megatrends may vary considerably.

A second key insight concerns the **rise of political extremism** as a potential challenge to a social and inclusive Europe in the coming decade. Some participants observed that this trend could, in turn, lead to discrimination in access to social services – echoing concerns raised in expert interviews about welfare chauvinism – and contribute more broadly to the erosion of democratic institutions and civil society participation.

The extremisation of politics […] I think would have an impact on social value, for instance, on democracy at work, but also on the participation of civil society. And so it has an impact on inclusion of representation of marginalised groups…

While some participants suggested the inclusion of this phenomenon as a key driver, the study frames it instead as a (potential) secondary impact and as a challenge. This interpretation is supported by academic research, which identifies factors such as economic or employment insecurity (Vlandas and Halikiopoulou, 2019; Zagórski, Rama, and Cordero, 2021), reduced upward social mobility (Derndorfer, 2025), and regional decline and inequality (Rodríguez-Pose, 2018; Rodríguez-Pose, Terrero-Dávila, and Lee, 2023) as key factors favouring the growth of these movements – and political extremism more generally. Social exclusion, marginalisation, limited education or employment opportunities, and lack of social cohesion have also been identified as among the root causes of violent extremism (Ranstorp and Meines, 2024).

Related to this, one participant also highlighted the **role of civil society organisations** in promoting social inclusion as well as democratic values and institutions, emphasising how a decline in funding for these organisations can undermine their capacity to fulfil their missions.

> **There's also the reduction of funding for civil society organisations. […] We need to increase social investment, but also investment like funding for civil society organisations means investing in social inclusion, protection of the democratic system…**

7.2. Insights on leverage points for intervention

Social dialogue and collective bargaining were identified by several participants as important leverage points for intervention across the three vicious circles outlined in the previous chapter. For social dialogue to be truly effective, however, it was noted that it is essential to remove any obstacles to collective bargaining and ensure high unionisation rates. This is particularly relevant to two areas: precarious work and workers' reskilling. In the case of precarious work, collective bargaining plays a crucial role in improving employment and working conditions, enhancing career prospects, and fostering a sense of identity among workers – contributing, in turn, to preventing the rise of political extremism. Regarding reskilling, social dialogue was said to support skills matching and work reorganisation.

In this respect, the discussion delved in some depth into **training and skills development**, especially in light of the challenges arising from the megatrends. Stakeholders highlighted the importance of improving access to training across all worker groups. In particular, the necessity to reskill workers during the green transition, especially in the manufacturing sector, was mentioned. Some raised specific concerns about training and reskilling for older workers and long-term unemployed, who often face discrimination when attempting to re-enter the labour market. Some participants called for a demand-driven, 'skills-first' approach developed with input from social partners, and emphasised the importance of strengthening the connection between education systems and labour market needs.

There were also calls for companies – not just public authorities – to take greater responsibility for funding training, noting that it should be linked to tangible rewards for workers. Finally, the importance of recognising and certifying skills acquired informally through job experience was highlighted.

> **A lot of the training that is taking place […] is this compulsory health and safety training. And then we are not speaking about competence development, which is what we actually need, especially if we want to ensure this job-to-job transition.**

In relation to this, some stakeholders also emphasised the need for a **more holistic and comprehensive understanding of skills and reskilling**. Participants highlighted the importance of recognising the link between work (re)organisation and reskilling. They also stressed the need to move beyond the predominant focus on formal training, calling for greater recognition of non-formal learning, counselling, and spaces for learning opportunities during working hours. Some participants further suggested that current policy debates place too-narrow an emphasis on skills for the workplace and the labour market, and argued for the inclusion of community-based learning and competences that enable civic participation.

> **[Taking a different approach] also brings this opportunity of talking about something that doesn't necessarily have to have an added value for an immediate task […] because you can be learning in different contexts. You can be on a learning mobility even later on in life when you develop competence, [for instance] through civic participation, where you develop a desire to work on social challenges within your community. And that becomes something completely different than the very, very labour market focused [perspective].**

In particular, there was a call to reframe education for children and young people beyond employability and around broader goals of social rights, inclusion, and participation in society:

> **[My hope] is that we move beyond just employability, especially for young people and start trying to design a future with labour markets based on equity and inclusion… […] [A]ccess to quality education, housing, maybe digital inclusion […] should be seen as safeguards for a foundation for [young people's] future participation in society, and not just as [means to prepare] a workforce. […] Every time […] we have to prove why [social services are] a good investment for the economy and its workforce. But Europe is not about that. It was really about social rights and building a society, not a workforce.**

The discussion thus suggested that broadening the aims of education and training could help foster social inclusion and cohesion and support active citizenship and civic participation.

Conclusion

This report has examined how key drivers of change are likely to reshape labour markets and social inclusion in the EU. It explored how future labour and skill demand can potentially emerge, which sources of labour and skill supply could help meet these needs, and what risks and opportunities these changes pose for equality of opportunity and the sustainable development of inclusive societies. In so doing, the study has addressed the four research questions (RQs) outlined in the Introduction.

RQ1: Which challenges, opportunities, and factors will shape the future needs for skills and competences?

Methodologically, this question was approached by analysing projected changes in labour *demand*. The underlying assumption is that, since occupations are composed of tasks, and skills represent the capacity to perform those tasks, occupations can be conceptualised as bundles of skill requirements (see **Box 1** in Chapter 2). Future labour demand and skill needs in the EU will likely be shaped by technological, environmental, geopolitical, and demographic shifts.

Technological change, especially digitalisation, AI, and robotisation, will be a central driver. While fears of mass job losses are likely overstated, these changes will affect task content across occupations and sectors. For instance, the expansion of employment in ICT services is expected to continue in the coming decade. Similarly, AI adoption may augment high-skilled roles while reducing demand for routine cognitive tasks (and related skills) in clerical work. At the same time, mechanisation and robotisation are expected to impact lower-skilled occupations, especially in regions where manufacturing sectors are largest. Technology-induced changes in labour and skill demand are mediated by organisational choices, as technology allows employers to automate tasks, digitise processes, and outsource, offshore or ‘platformise’ work.

Similarly, **environmental change** is likely to change labour and skill demand across both green and traditional sectors. While green sectors may stimulate demand for new occupations, sectors like agriculture and mining may see employment decline driven by environmental sustainability policies (alongside automation and structural economic shifts). These changes risk exacerbating regional inequalities, as job losses and new opportunities may not align geographically.

Geopolitical developments, such as renewed industrial policy and defence expansion, could raise demand for labour and skills in advanced manufacturing and critical technologies. However, some key strategic sectors, such as the pharmaceutical industry, might also suffer. Overall, impacts may be uneven, with wealthier regions more likely to attract investment and benefit from relaxed state aid rules.

Lastly, **population ageing** will increase demand for care-related occupations, with employment in health and social care expected to rise. As with other drivers, regional variation may deepen existing disparities across the EU.

RQ2: Which developments could be expected, and which areas could be tapped into to ensure an adequate supply of these skills and competences?

As with RQ1, the study analysed expected developments in future skill supply by exploring potential changes in labour supply as well as the ways in which skills are acquired and deployed. **Demographic change** is the main factor expected to constrain future labour supply in the EU, with the working-age population projected to shrink under all scenarios. While migration may help mitigate this decline, it is not expected to fully offset it. Additionally, intra-EU mobility may exacerbate skill depletion in certain regions. Demographic decline, alongside rising labour demand, is likely to intensify skill shortages across the EU. Addressing this requires tapping into several potential sources.

First, **technological advancements**, including automation and AI, may alleviate some of the pressure on labour supply by boosting productivity, extending working lives, and supporting the labour market inclusion of underrepresented groups, provided equitable access is ensured. Second, increased **migration** – if accompanied by effective integration, reskilling, and skills recognition – can help expand the labour pool, particularly in sectors facing shortages. Third, investing in **enabling services** such as early childhood education and care and long-term care can support labour participation, especially among women. However, improving job quality in these sectors is essential to attract and retain workers.

The report also highlights the existence of a '**skills underutilisation trap**' which weakens the talent pipeline by limiting opportunities for workers who remain in narrowly defined roles. Intervening to break this vicious circle through, for instance, job redesign and work-based learning can create opportunities to respond to labour and skill needs within organisations. Additionally, **active labour market policies**, including training, apprenticeships, and targeted activation, can improve alignment between available competences and emerging demand. Finally, while **extending working lives** could ease labour pressures, such policies must be approached with great caution by considering challenges related to physical and mental health, particularly for those with long-term illnesses or demanding job conditions.

RQ3: What are the main drivers that could impact the equality of opportunity across the EU?

The study identifies a range of key drivers that could potentially impact equality of opportunity across the EU in the decade ahead. These include intersecting factors related to gender, migration, socioeconomic background, and geography.

First, **gender** remains a major axis of inequality. Technological and environmental changes are expected to affect men and women differently because of underlying occupational segregation. Women, overrepresented in clerical roles, are more

exposed to generative AI, while men are more exposed to broader technological transformations affecting manufacturing and manual occupations. Women may also benefit less from new opportunities brought by the green transition, because of underrepresentation in STEM and technical fields, and may be disproportionately impacted by job displacement.

Second, **migration** can help address labour and skill shortages and demographic shifts, provided that challenges related to social inclusion and job quality are addressed. Shortages will likely be larger in medium to lower-skilled occupations where jobs are more precarious and of lower quality, and where migrant workers remain overrepresented – a pattern reinforced in sectors undergoing demographic pressures (e.g. care) and green transition (e.g. construction). Moreover, rising political extremism, including the growth of political forces promoting welfare chauvinism, risk further limiting migrants' access to rights and services, with adverse consequences for equality of opportunity. Leverage points of intervention to address challenges in equality of opportunity include equitable access not only to essential and enabling services, such as education and healthcare, but also to better working and employment conditions.

Third, technological and environmental changes are expected to affect **disadvantaged social groups** the most if their distributional effects are not mitigated. AI adoption could widen income gaps if gains are not equitably distributed. Digitalisation of services risks excluding those lacking connectivity or digital skills, while algorithmic decision-making can replicate bias and reinforce discrimination in access to benefits or social entitlements. Finally, climate change impacts are likely to weigh most heavily on disadvantaged groups – often already working in though physical working conditions – without means to adapt, while the green transition policies can have regressive distributional effects if not designed fairly.

Fourth, **spatial disparities** – particularly between urban and rural areas – pose growing challenges to equality. Unevenness in availability, accessibility and quality of services, infrastructure development, AI and automation exposure, and demographic dynamics (including out-migration) shape diverging life chances across regions and geographical areas.

The report also highlights how labour market dynamics and social inclusion are closely interlinked. Two vicious circles – the '**intergenerational poverty and social exclusion trap**' and the '**low-quality jobs and un(der)employment trap**' – are found to limit upward mobility. A systemic approach that addresses access to services, employment opportunities, and job quality simultaneously can help break these cycles and promote more inclusive outcomes.

RQ4: What could be the challenges that are expected to impact the sustainable development of inclusive societies?

The study examined the potential challenges expected to impact the sustainable development of inclusive societies. First, the **uneven distributional effects** of technological change and the green transition could deepen inequalities and fuel social and political tensions and public discontent. In the case of the green transition, this may lead to resistance or backlash, especially in regions or sectors facing job losses or higher living costs.

