POLITECNICO DI TORINO
Repository ISTITUZIONALE

Just technology transition. A policy agenda to minimise the social impacts of digitalisation and automation on the transport workforce

Original
Just technology transition. A policy agenda to minimise the social impacts of digitalisation and automation on the transport workforce / Pronello, C., Fedeli, E.. - In: TRANSPORTATION RESEARCH INTERDISCIPLINARY PERSPECTIVES. - ISSN 2590-1982. - ELETTRONICO. - 34:(2025). [10.1016/j.trip.2025.101670]

Availability:
This version is available at: 11583/3003925 since: 2026-01-09T19:23:15Z

Publisher:
Elsevier

Published
DOI:10.1016/j.trip.2025.101670

Terms of use:

This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright
AIP postprint versione editoriale con licenza CC BY/Version of Record with CC BY license

Copyright 2025 Author(s). This article is distributed under a Creative Commons Attribution (CC BY) License https://creativecommons.org/licenses/by/4.0/."

(Article begins on next page)

28 November 2026

Transportation Research Interdisciplinary Perspectives 34 (2025) 101670

Contents lists available at ScienceDirect

Transportation Research Interdisciplinary Perspectives

journal homepage: www.sciencedirect.com/journal/transportation-research-interdisciplinary-perspectives

Just technology transition. A policy agenda to minimise the social impacts of digitalisation and automation on the transport workforce

Cristina Pronello *, Enrico Fedeli

Interuniversity Department of Regional and Urban Studies and Planning, Politecnico di Torino, Torino 10125, Italy

ARTICLE INFO

Keywords:
Policies
Digitalisation
Automation
Transport workforce
Regulation
Training
Social justice

ABSTRACT

Digitalisation and automation are producing and will produce profound changes for transport workforce. This research aims to develop a policy agenda addressing challenges, impacts, and effects that digitalisation and automation in transport may have on the labour force. Policies are defined through a participatory approach, using collective intelligence to co-create an evidence-based and action-oriented agenda that provides for a just technology transition in the transport sector.

The methodology involves four stages: 1. defining the framework of the 'living hub' and selecting the stakeholders involved; 2. selecting the methods adopted within the 'living hub' to co-create knowledge; 3. policy agenda creation; and 4. policy agenda validation.

The 'living hub'—where the co-creation process takes place—gathered more than 600 stakeholders from 450 organisations coming from 40 countries. Out of them, 322 stakeholders from all the transport modes (social partners, companies, and representatives of ministries and political institutions) and 73 workers have been involved in focus groups and creative thinking. Overall, 395 persons have participated to the creation of 11 policies eventually validated by a panel of 43 stakeholders coming from 10 EU countries, UK, USA, and South Korea (companies, labour lawyer and economists, psychologists, R&D, training agencies, trade unions, and politicians). The policies are divided in four thematic areas: 1. Public Governance and Regulation (4 policies); 2: Industrial Governance (2 policies); 3. Training and Reskilling (1 integrated policy); 4. Minimisation of Workforce Exclusion and Exploitation (4 policies). A comparison between EU versus US implementation is eventually discussed.

1. Introduction

The United Nations Sustainable Development Goals set global targets for decent work and economic growth for 2030. The European Commission's *Transport White Paper* (2011) underscored the need to align labour market competitiveness in the transport sector with broader social goals. Digital and automated technologies are seen as key enablers of this alignment: as transport companies increasingly adopt ICT and automation to offer new services, demand for new professional skill sets is rising.

However, this dynamic—rooted in the historical tension between labour supply and technological change since the Industrial Revolution—must now contend with accelerated digital transformation and external shocks such as COVID-19, which have exposed both physical and systemic vulnerability in human resources. Preexisting and yet to be solved workforce issues—such as poor working conditions or safety