Second, this discontent can feed into the rise of **political extremism and far-right forces**, threatening social cohesion and democratic institutions. This trend can foster welfare chauvinism, excluding migrants and marginalised groups from social protection and services.

Third, **AI** presents additional risks, particularly in digital communication platforms where algorithmic systems may amplify polarising content, eroding the quality of public debates. In parallel, the concentration of AI development and data control within a small number of private firms raises concerns regarding the distribution of power, distortions in market functioning, and democratic oversight. Finally, algorithmic management might concentrate power with employers, both on (online) labour platforms and in traditional employment settings, unless countervailing forces are in place protect worker agency and voice.

Finally, industrial relations can be impacted by key drivers of change, such as technological advancements, AI adoption, and organisational shifts, which may shift the balance of power from workers to employers, undermining **collective bargaining and social dialogue**. These mechanisms are vital for protecting workers, enabling workplace democracy and participation, and fostering consensus, but their effectiveness could be weakened by declining union density and fragmented employment relations. Strengthening social dialogue and collective bargaining is therefore crucial for reinforcing the social fabric and supporting inclusive democratic governance.

In conclusion, this study has examined the key challenges and opportunities that are likely to shape the future of a social and inclusive Europe. It has highlighted the significant impacts of technological, environmental, geopolitical, and demographic changes on labour markets, skills, job quality, and social inclusion. The report provides a foundation for developing a proactive policy approach, focusing on equitably addressing skill gaps, improving access to quality employment, and ensuring social inclusion across all regions. The need for policies that strengthen social dialogue and promote the sustainable development of inclusive societies will be critical in responding to these dynamics, ensuring that the opportunities presented by future transitions are shared broadly, and preventing the risk of deepening inequalities.

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Annexes

Annex A. Research process

Table A1. Overview of the research activities and link to research questions

Research activities	Task description	RQs
Literature review	This activity involved a comprehensive review of academic and grey literature, including foresight studies, EU strategic documents, and reports. The focus was on a) key drivers of change; b) impacts on labour (and skill) supply and demand; c) impacts on social inclusion aspects; and d) opportunities and challenges for a social and inclusive Europe. This task formed the basis for the other activities.	**RQ1 RQ2 RQ3 RQ4**
Comparative quantitative analysis	A comparison of available quantitative projections of skill supply and skill demand, as well as estimates of occupational automation risk, was conducted for this study. This activity synthesised labour market trends, job displacement, and skills mismatch projections, providing data-driven insights into how demographic, technological, and environmental changes will impact the demand and supply of skills.	**RQ1 RQ2**
Expert interviews and stakeholder workshop	Two qualitative research activities were carried out: a) a set of eight semi-structured interviews with experts in a variety of fields; and b) one workshop with nine stakeholders from European organisations. These activities provided qualitative insights to complement the literature review and the comparative quantitative analysis. They also shed light on potential secondary and tertiary effects of drivers of change and labour market dynamics on equality of opportunity and the sustainable development of inclusive societies.	**RQ1 RQ2 RQ3 RQ4**
Systemic analysis of interdependencies	This activity identified the interactions between the various elements of the analytical framework and mapped out systemic effects of drivers of change. The emphasis was on interdependencies between skills demand, skills supply, skills matching, and the risk of inequality and social exclusion. The main method adopted was a systems mapping workshop among CEPS researchers from a variety of fields. This helped uncover potential secondary and tertiary effects and informed the analysis with a focus on equality of opportunity and sustainable development of inclusive societies.	**RQ3 RQ4**
Refinement of analytical framework	On the basis of findings from all activities, a final step involved the refinement and updating of the analytical framework, ensuring it captures both immediate and long-term impacts of key challenges.	**RQ1 RQ2 RQ3 RQ4**

Annex B. Literature review

Box B1. Literature review process

The literature review process involved several steps. First, titles and abstracts of documents retrieved from databases, search engines, and publication pages from international and EU institutions were scanned to filter out studies that were clearly irrelevant. For example, papers that lay outside the geographical scope (EU27), were published more than ten years ago, were not up to date with the most recent developments, or were unrelated to the key themes of this study were excluded. For documents passing the initial screening, a review of the full text was conducted to ensure alignment with the research questions. The review prioritised future-oriented studies and policy papers from institutions and reputable organisations, while sources with unclear methodologies and anecdotal evidence were disregarded. A clear record of the selected literature was maintained throughout the process to ensure transparency, accountability, and reproducibility (**Table B1**). The selected sources were reviewed with the help of a specific assessment framework (**Table B2**). For each source, information was compiled on publication type, type of analysis, time coverage or horizon, geographical scope, sectoral or socio-demographic focus (if any), and relevant insights on each of the elements making up the analytical framework. The preliminary findings of the literature review informed all the subsequent research steps and activities.

Table B1. Overview of sources collected for the literature review

Reference	Thematic areas covered	Publication type
Alexander, et al. (2024), *Green jobs and the future of work for women and men*	Environmental change, labour market impacts, gender inequality	Working Paper
Asikainen (2021), *The future of jobs is green*	Environmental change, labour market impacts, regional dimensions	Report
Boffi, Suari-Andreu, and van Vliet (2024), *Decomposing the net fiscal position of migrants in Europe*	Demographic change, migration, social inclusion	Working Paper
Causa et al. (2024), *Labour market transitions in the greening economy: structural drivers and the role of policies*	Environmental change, labour market impacts, regional dimensions	Working Paper
Cedefop (2022), *Setting Europe on course for a human digital transition: new evidence from Cedefop's second European skills and jobs survey*	Technological change, job quantity, job quality	Report
Cedefop (2024), *Digital skills ambitions in action: Cedefop's skills forecast digitalisation scenario*	Technological change, job quantity	Report
Eurofound (2021a), *Digitisation in the workplace*	Technological change, job quantity, job quality	Report
Eurofound (2021b), *The Digital Age: implications of automation, digitisation and platforms for work and employment*	Technological change, job quantity, job quality	Report
Eurofound (2022), *The cost-of-living crisis and energy poverty in the EU: social impact and policy responses: background paper*	Geopolitical and environmental change, social inclusion	Report

Reference	Thematic areas covered	Publication type
Eurofound (2023a), *Impact of climate change and climate policies on living conditions, working conditions, employment and social dialogue: a conceptual framework*	Technological change, organisational change, job quality	Report
Eurofound (2023b), *Intergenerational inequalities: how to close the gaps?*	Social inclusion, inequality	Report
Eurofound (2024), *Working conditions and sustainable work: Job quality side of climate change*	Environmental change, job quality	Research Report
Eurofound and EEA (2023), *The transition to a climate-neutral economy: exploring the socioeconomic impacts*	Environmental change, social inclusion	Research Report
European Agency for Safety and Health at Work (EU-OSHA) (2024), *Digital technologies at work and psychosocial risk*	Technological change, job quality	Research Report
European Commission (2023b), *Strategic foresight report 2023*	Drivers of change, labour market impacts, impacts on social cohesion	Report
European Commission (2023c), *The future of social protection and of the welfare state in the EU*	Drivers of change, labour market impacts, impact on welfare states and social inclusion	Report
European Commission (2024a), *Employment and social developments in Europe 2024*	Current labour market developments, current social inclusion developments, social convergence	Report
European Commission (2024b), *Labour market and wage developments in Europe: annual review 2024*	Current labour market and wage developments	Report
European Commission (2024c), *Ninth report on economic, social and territorial cohesion*	Drivers of change, economic, social and territorial cohesion	Report
European Commission, Joint Research Centre & Aloisi, A. (2025), *Integrating the EU twin (green and digital) transition? Synergies, tensions and pathways for the future of work*	Environmental change, technological change, labour market impacts	Working paper
European Commission, Joint Research Centre, Gonzalez Vasquez, et al., (2024), *Digitalisation and workers wellbeing: the impact of digital technologies on work-related psychosocial risks*	Technological change, job quality	Working Paper
European Committee of the Regions (2022), *Small urban areas – a foresight assessment to ensure a just transition*	Environmental change, demographic change, regional dimension	Report
European Labour Authority (2024a), *Report on labour shortages and surpluses 2023*	Labour market impacts, labour and skills shortages	Report
European Labour Authority (2024b), *The impact of labour shortages and surpluses on EURES services by 2030: strategic foresight summary report*	Labour market impacts, labour and skills shortages	Report
Greve (2017), *Technology and the Future of Work*	Technological change, labour market, impact on welfare states	Book
Grossi and Rayner (2023), *The socio-ecological dimension of the Green Deal Industrial Plan*	Environmental change, labour market and social inclusion impacts	Book Chapter

Reference	Thematic areas covered	Publication type
Matti, et al. (2024), *Towards a fair and sustainable Europe 2050: social and economic choices in sustainability transitions*	Environmental change, social inclusion	Policy Brief
National Academies of Sciences, Engineering, and Medicine (2024), *Artificial Intelligence and the Future of Work*	Technological change, labour market impacts	Book
OECD (2018a), *Assessing the role of migration in European labour force growth by 2030*	Demographic change, labour market impacts	Working Paper
OECD (2018b), *The future of social protection: what works for non-standard workers?*	Organisational change, labour market impacts, social protection	Report
OECD (2024a), *Assessing potential future artificial intelligence risks, benefits, and policy imperatives*	Technological change, labour market impacts	Policy paper
OECD (2024b), *Megatrends and the future of social protection*	Drivers of change, labour market and social inclusion impacts	Report
OECD (2024c), *Modernising access to social protection: strategies, technologies and data advances in OECD countries*	Drivers of change, social inclusion	Report
Pinkus and Ruer (2025), *The demographic divide: inequalities in ageing across the European Union*	Demographic change	Policy brief
Urban et al. (2023), *Jobs for the green transition: definitions, classifications, and emerging trends*	Environmental change, labour market impacts, eco-social inclusion	Study
World Economic Forum (2025), *The future of jobs report 2025*	Drivers of change, labour market impacts	Report

Table B2. Assessment framework of the reviewed literature (examples)

	Example 1: World Economic Forum (2025), *The Future of Jobs Report 2025*	Example 2: OECD (2024), *Megatrends and the future of social protection*
Publication type	Report (Grey)	Report (Grey)
Type of analysis	Overview of global labour trends, particularly from business perspective	Stocktaking exercise of existing mega-trends and their future impact on social protection systems
Years covered/Time horizon	2025-2030	Not specified, inferred horizon is 2015-2035
Geographical scope	Global	OECD member countries
Sector- or industry-specific?	Not in methodology, some findings are specific, dedicated sectoral section	No, some findings note some sectors especially exposed to technological and climate change
Analytical framework elements covered	Labour demand, to lesser extent: drivers of change, changes in labour market, challenges	Changes in social inclusion, lesser extent: drivers, changes in labour market

	Example 1: World Economic Forum (2025), *The Future of Jobs Report 2025*	Example 2: OECD (2024), *Megatrends and the future of social protection*
Methodology	Survey of 1,000 global employers (22 industries; 55 economies; 14 million employees). Job data from ILO, Coursera & LinkedIn (specific methodology not clarified)	Literature review of existing OECD research on the topic, no sustained or explicit methodology
Findings on drivers of change	Three big drivers: growing digital access, increasing cost of living (inc. inflation), carbon emissions reduction, economic slowdown and focus on labour and social issues also significant Three new technologies driving change: AI information processing, robots, and energy generation, storage, and distribution Geoeconomic macro-trends: increased govt. subsidies and industrial policy, geopolitical fragmentation and conflict, restrictions to global trade	Ageing population, technological change (AI in particular), women greater labour force activity (extensive and intensive margins), men increasingly underemployed, platform work rising (but still a small employment share with earnings often used to supplement other income)
Findings on labour market impacts	Jobs: estimated net 7 % increase in total employment by 2030 compared with today (14 % created; 8 % lost/displaced), increased demand for healthcare in high income countries, linked to ageing pop. All 3 geoeconomic trends to be net-job creators (only ~ 5M between them) Slow growth to displace 1.6 million jobs globally. 40 % of businesses planning on reducing staff because of evolving skills demand. Wages good - only 7 % of surveyed businesses foresee decreasing wages as a share of revenue (driven by increased productivity and competition) Skills: increased demand for technological, climate-related, human-centred (soft), and 'frontline' (e.g. farmworkers, construction workers) skills, broadly similar across region and sector, biggest fall in demand for clerical and administrative workers [detailed job-level analysis - pp. 18-32], ~ 39 % of a worker's skill set will be transformed or outdated by 2030 Increased demand for upskilling and other ALMPs (59 % of workers need upskilling before 2030)	Uncertain, AI not yet net displacing jobs, though evidence of changing occupational/skill composition, wages seem slightly depressed by robotics, while AI has a slightly positive or negligible effect. Climate change may drive poorer quality work (extreme weather events)
Findings on social inclusion impacts	AI expected [not quantified] to replace human work with impacts on inequality and unemployment Ongoing cost of living crisis particularly acute for LMICs and people	Trend of men working part-time suggests worsening social protection and possibly SI, self-employment is on a slow decline (since 1950s) - good, as less access to SP & SI, platform work rising – bad for same reason Rising productivity via AI/tech vital to offset driver of demographic change & sustain public expenditure (on SI policies), high risk profit will mostly accrue to capital not workers

	Example 1: World Economic Forum (2025), *The Future of Jobs Report 2025*	Example 2: OECD (2024), *Megatrends and the future of social protection*
		Green Transition impacts concentrated on workers at high risk of social exclusion, high exposure to long-term unemployment, with high costs of job reallocation Women still bear brunt of unpaid care work, and households are increasingly more fragmented - implications for women's access to social protection
Findings on challenges	Large and persistent skills mismatches Need for greater in-work reskilling 8 % of current jobs lost or displaced	Net-zero transition is likely to disproportionately affect men who are older, male, rural, with lower levels of education High risk of productivity gains from new tech accruing to capital not labour Poorer quality work in climate-exposed work Long-term unsustainability of public expenditure without productivity growth, exacerbated by continued rise in cost of living

Annex C. Methodological information on labour market forecasts

Box C1. Collected forecast sources and their underlying methodologies

The analysis relies on available forecasts of labour demand and labour supply. Based on the latest available Cedefop data, labour market mismatches are also considered. To the extent possible, depending on data availability, the variables mentioned were broken down by sector, occupation, level of education, age bracket, and region (some of these aspects are considered when analysing the selected Member States in **Annex D**).

This part of the investigation relies on both supranational and national sources. The first set of sources consists of selected forecast indicators by Cedefop, Eurostat and JRC (detailed in **Table C1**), while the second is based on national data. Cedefop provides detailed insights into labour market forecast trends across Europe through its Skills Forecast project (release 2025), including comprehensive insights into the expected labour demand, and mismatches for the EU27 and each of the 27 Member States. The most recent forecast, which extends to 2035, utilises standardised data and a unified methodology, ensuring comparability within the EU. The data referring to the labour supply side are instead based on Eurostat population projections and on JRC working age population and labour market participation forecasts.

National employment market forecasting programmes may employ more specialist approaches and provide greater depth. Although several Member States extend their forecasts beyond the next decade, to our knowledge, long-term projections are not accessible for all 27 of them. At the Member States level, forecasts may focus on short- and medium-term timeframes. However, we emphasise studies that employ methodology for predictions extending into the late 2020s and beyond. A comparison between the forecasting methodology adopted by Cedefop and one of the selected Member States is discussed in **Box C2**.

Box C2. Comparison between supranational (Cedefop) and a case of national (Bulgaria) forecasting methodology

EU-wide models and national models are complementary: in this case, while **Cedefop's model offers a harmonised EU-wide outlook**, Bulgaria's **more flexible, detailed national model** is better suited to **local labour market planning**. As explained in Simeonova-Ganeva et al (2019a, 2019b), the two models are similar in several respects. Indeed, both are modular-based, and the structure and content of labour supply source information are similar to both techniques. As far as the differences are concerned, the following have been identified:

Modelling framework/structure

- **Cedefop**: i) uses a multi-country, top-down macroeconomic model developed with the European Commission and Cambridge Econometrics; ii) projections are driven by macroeconomic assumptions and use a consistent production function model; iii) relies on historical trends, economic structures, and future assumptions to model GDP, productivity, and employment growth; and iv) the model focuses on sectoral employment by qualification and occupation.
- **Bulgaria**: i) uses a nationally developed, bottom-up modelling system, tailored to local labour market specifics; ii) combines econometric forecasting with expert assessments and administrative data; iii) includes multiple modules such as labour supply (demography, participation), labour demand (sector, occupation, education), imbalance analysis; iv) allows for flexibility, taking into account policy scenarios and sector-specific developments.

Data sources

- **Cedefop** uses harmonised EU datasets, including Eurostat Labour Force Survey, National Accounts, and European System of National and Regional Accounts (ESA).
- **Bulgaria** uses local administrative sources (e.g. National Employment Agency, Ministry of Education records, National Statistical Institute microdata) and integrates employer surveys and qualitative expert input, offering greater specificity to national needs.

Labour market indicators and outputs

- **Cedefop** provides projections for expansion demand, replacement demand, including employment by sector, occupation, and education level.
- **Bulgaria** prioritises expansion demand. However, the replacement demand is not estimated. This omission is because in Bulgaria, a significant number of older labourers continue to work beyond the age of retirement, as well as data limitations. The model conducts a more thorough examination of labour market imbalances, identifying structural surpluses and shortages by sector, region, and educational level.

Table C1. Overview of sources for labour market forecast

Supranational sources for EU27 and 27 Member States
Source: Cedefop **Time coverage**: Time series up to 2035 and growth rate 2022-2035 **Variables used**: - Future employment growth (%), by sector and occupation. - Future annual employment growth (%), by sector and occupation and qualification. - Future employment needs for 2022-2035, which is an indicator of labour demand, providing the number of people who will be required to work in an occupation in the forthcoming years. The demand for these people is broken down by: i) new/lost jobs (expansion demand) indicates the net change in employment caused by the creation of new jobs and the destruction of some of the existing ones (it can be positive or negative); ii) replacements (replacement demand) refers to the number of people required to replace workers who have changed jobs or left the labour market, such as retirees; and iii) total job openings are the sum of 'new/lost jobs' and 'replacements'. - Labour and skills shortage index. 'The index focuses on three pillars driving labour shortages: demand, where high-growth occupations may outpace skill provision; supply, highlighting replacement needs as workers retire or change careers; and imbalances, identifying mismatches between job qualifications and requirements. […] Each occupation's shortage is ranked from 1 to 4, with 1 indicating no shortage or surplus and 4 indicating an intense shortage.' See https://www.cedefop.europa.eu/en/datasets/labour-skills-shortage-index.
Source: Lutz, W., G. Amran, A. Belanger, A. Conte, N. Gailey, D. Ghio, E. Grapsa, et al., *Demographic Scenarios for the EU*, Publications Office of the European Union, Luxembourg, 2019, Joint Research Centre (JRC) of the European Commission, in collaboration with the International Institute for Applied Systems Analysis (IIASA). For the workforce projections and the dependency ratio, five different scenarios are compared. The scenarios rely on various combinations of assumptions concerning fertility, migration, mortality, and participation rates. The central scenario: 'Central scenario represents the future of the EU-28 population assuming slightly increasing fertility and flows of approximately 2 000 000 immigrants from third countries into the EU every year. Medium assumptions on mortality and education levels includes intra-EU mobility and uses the recent average for migration rates (2013-2016)'. The ZIM scenario simulates a significant halt in migration. Scenarios of increased immigration and higher fertility rates indicate potential demographic growth. For labour participation, three additional specific scenarios are introduced, including labour market/social policies: the constant scenario, the equalisation scenario, and the Swedish (or increased participation) scenario. The constant scenario assumes that the gender gap in participation rates remains unchanged. The equalisation scenario assumes that the participation rate of women and men equalises over time because of significant policy efforts that lead to the removal of barriers to female workforce participation. The participation rate among older workers improves slightly, with a primary focus on achieving gender equality. The increased participation scenario mirrors the high participation rates observed in Sweden, particularly among women and older workers. Women participate at similar rates to men, thanks to strong work-life balance policies. The retirement age is extended, and older adults remain in the workforce for longer as lifelong learning initiatives ensure that older workers remain skilled and employable. **Time coverage**: 2022-2100 **Variable used**: proportion of population aged 15-64, young age dependency ratio, net migration (code:proj_23ndbi)
Source: Eurostat, 'Population Projections in the EU', 2023. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Population_projections_in_the_EU. **Time coverage**: up to 2060 **Variable used**: working age population 20-64, labour market participation

Table C2. Share of population aged 65 and above and the total age-dependency ratio in 2015, 2040 and 2060 in the EU28, by scenario

Year	Central scenario	ZIM	ZIM +10 % fertility	ZIM +25 % fertility	ZIM +50 % fertility	High immigration
% POPULATION 65+						
2015	19	19	19	19	19	19
2040	28	30	29	28	27	26
2060	32	34	33	30	27	29
TOTAL AGE-DEPENDENCY RATIO						
2015	76	76	76	76	76	76
2040	99	103	106	112	121	93
2060	114	118	122	125	130	104

Note: ZIM = Zero International Migration. Total age dependency ratio = a ratio between the economically inactive (age 0-19 and 65+) and the working age population (age 20-64).

Source: JRC/CEPAM.

Annex D. Selected Member State forecasts based on national data

Belgium – Flanders

In Flanders, studies have focused on future employment needs (Neefs and Vansteenkiste, 2022), distinguishing between age groups and sectors. In this case, a sector projection has been used based on two alternative growth scenarios: 'Scenario 1' (continuation of historical growth) and 'Scenario 2' (based on HERMREG economic forecasts). A focus is dedicated to social workers (Hannon and Vansteenkiste, 2024). Projections extend up to 2030. The challenges and strategies needed to achieve an 80 % employment rate in Flanders by 2030 are also considered (Vansteenkiste and Theunissen, 2022). The main conclusions of these studies follow.

The general trend in employment growth shows **a gradual increase in the total recruitment needs** in the Flemish Region up to 2030. Moreover, **the demand for future employment needs will be substantial because of the replacement needs**. The vast majority (94 %) of recruitment needs come from replacing workers who leave their jobs (replacement demand), rather than from job growth (expansion demand).

A more in-depth analysis of the dynamics of outflows distinguishes between age groups and shows that **although ageing is important, it plays a significantly smaller role in recruitment needs than the turnover of younger workers**. This insight challenges the common perception that ageing is the main issue and shifts the focus towards retention and mobility management for younger employees:

- For those ***under 55***, there is higher job mobility, as younger people are more likely to change jobs frequently, either within or between sectors, or due to them becoming unemployed/inactive or self-employed, or migration. The contribution to recruitment needs is estimated at 80 %.
- For those ***over 55***, the primary reason for leaving is retirement, but it also includes mortality or early exit. The contribution to recruitment needs is estimated at 14 %.

The highest expansion demands are observed in sectors that are either rapidly growing (such as ICT and business services) or linked to demographic changes (such as social services). Traditional public sectors and those hit by the pandemic (such as hospitality) show low or negative expansion demand.

The most significant replacement demand is seen in sectors with high job mobility, such as hospitality, business services, and retail. Public sectors and educational institutions exhibit diminished replacement requirements owing to job stability and extended tenure.

Employment growth for social workers is projected to slow, while the relative recruitment need remains high, primarily driven by the need to replace an ageing

workforce (Hannon and Vansteenkiste, 2024). In particular, a significant proportion of current professionals are over 55 years and are expected to exit the labour market in the coming years. This demographic shift is expected to generate a sustained demand for new entrants into the profession. Social workers are in high demand for various reasons: i) the ageing population, which requires services such as elder care, social assistance, and health-related social work; ii) social challenges and inequality (poverty, homelessness, mental health problems, and addiction are persistent or increasing in many regions); iii) increase in specific groups (migrants, refugees, people with disabilities, and those affected by social exclusion.

Reaching an 80 % employment target in the Flemish labour market requires structural policy changes (Vansteenkiste and Theunissen, 2022). The projection model evaluates three scenarios: Demography (75.9 %), BAU (75.2 %), and IMPACT (76.6 %). Even in the best scenario, a gap of 3.4 percentage points remains. To close this gap, policies must focus on activating underrepresented groups, including the long-term unemployed, older workers, and non-working populations.

Bulgaria

The principal long-term projection study in Bulgaria extends to 2034 (Simeonova-Ganeva et al., 2019a; 2019b). It focuses on analysing the evolution of labour supply and potential structural imbalances in the Bulgarian labour market. A part of the study delves into the provincial level.

A negative demographic trend (decline in the working-age population) is the primary driver behind the projected decrease in employment. Throughout the prediction period up to 2034, both the employment level and the working-age population (aged 15-64) are projected to decline. As the working-age population declines more swiftly than employment levels, the employment rate remains steady or experiences a slight increase.

In terms of sectors and occupations, the long-term forecasts are based on different scenarios, and while the magnitude of change may differ across scenarios, the leading occupations and sectoral trends identified in the baseline scenario remain consistent.

- **The manufacturing sector will maintain its leading position.** In contrast, **wholesale and retail trade will see a significant decline in employment.** In the ICT sector, information technologies and services will remain dominant, with a slight decrease in employment. The construction sector is expected to experience modest growth, while the transportation sector is projected to decline slightly.
- In terms of occupations, the long-term forecast reflects the **evolving structure of the Bulgarian labour market, shifting towards more skilled and service-oriented occupations.** Consequently, a strong demand for

healthcare professionals, educators, ICT specialists, and administrative roles is anticipated by 2034.

- **The labour demand by educational attainment level will vary significantly across sectors.** By 2034, sectors where primary education plays a major role will include vehicle manufacturing and textile manufacturing. Upper secondary education will be most significant in the textiles, transportation, and basic metals sectors. Tertiary education will be predominant in the fields of ICT, education, and publishing and broadcasting.

Mismatches are recognised as a critical challenge in the Bulgarian labour market. In the long-term projections, such mismatches are primarily driven by educational attainment gaps and regional economic disparities. While improvements are expected in the long term, structural imbalances between qualifications and job requirements are likely to persist in several sectors and regions.

At the provincial level, an uneven distribution of employment is observed, and it is projected to persist in the long term. This is mostly due to urban-rural disparities and regional economic inequalities. Employment levels tend to be concentrated in large metropolitan and economic centres, such as Sofia City, Plovdiv, Varna, and Burgas, where economic prospects are more accessible, driven by industries, services, and administrative responsibilities. Conversely, provinces situated in northern Bulgaria and other rural or economically disadvantaged areas, such as Vidin, Montana, and Silistra, exhibit markedly lower employment rates. The disparities stem from past economic development trends, wherein urban centres and capitals have profited from investment, infrastructure, and service sector growth, while rural and isolated regions have fallen behind.

Finland

Long-term labour market forecasts in Finland are limited, primarily focusing on labour supply dynamics. The main source of these forecasts is the Bank of Finland (Kokkinen, Jalasjoki, and Obstbaum, 2025), which uses a forecasting methodology based on three scenarios (the 'No Policy Change Scenario', the 'Baseline Scenario', and the 'Optimistic Scenario') up to 2060. However, when it comes to skill anticipation[11], Finland stands out among Member States for initiating a long-term project led by the Finnish Education and Training Forum (Opetushallitus, 2019). This initiative aims to identify the most essential skills and competencies needed in the

[11] This belongs to the so-called 'labour market skills intelligence' (LMSI), defined as the '[o]utcome of a knowledge-driven process of collecting, selecting, combining and presenting evidence to map and anticipate labour market and skills trends' (Van Loo, 2021). More generally, it is meant as a skills anticipation mechanism that has been recognised as a fundamental tool, also in the selection of the training opportunities.

future and to forecast skill requirements in various growth sectors, taking into account expected changes in job structures.

The long-term labour supply in Finland is expected to decrease, primarily as a result of demographic changes. Although immigration and increased labour force participation offer temporary relief, they are insufficient to fully mitigate the declining working-age population. More specifically, in the no-policy-change scenario, the labour supply is expected to start declining from the 2040s because of a shrinking working-age population and stagnant human capital. In the baseline scenario, the labour supply remains stable through the 2030s but starts to decline from the 2040s, with improved immigration policies and modest increases in higher education levels providing partial support. In the optimistic scenario, the labour supply remains stable until the 2060s before declining, sustained by a high immigration rate and significant improvements in educational attainment.

Since labour supply is projected to decrease in the long term, economic growth will increasingly depend on labour productivity. The latter is essential to offset the declining number of working hours and maintain GDP growth, and in the optimistic scenario, higher productivity, driven by education and R&D investments, compensates for the reduced labour input.

As per the **skill anticipation up to 2025** (Opetushallitus, 2019), the main results, based on a mixed methodology encompassing expert analysis, survey data, and foresight workshops, are as follows:

- **The most important skills for the future are categorised into two main groups**: i) **Key generic and general working life skills** that are cross-cutting, foundational skills needed across all industries and roles such as ‘learning ability’, ‘self-direction’, ‘problem-solving’, ‘digital competence’ and ‘information evaluation’; and ii) **Most important skills in the long term** across all sectors including ‘meta-skills’ (e.g. adaptability, emotional intelligence, and resilience highlighted as key for handling the speed and scope of technological change), ‘sustainable development knowledge’, ‘customer-oriented service’ and ‘teamwork and networking’.
- In various growth sectors, certain core competencies emerged as consistently important: i) digital capabilities: strong need for workers who can use digital platforms and tools across all industries; ii) information evaluation: needed to interpret complex data and make sound decisions; iii) remote work and service management (essential in fields offering virtual services or distributed workforces); iv) IoT and smart systems skills (especially needed in manufacturing, logistics, and tech-heavy industries); and v) sustainability knowledge (key in industries aiming for greener operations, like energy, construction, and manufacturing).

France

The principal long-term projection study in France, conducted by France Stratégie and DARES (2022) forecasts employment needs up to 2030. It addresses both replacement demand and expansion demand, focusing on trends within specific sectors and occupations. On the labour supply side, the report examines factors affecting the participation rate, including demographic changes and shifting rates among different groups. It also highlights the increasing influx of better-educated young workers entering the workforce. A dedicated section analyses regional disparities. The forecasting methodology includes five scenarios: i) baseline, ii) low-carbon, iii) digital transformation, iv) Covid-19+, and v) high-growth. The main results presented are based on the baseline scenario.

Expansion demand is primarily concentrated in sectors characterised by technological innovation, demographic shifts, and evolving economic demands. The information technology and digital services sector leads this trend, driven by digital transformation and the expansion of remote work. Healthcare and social assistance also exhibit robust growth, influenced by the increase of healthcare needs and technological advancements. The green economy, particularly in renewable energy and construction, is expanding because of environmental policies and sustainability initiatives. Research and development, alongside high-tech industries, benefit from ongoing innovation and investment. Additionally, business services, including consulting and financial analysis, are experiencing growth because of the complexity of modern business environments.

The working-age population is projected to either decline or stagnate by 2030. This trend is primarily attributed to low birth rates and ongoing demographic transitions. Such a decline raises concerns about potential labour shortages, particularly in manual and low-skilled occupations where attracting younger workers may become increasingly challenging.

The labour force participation is projected to undergo significant changes up to 2030, primarily influenced by demographic trends, educational shifts, and labour market policies. Efforts to increase female participation through policies that support work-life balance and flexible working arrangements are expected. Addressing labour gaps may also involve relying on migrant workers, particularly in sectors that require low-skilled or manual labour.

Jobs requiring higher education qualifications are expected to increase by 2030, and the younger population is expected to attain higher levels of education. This trend reflects a growing focus on academic and professional qualifications, particularly within the digital, healthcare, and business service sectors. However, this shift also implies a potential shortage of workers in occupations that do not require advanced qualifications, as fewer young people are opting for vocational training in manual trades.

Significant regional disparities in labour market dynamics are expected to persist up to 2030. Urban areas, particularly larger cities such as Paris, Lyon, and

Marseille, are expected to attract more skilled and younger workers thanks to the concentration of educational opportunities and high-skilled job opportunities. In contrast, rural and declining industrial areas, such as parts of Hauts-de-France, Grand Est, and rural Occitanie, may face labour shortages, particularly in manual or low-skilled sectors, including agriculture, manufacturing, and basic services. Regions involved in green transition projects, like Nouvelle-Aquitaine and Auvergne-Rhône-Alpes, which focus on renewable energy and building renovations, are likely to experience job growth, while other areas may see slower employment expansion. Additionally, sectors such as transport, logistics, and tourism may struggle with recruitment in regions lacking a young workforce, such as Normandy and Bourgogne-Franche-Comté, creating regional mismatches. To address these disparities, the report suggests enhancing workforce mobility and improving access to training in affected areas.

Beyond 2030, the report predicts that the French labour market will continue to face demographic challenges, particularly because of an ageing population and a declining working-age cohort, resulting in persistent labour shortages in certain sectors. Technological advancements are likely to accelerate, creating new roles while increasing the risk of job displacement due to automation. The trend of job polarisation may persist, with high-skilled and low-skilled roles expanding while mid-skilled jobs decline. The transition to a low-carbon economy will further shape job creation, emphasising the need for green skills and sustainable practices. Long-term workforce planning will necessitate adaptable educational policies to meet the evolving demands of a knowledge-driven and digitally transformed economy.

Italy

In Italy, IRPET (Istituto Regionale Programmazione Economica della Toscana) conducts long-term forecasting for the entire country, as well as for the Tuscany region specifically (Maitino, Ravagli, and Sciclone, 2020). Among other factors, certain labour market-related variables are included for a timeframe extending to 2050. From a methodological standpoint: i) the *'basic scenario'* emphasises existing legislation and consistent economic development; and ii) the *'official scenario'* adjusts to more conservative labour assumptions. Discrepancies primarily arise after 2033, as the official scenario indicates marginally enhanced pension replacement rates compared with the basic scenario. Main results are described based on the basic scenario.

The general trend in labour supply up to 2050 indicates a significant reduction, albeit a brief stabilisation period from 2035 to 2044. The workforce is expected to diminish over time, and by 2050, the economy is expected to encounter labour shortages, with unemployment rates approaching near-zero levels. More specifically, by 2035, the labour supply is expected to steadily decline because of diminishing birth rates and a reduced influx of new workers, somewhat offset by older workers postponing retirement as a result of pension reforms. Between 2035 and 2044, the labour supply stabilises as older employees remain in

the workforce, reinforcing its composition. Between 2044 and 2050, a notable decline transpires as the baby-boom generation retires *en masse*, and the younger demographic is unable to sustain workforce levels.

Both quantitative and qualitative labour market mismatches are projected to decrease over time:

- The ***quantitative mismatch***, defined as the gap between labour demand and supply, is expected to diminish because of a reduction in labour supply following the retirement of the baby-boom generation and fewer young workers entering the market. As labour demand grows, this gap will narrow, leading to a structural reduction in unemployment by 2040, approaching zero.
- The ***qualitative mismatch***, which occurs when workers' education or skills do not align with job requirements, is also projected to decrease until 2038. This improvement is attributed to the increasing educational attainment of younger generations. However, the model anticipates that overqualified individuals, particularly graduates, may increasingly accept lower-skilled jobs when more suitable positions are unavailable.

As far as the region of **Tuscany** is concerned:

- The ***labour supply*** is expected to align with the national trend, exhibiting a gradual decline until 2035, followed by a period of temporary stability from 2035 to 2044, and a notable decrease commencing in 2044 due to the retirement of the baby-boom generation.
- The ***quantitative mismatch*** is expected to decrease, influenced by a shrinking workforce and consistent demand. The ***qualitative mismatch*** is projected to diminish by 2038, in line with the national forecast.

Latvia

The report prepared by the Ministry of Economics in Latvia (2024) is the main source for the labour market forecast that extends up to 2034. It analyses labour market variables from both demand and supply perspectives, highlighting the importance of matching educational qualifications with occupational demands. A part of the report is dedicated to regions. From a methodological perspective, the report primarily considers one main scenario, referred to as the 'Target Scenario of Economic Growth' (based on Latvia's strategic planning documents, including the Sustainable Development Strategy of Latvia up to 2030 and the National Development Plan for 2021-2027).

Employment levels are projected to rise moderately until 2030, followed by a slight decline in the long term, driven by demographic factors and increased productivity. The most significant long-term increase in new jobs is expected in construction, professional, scientific, and technical activities, as well as information and communication.

Replacement demand could account for nearly 70 % of the total vacancies in the Latvian labour market by 2040. The greatest need for high-qualification roles is expected among professionals, especially in education and healthcare, while medium-qualification occupations, such as operators, personal care workers, and agricultural workers, will also face substantial demand.

Economic growth in the long term will increasingly be driven by productivity growth rather than the number of employed. This means that while new jobs will still be created, the focus will be on increasing output per worker rather than hiring more employees.

Workforce availability in Latvia by 2040 will be significantly impacted by the demographic shift and migration. The population is projected to decline primarily because of an ageing population and low birth rates. While immigration, particularly from Ukrainian refugees, has temporarily slowed the decline, this effect may not be sustained as some refugees may return or move to other EU countries. Despite these challenges, positive net migration is expected from 2027 onwards, potentially reducing the long-term demographic imbalance.

Labour force participation is expected to increase in the medium term, driven by economic growth, increased economic activity, and rising wages. The economically active population is expected to increase by 2030. However, after 2030, demographic factors are expected to take precedence, leading to a slight decline by 2040 (1 % lower than in 2023). The most significant increase in participation is expected among pre-retirement age groups (60-64) and young people (15-24).

By 2040, the demand for labour will continue shifting towards specialists with higher education, but there will still be significant disparities between demand and supply across different education segments. The most substantial labour shortage is expected among high-qualification specialists, particularly in STEM fields, while there may be a surplus in social sciences and humanities.

Latvia's labour market exhibits significant regional disparities, primarily between urban and rural areas, as well as between the eastern and western regions. Urban centres, particularly Riga and its surrounding areas, benefit from lower unemployment rates and increased economic activity, while rural areas continue to face persistent challenges related to limited job opportunities. The eastern region of Latgale remains the most economically disadvantaged, characterised by high unemployment and slower economic growth compared with the more dynamic western regions. These regional imbalances highlight the need for targeted policy interventions.

Annex E. Occupational automation risk: overview of sources

Table E1. Overview of sources collected for comparison of occupational automation risk scores

Full reference	Short reference	Organisation
Autor, D., Chin, C., Salomons, A., and Seegmiller, B. (2024), New Frontiers: The Origins and Content of New Work, 1940–2018*, *The Quarterly Journal of Economics*, qjae008.	(Autor et al., 2024)	Academic
Brynjolfsson, E., Mitchell, T., and Rock, D. (2018), What Can Machines Learn, and What Does It Mean for Occupations and the Economy? *AEA Papers and Proceedings*, 108, 43-47, https://doi.org/10.1257/pandp.20181019.	(Brynjolfsson, Mitchell, and Rock, 2018)	Academic
Eloundou, T., Manning, S., Mishkin, P., and Rock, D. (2024), GPTs are GPTs: Labor market impact potential of LLMs, *Science*, 384(6702), 1306–1308, https://doi.org/10.1126/science.adj0998.	(Eloundou et al., 2024)	OpenAI + Academic
Engberg, E., Görg, H., Lodefalk, M., Javed, F., Längkvist, M., Monteiro, N. P., Nordås, H. K., Pulito, G., Schroeder, S., and Tang, A. (2024), AI unboxed and jobs: A novel measure and firm-level evidence from three countries (Working Paper 14/24), *RF Berlin - CReAM Discussion Paper* Series: https://www.econstor.eu/handle/10419/304412.	(Engberg et al., 2024)	Academic
Felten, E. W., Raj, M., and Seamans, R. (2021), Occupational, industry, and geographic exposure to artificial intelligence: A novel dataset and its potential uses, *Strategic Management Journal*, 42(12), 2195–2217, https://doi.org/10.1002/smj.3286.	(Felten, Raj, and Seamans, 2021)	Academic
Felten, E., M. Raj, and R. Seamans (2023), How Will Language Modelers like ChatGPT Affect Occupations and Industries? *arXiv Preprint* arXiv:2303.01157.	(Felten, Raj, and Seamans, 2023)	Academic
Frey, C. B., and Osborne, M. A. (2017), The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change*, 114, 254-280, https://doi.org/10.1016/j.techfore.2016.08.019.	(Frey and Osborne, 2017)	Academic
Gmyrek, P., Berg, J., and Bescond, D. (2023), Generative AI and jobs: A global analysis of potential effects on job quantity and quality (96; ILO Working Papers), ILO. https://doi.org/10.54394/FHEM8239.	(Gmyrek, Berg, and Bescond, 2023)	ILO

Full reference	Short reference	Organisation
Lassébie, J., and Quintini, G. (2022), What skills and abilities can automation technologies replicate and what does it mean for workers?: New evidence, OECD, https://doi.org/10.1787/646aad77-en.	(Lassébie and Quintini, 2022)	OECD
Loaiza, I., and Rigobon, R. (2024), The EPOCH of AI: Human-Machine Complementarities at Work (SSRN Scholarly Paper 5028371), https://doi.org/10.2139/ssrn.5028371.	(Loaiza and Rigobon, 2024)	Academic
Prytkova, E., Petit, F., Li, D., Chaturvedi, S., and Ciarli, T. (2024), The Employment Impact of Emerging Digital Technologies (SSRN Scholarly Paper 4739904), https://doi.org/10.2139/ssrn.4739904.	(Prytkova et al., 2024)	Academic
Tolan, S., Pesole, A., Martínez-Plumed, F., Fernández-Macías, E., Hernández-Orallo, J., and Gómez, E. (2021), Measuring the Occupational Impact of AI: Tasks, Cognitive Abilities and AI Benchmarks. *Journal of Artificial Intelligence Research*, 71, 191-236, https://doi.org/10.1613/jair.1.12647.	(Tolan et al., 2021)	JRC
Webb, M. (2020), The Impact of Artificial Intelligence on the Labor Market.	(Webb, 2020)	Academic

Note on inclusion criteria: The selection is limited to primary studies published after the influential work of Frey and Osborne (2017). For expository purposes – balancing the depth and width of this exercise – we focused exclusively on studies that propose a new methodology to estimate occupational exposure to technology. This means we excluded studies that either extend existing exposure scores or use them in broader macroeconomic analyses. For example, Arntz, Gregory, and Zierahn (2016) expand on Frey and Osborne's original methodology, while Cazzaniga et al. (2024) and Georgieff and Hyee (2021) rely on the exposure scores developed by Felten et al. (2021). We also excluded studies that estimate exposure to organisational change rather than technological change – such as Sostero et al. (2023) on teleworkability and Autor and Dorn (2013) on offshorability.

Table E2. Source of occupational content across scores

Short reference	Source	Type of source	Analytical level (what is labelled)
Frey and Osborne (2017)	O*NET (2010)	Job descriptions	Occupations (702)
Brynjolfsson, Mitchell, and Rock (2018)	O*NET	Job descriptions	Daily work activities (2,069) Tasks (18,156)
Webb (2020)	O*NET	Job descriptions	Tasks
Felten, Raj, and Seamans (2021, 2023)	O*NET 24.3	Job descriptions	Abilities (52)
Tolan et al. (2021)	O*NET EWCS, PIAAC	Job descriptions Worker surveys	Task intensity (59) Cognitive abilities (14)

Short reference	Source	Type of source	Analytical level (what is labelled)
Lassébie and Quintini (2022)	O*NET 26.2 ESCO	Job descriptions	O*NET: Abilities (52), Skills (35), Work activities (4), Work context (1), Knowledge (1) ESCO: digital skills (5)
Gmyrek, Berg, and Bescond (2023)	ISCO-08 (4-digit)	Job descriptions	ISCO Tasks (3,123) GPT-4 generated ISCO tasks (4,360)
Autor et al. (2024)	A) DOT (1939 & 1977) B) CAI	A) Job descriptions B) Micro job titles by industry	A) Occupations B) Occupation-industry cells
Eloundou et al. (2024)	O*NET 27.2 (2023)	Job descriptions	Daily work activities (2,087) Tasks (19,265)
Engberg et al. (2024)	O*NET	Job descriptions	Abilities (52) Social skills (6)
Laoiza and Rigobon (2024)	O*NET (2016) O*NET (2024)	Job descriptions	Tasks (18,469) Tasks (18,008)
Prytkova et al. (2024)	A) ISCO-08 (4-digit) B) NACE Rev.2 (3-digit)	Job descriptions Sector descriptions	A) Occupations B) Industries

Note: CAI = Census Alphabetical Index of Occupations and Industries; DOT = Dictionary of Occupational titles; ESCO = European Skills, Competences, Qualifications and Occupations; EWCS = European Working Conditions Survey (Eurofound); O*NET = Occupational Information Network (US Dep. Of Labour); PIAAC = Programme for the International Assessment of Adult Competencies (OECD).

Table E3. Source of technological potential and mapping to occupation

Short reference	Source of technological potential	Mapping tech to occupation	Aggregating to occupation
Frey and Osborne (2017)	Human annotators (ML Experts)		Occupations are scored as a whole
Brynjolfsson, Mitchell, and Rock (2018)	Human annotators (CrowdFlower)		Average SML of tasks
Webb (2020)	Patents (Google Patents) on robots, software and AI	Overlap of word-noun pairs between tasks and patent titles using WordNet for conceptual grouping	Weighted (by frequency, importance and relevance) average exposure of tasks
Felten, Raj, and Seamans (2021, 2023)	10 AI Benchmarks (EFF)	Human mapping: crowdsourced (Amazon Mechanical Turk)	Weighted (by importance and prevalence) average exposure of abilities
Tolan et al. (2021)	328 AI Benchmarks (PPWC and own collection)	Human mapping: AI experts (AI benchmark to abilities) and multidisciplinary experts (abilities to tasks)	Weighted sum of (research-intensity of ability) and (ability-intensity of occupation - through tasks)

Short reference	Source of technological potential	Mapping tech to occupation	Aggregating to occupation
Lassébie and Quintini (2022)	Human annotators (Experts in AI and robotics)		Weighted (by importance) average automatability of abilities and skills
Gmyrek, Berg, and Bescond (2023)	LLM annotator (GPT-4)		Mean and std.dev. of task automation potential: - High M, low SD: automation; - Low M, high SD: augmentation; - High M, high SD: unknown; - Low M, low SD: unaffected
Autor et al. (2024)	All US utility patents (USPTO and Google Patents), 1920 - 2018	Textual similarities between patents and (A) job descriptions and (B) job titles through TF-IDF of word embeddings	Weighted (by citations) count of top 15 % most similar patents by occupation
Eloundou et al. (2024)	Human annotators (OpenAI) & LLM annotator (GPT-4)		Average exposure of tasks
Engberg et al. (2024)	AI Benchmarks (EFF, PWC)	Expert mapping (by 4 computer scientists), reused from Felten (2018)	Weighted (by importance and level) average exposure of ability - discounted by socialness
Laoiza and Rigobon (2024)	Foundation model for paraphrasing and embedding tasks to EPOCH capabilities (unique human capabilities that complement AI's shortcomings)		- EPOCH score: weighted (by cluster size) average of task-cluster-level EPOCH scores (which are themselves a CES function of the individual EPOCH capabilities of the centroid of each task cluster) - Automation and augmentation risk: aggregation using function that capture convexity for augmentation (complementarity between task clusters) and concavity for automation
Prytkova et al. (2024)	190 714 Patents on emerging digital technologies (DII), 2012-2021	Semantic (cosine) similarity	Inverse hyperbolic sine transformation of average cosine similarity scores between embeddings of patents and occupation/sector descriptions (weighed by citations) - by type of technology

Note: DII = Derwent Innovation Index; EEF = Electronic Frontier Foundation; LLM = Large Language Model; PWC = Papers With Code.

Table E4. Features of occupational exposure scores

Short reference	Exogenous tech. variation	Which technology	Variation across	ISCO / SOC level	ISCO equiv.	Exposure or direction	Task interdepen-dence
Frey and Osborne (2017)	-	Automatability (assessed by ML experts)	-	6-digit SOC (702 occupations)	4	Automation	Implicit* (by labelling whole occupation)
Brynjolfsson, Mitchell, and Rock (2018)	-	Machine learning	-	8-digit SOC (951 occupations)	4	Exposure	-
Webb (2020)	✓	Robots, software, AI	Tech.	8-digit SOC (964 occupations)	4	Exposure	-
Felten, Raj, and Seamans (2021, 2023)	✓	AI (+2 subdomains of genAI)	-	6-digit SOC (774 occupations)	4	Exposure	-
Tolan et al. (2021)	✓	AI	-	3-digit ISCO (119 occupations)	3	Exposure	-
Lassébie and Quintini (2022)	-	Automatability (assessed by experts in AI & robotics)	-	3-digit SOC (132 occupations)	?	Automation	-
Gmyrek, Berg, and Bescond (2023)	-	GPT	-	4-digit ISCO (436 occupations)	4	Automation and augmentation	-
Autor et al. (2024)	✓	All	Year	occ1990dd_18 code (306 occupations)	4	Automation and augmentation	Implicit* (by labelling whole occupation)
Eloundou et al. (2024)	-	LLM	-	8-digit SOC (923 occupations)	4	Exposure	-
Engberg et al. (2024)	✓	AI (+9 subdomains)	Year	4-digit ISCO (438 occupations)	4	Exposure	-
Laoiza and Rigobon (2024)	-	AI	-	8-digit SOC (1204 occupations)	4	Automation and augmentation	Explicit
Prytkova et al. (2024)	✓	40 digital technologies	Year, sector, and tech.	4-digit ISCO (416 occupations)	4	Exposure	Implicit* (by labelling whole occupation)

Note: *Automation* refers to the potential for technology to fully or partially replace human tasks, removing the need for human involvement; *Augmentation* captures how technology might complement human work by enhancing productivity or enabling new capabilities without substituting the worker; *Exposure* is a broader concept that indicates whether a job is likely to be affected by technology, without specifying whether the effect is substitutive or complementary.

Annex F. Technology exposure in the EU

Figure F1. Exposure to technology by ISCO 2-digit occupation

Figure F2. Rank correlations between scores

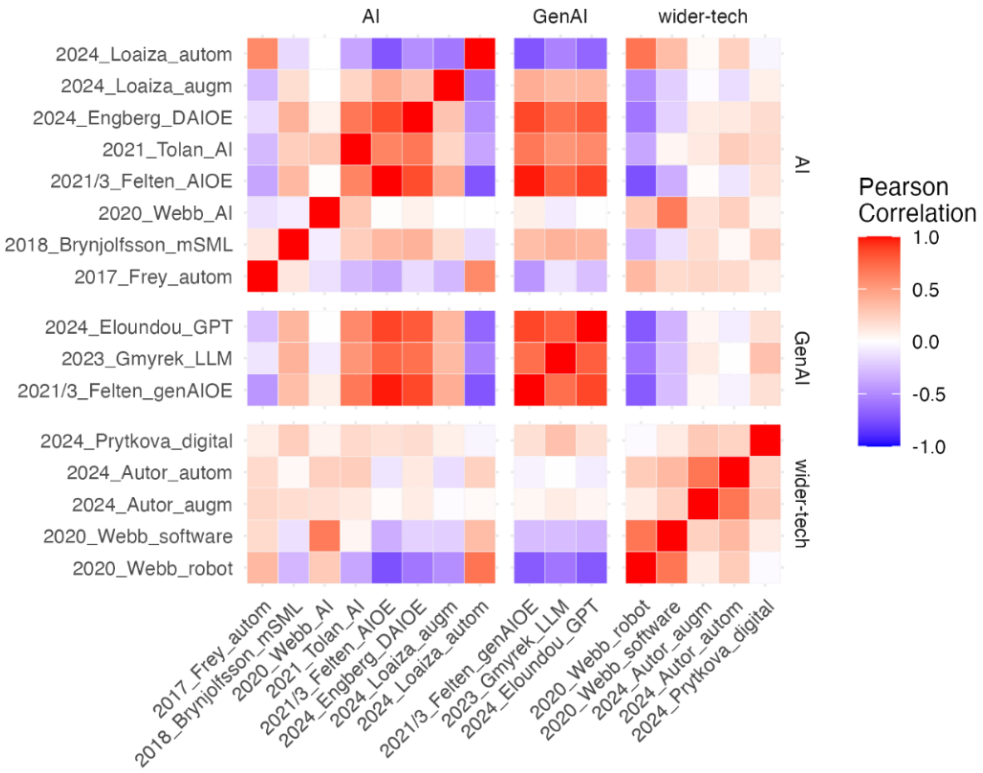
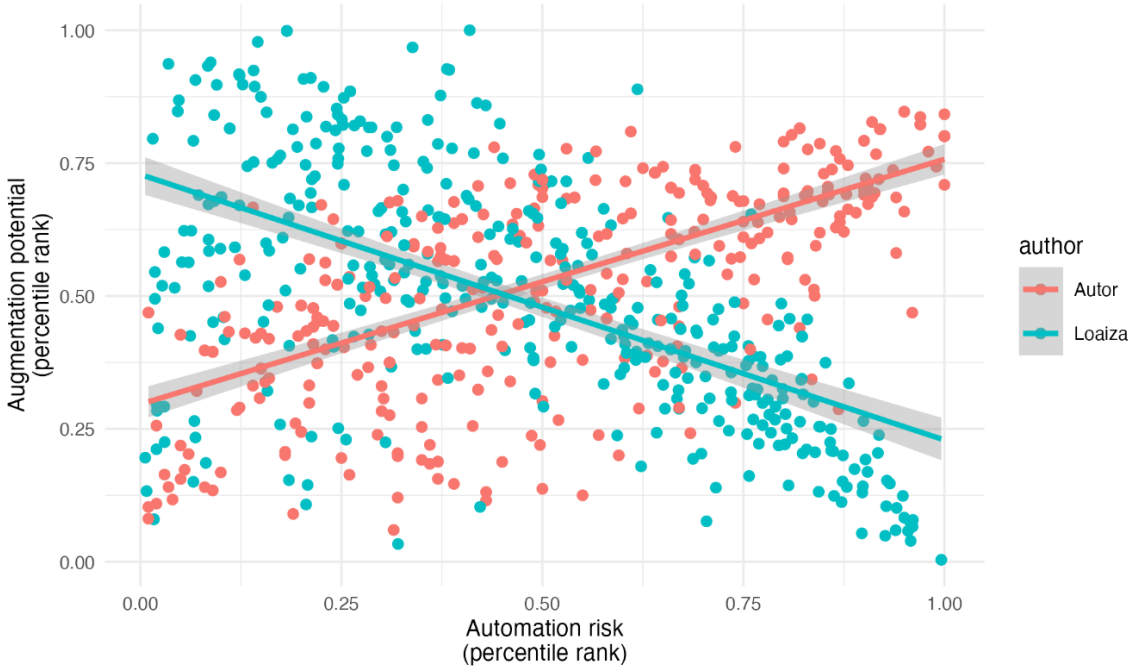


Figure F2 visualises the pairwise rank correlations between occupational exposure scores, offering insight into the extent to which different methodologies and technological foci yield comparable results. A few clear patterns emerge.

- **GenAI exposure scores are highly consistent.** The three studies focusing exclusively on GenAI show strong positive correlations with each other, forming a distinct cluster (visible in the deep red block at the centre of the heatmap). This suggests that, despite using different data or mappings, they converge on similar occupational rankings in terms of GenAI exposure.
- **GenAI exposure overlaps with recent AI scores.** These GenAI studies also correlate strongly with more recent general AI scores, including those in Tolan et al. (2021), Felten, Raj, and Seamans (2021), and Engberg et al. (2024). This supports the conclusion that a consensus has emerged around the occupational profile of AI and GenAI exposure.
- **Divergence from earlier and broader studies.** In contrast, the earlier automation risk scores from Frey and Osborne (2017) and Brynjolfsson et al. (2018) show weaker or even negative correlations with more recent ones, indicating how methodological and technological progress influence outcomes.
- **Wider technological change paints a different picture.** The exposure scores focused on robotics and software (Webb, 2020) are negatively correlated with GenAI scores, highlighting that the impact of earlier waves of automation potentially differs significantly from that of recent AI. Meanwhile, the two comprehensive studies that consider multiple technologies across

domains (Autor et al., 2024 and Prytkova et al., 2024) display very low correlation with any of the more technology-specific scores. This suggests that exposure profiles for broad technological change differ meaningfully from those narrowly focused on AI or GenAI.

Figure F3. Automation and augmentation potential for ISCO 4-digit occupations



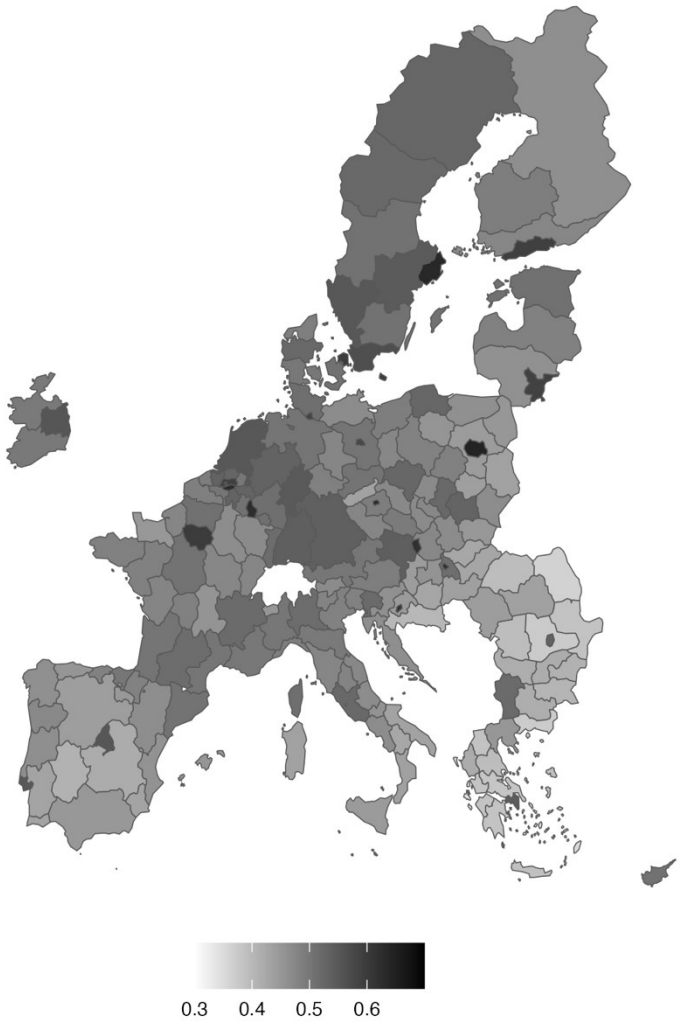
Source: Autor et al (2024) and Loaiza and Rigobon (2024). See full list of sources in Annex E.

Figure F3 compares automation and augmentation potential of ISCO 4-digit occupations for the two studies providing both types of scores: Autor et al. (2024) and Loaiza and Rigobon (2024). Interestingly, the two studies reveal opposite relationships.

Autor et al. find a **positive correlation**, suggesting that occupations with higher automation potential also tend to have high augmentation potential. In their approach, automation is measured based on textual similarity between patents and job descriptions (or 'occupational task input'), while augmentation is based on similarity between patents and micro-job titles (or 'occupational output'), across many technologies. This implies that, within the same occupation, different sets of technologies could potentially automate their tasks or complement their occupational output.

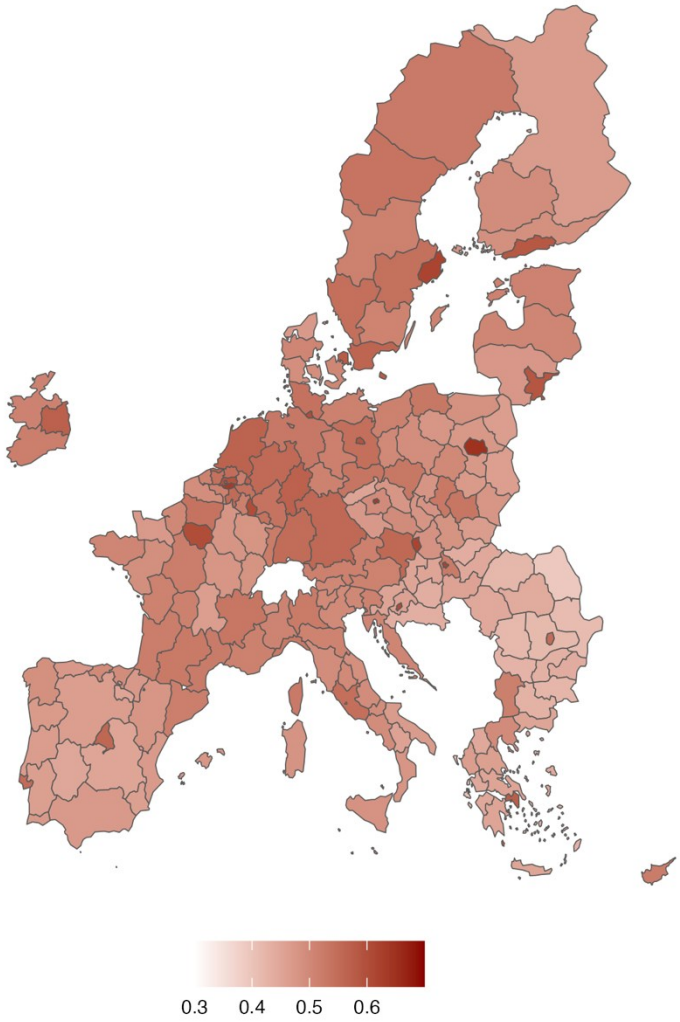
In contrast, Loaiza and Rigobon observe a **negative correlation**, indicating that occupations at high risk of AI automation are typically not those with high AI augmentation potential. Their methodology focuses specifically on AI technologies and defines augmentation based on complementarity with uniquely human capabilities that AI struggles to replicate. This means augmentation is concentrated in occupations where human strengths (such as empathy, judgement, or complex social interaction) can fill gaps in AI capabilities. These are not the same occupations where AI could automate tasks.

Figure F4. Occupational exposure to *Artificial Intelligence (AI)* by region



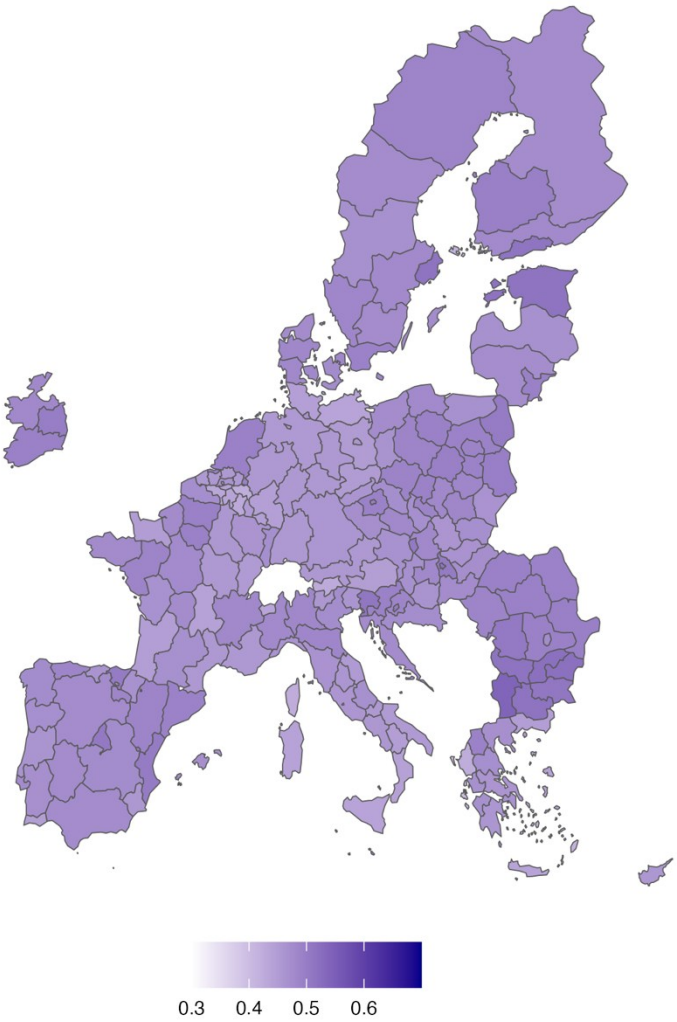
Source: Engberg et al. (2024). See full list of sources in Annex E.

Figure F5. Occupational exposure to *generative AI (GenAI)* by region



Source: Eloundou et al. (2024).

Figure F6. Occupational exposure to *wider technology* by region



Source: Prytkova et al. (2024). See full list of sources in Annex E.

Annex G. Expert interviews

Box G1. Expert interviews methodology and process

Eight in-depth, semi-structured interviews have been conducted with selected experts from academia and European and international organisations. Unlike structured interviews, semi-structured interviews allow interviewees to fully express their informed views and interviewers to follow up on 'leads' and unexpected insights (Brinkmann, 2018). The interviews were conducted online in English between 10 March and 1 April 2025, and lasted 50-75 minutes each. The fieldwork timing allowed findings from other activities, such as the literature review and the systems mapping, to inform and stimulate the conversations. Interviewee selection ensured an adequate gender and geographical balance, as well as coverage of multiple fields and disciplines and of all the elements of the study's analytical framework. The selected interviewees received a briefing document outlining the analytical framework of the study and key preliminary findings in advance. Following on the semi-structured approach, the interviews were conducted on the basis of an interview guide (**Table G2**) covering relevant issues while still allowing for flexibility to tailor questions to the participants' expertise and to adjust to time constraints and flow (Arthur and Nazroo, 2003). The interviews were later entirely transcribed and analysed thematically (Naeem et al., 2023). After a close reading of the transcripts, the statements were categorised according to the elements of the analytical framework, in particular by a) drivers of change and b) impacts (job quantity, job quality, social inclusion/services, secondary effects). The groups of statements were then examined to identify recurrent patterns and key insights relevant to answer the RQs.

Table G1. List of interviewees

Name	Affiliation	Role
Mehtap Akgüç	ETUI	Senior Researcher
Stijn Broecke	OECD	Senior Economist
Bea Cantillon	University of Antwerp (Belgium)	Emeritus Professor of Sociology
Agnieszka Chłoń-Domińczak	SGH Warsaw School of Economics (Poland)	Vice-Rector for Research and Director of the Institute of Statistics and Demography
Enrique Fernández-Macías	JRC	Researcher
Anton Hemerijck	European University Institute (EUI)	Professor of Political Science and Sociology, Director of Research
Olga Strietska-Ilina	ILO	Senior Skills and Employability Specialist
Ive Marx	University of Antwerp (Belgium)	Professor of Socio-Economic Policy

Table G2. Interview guide

Block and list of questions	Objective(s)	Relevant for which RQs?
Introduction by interviewer (4-6 min) Outline of interview scope, purpose and relevance. Approximate structure and duration. Confidentiality and consent for recording.	To inform the interviewee as well as to communicate study's relevance in order to foster engagement. To check in advance about time constraints. To establish an atmosphere of trust between interviewee and interviewer.	/
Opening question(s) (1-3 min) Currently what do you think are the major trends driving changes in European labour markets and social models?	To warm up the conversation and put the interviewee at ease. To transition from the introductory to the substantive part of the interview.	/
Drivers of change (10-15 min) And among them, which do you think will still be relevant drivers in the next 10-15 years? In our study, we have found so far that indeed [driver of change interviewee is an expert in] will be a significant driver of change for the future of European labour market and societies. Before turning to the potential impacts, could you please tell us more about what in your view will be the most significant trends in [driver of change]?	To pinpoint and explore in depth the future megatrends.	RQ1 RQ2 RQ3 RQ4
Labour market impacts (10-15 min) In your view, how are the drivers we discussed going to shape European labour markets in the coming 10-15 years? Do you see more challenges or opportunities? What about demand for specific skills or occupations? Is this demand going to be adequately satisfied or are mismatches more likely? What challenges or opportunities do you anticipate here? What about their impact on job quality aspects? Working or employment conditions, industrial relations, skills use and autonomy, and workers wellbeing. Do you see any specific sectors or demographic groups being particularly vulnerable to these changes?	To examine the pathways through which drivers of change shape labour market developments (employment levels, demand-supply of skills, job quality).	RQ1 RQ2

Block and list of questions	Objective(s)	Relevant for which RQs?
Social inclusion and poverty impacts (10-15 min) How are the drivers we discussed going to negatively or positively impact social inclusion in European societies? Are these impacts a direct effect of the driver(s) of change or mediated by labour markets? In the study, we identify the essential and enabling services as key social inclusion factors. These can be education and training, care services, housing, transport, energy, digital infrastructure, etc. How will the drivers of change impact availability, accessibility and quality of these services? Do you see any particular social or demographic groups facing barriers to access these services? What about regions? Other impacts on social inclusion?	To examine the pathways through which drivers of change have an impact on social inclusion and equality of opportunity.	RQ3
Secondary and tertiary effects, and interdependencies (10-15 min) Do you think future shifts in the labour market are likely to have a (positive or negative) impact on social inclusion? How? What about the impact of availability and accessibility of services on labour market outcomes? What kind of secondary effects on European societies and polities we have not discussed so far could arise from drivers of change? Do you think there is a risk of rising political and social instability? Can the drivers of change directly or indirectly undermine or enhance democracy and participation?	To identify interdependencies and secondary and tertiary effects of drivers of change. To explore potential impacts of drivers of change and labour market and social inclusion impacts on inclusive and democratic communities.	RQ1 RQ2 RQ3 RQ4
Closing questions (5 min) Are there any other trends or challenges you think we should consider in this study? Among those we have discussed, what do you think is the most pressing challenge that the EU should be focusing on in the near future?	To check if the study leaves out important areas. To conclude the interview on a forward-looking and positive note.	RQ1 RQ2 RQ3 RQ4

Annex H. Systems mapping workshop

The project team organised a systems mapping workshop at CEPS premises in Brussels on 19 March 2025, which was facilitated by Milan Petit – a systems mapping expert with extensive experience applying science-policy methods to complex challenges. The workshop followed a systems thinking approach to three core challenges identified in preceding project stages: intergenerational poverty and social exclusion, long-term un(der)employment, and skills underutilisation. Rather than conducting an open-ended mapping exercise, the CEPS project team and the facilitator prepared a set of preliminary 'vicious circles' in advance, based on literature review, quantitative analysis, and expert interviews. These diagrams outlined key nodes and relationships thought to be involved in the challenges, enabling the workshop to quickly move into a critical discussion of the loops.

Participants were asked to assess a) whether the vicious circles contained all relevant nodes and relationships, b) whether the links between them were sufficiently clear, and c) how the broader megatrends identified in earlier tasks might reinforce or dampen these dynamics. The group also identified leverage points of policy interventions that could disrupt the feedback loops and shift the system towards more inclusive and resilient outcomes. The workshop gathered a diverse group of 11 CEPS researchers from across policy domains (**Table H1**).

Table H1. List of participants in systems mapping workshop

CEPS Units	Participants
Jobs & Skills/Economic Policy	Cinzia Alcidi (project team)
	Laura Nurski (project team)
	Davide Monaco (project team)
	Caterina Astarita (project team)
	Harry Crichton-Miller (project team)
	Eulalia Rubio* (project team)
Foreign Policy	Ceren Ergenc
Justice and Home Affairs	Davide Colombi
Energy, Resources and Climate Change	Patricia Urban
	Luca Nipius
Data Science	Pierre-Alexandre Balland
	Robert Praas

*Provided asynchronous input and feedback.

The agenda initially included six vicious circles: three core to the ESF+ mission and three non-core structural ones impacting wider policy areas. The non-core loops identified challenges at the levels of regions (left-behind places), sectors (uncompetitiveness) and firms (lack of innovation). However, the discussion proved so substantive on the three core loops that the others were left for written elaboration (see Annex J).

Annex I. Implications of systems thinking for social policy

The systems mapping exercise highlights the need to move beyond siloed policy responses. The core insight of a systems approach is that social exclusion, inequality and underutilisation are not caused by isolated factors, but by the way multiple elements interact and reinforce one another. Tackling these challenges effectively requires not only understanding their complexity but also designing policies that engage with that complexity.

From single interventions to systemic responses

Each of the vicious circles identified in the workshop illustrates how disadvantage is compounded over time. People are not un(der)employed only because they may lack skills, but also because they may face discrimination or care responsibilities, or because they may be locked in jobs with little room for development. Households are not poor just because of low income, but also because they may have educational and health disadvantages, limited access to services, and insecure work. A job is low-quality not simply because of its pay, but also because its progression prospects and learning opportunities may be lacking or insufficient. These dynamics cannot be addressed with narrowly targeted measures. Interventions in one domain – such as skills provision – must be accompanied by changes in others, such as job design or service delivery. The ESF+ can play a key role in enabling such joined-up responses, particularly by fostering collaboration between actors who may not traditionally work together.

The systemic analysis of interdependencies also shows that interventions can combine structural measures, mobilisation of public and private resources, and a mindset shift. Depending on the specific context, these interventions need not be costly to be cost-effective, provided they address the root causes rather than the symptoms.

Principles for systemic and integrated policymaking

Systems thinking implies a set of design and delivery principles for social policy, including:

- **Policy alignment across levels, actors and policy areas:** better coordination between EU, national and regional actors is needed to ensure that strategies, funding, and data systems reinforce each other. EU-level initiatives could be informed by regional and local realities, while national policies could actively align with EU objectives and tools. Labour market inclusion cannot be addressed through employment policy alone. Effective action requires coordination across education, housing, health, childcare, transport, and industrial policy.

- **Linking policy instruments:** different types of instruments – regulation, funds, strategies – may be more effective when used in combination. For instance, regulatory frameworks may set minimum job quality standards, while ESF+ funding enables job redesign and work organisation improvements. Public procurement policies may include social clauses to link infrastructure spending to inclusive employment outcomes.
- **Coordinated local delivery:** many of the problems identified in the vicious circles are deeply local. Integrated services, one-stop shops, and place-based approaches can help coordinate education, employment and social services around the needs of individuals and households. Local partnerships between public authorities, employers, NGOs, and education providers are essential to designing and delivering interventions that reflect the full complexity of people's situations.
- **Adaptive and learning-oriented governance:** systems are dynamic and non-linear. Policy approaches must be capable of adjusting to new evidence, feedback and changing conditions. This requires building capacity for experimentation, evaluation and institutional learning – something the ESF+ can help foster by supporting pilot projects, data collection and monitoring systems, and peer learning.

Next steps: research, capacity building and engagement

To further embed systems thinking in EU social policy, three areas could be prioritised. First, more empirical research is needed to map the systemic roots of exclusion, inequality and underutilisation, and to evaluate what works in breaking vicious circles. Second, capacity-building efforts could support national and regional managing authorities, as well as social partners and service providers, in developing skills in systems thinking and mapping methodologies. Third, stakeholder engagement is essential: systems approaches rely on participation and diverse perspectives, and future ESF+ programming cycles could include structured opportunities for cross-sector dialogue and co-creation. Through such steps, the ESF+ can move from treating symptoms to transforming systems – helping Europe build more inclusive, resilient and future-ready labour markets and societies.

Annex J. Beyond the core: structural vicious circles at other levels

The preparation for the workshop also considered three additional vicious circles operating at higher structural levels. While these were not fully developed during the workshop, they offer valuable insight into how macro-level dynamics reinforce disadvantage in the labour market and social inclusion.

Regional decline (or left-behind places) trap: regions with weak economic performance experience fiscal strain, which limits both public investment and service delivery. As firms exit and few new businesses enter, job opportunities decline, prompting the out-migration of skilled workers. This leads to further economic weakening, ageing populations, and rising underemployment – making it increasingly difficult for these regions to attract investment or break the cycle of decline.

Sectoral decline (or uncompetitiveness) trap: European sectors face a fragmented internal market, lack of capital market integration, and divergent regulatory environments. This hampers risk finance and weakens start- and scale-ups, while foreign competitors benefit from more supportive industrial and trade policies and lower regulatory standards in their own countries. The result is eroded competitiveness, weak start-up ecosystems, and increased offshoring – undermining local industrial ecosystems and accelerating talent loss.

Firm stagnation (or zombie-firm) trap: in some sectors, firms persist despite long-term underperformance. Weak innovation, outdated technologies, and resistance to change lead to productivity stagnation. These firms struggle to retain or attract talent, experience high turnover and low morale, and lack the resources to invest in modernisation. Over time, financial strain and inefficient practices erode competitiveness further, but structural support or low interest rates allow them to survive – blocking renewal and dragging down sectoral performance.

Annex K. Stakeholder workshop

Table K1. List of consulted stakeholder organisations

Type of stakeholder	Participating organisations
EU bodies	European Economic and Social Committee (EESC) – Workers' Group
Employers' organisations	World Employment Confederation-Europe
	SGI Europe
Trade unions	European Trade Union Confederation (ETUC)
	IndustriAll Europe
Civil society organisations	COFACE Families Europe
	Eurochild
	Lifelong Learning Platform (LLP)
	Solidar
	European Youth Forum*

*Provided asynchronous input in writing.

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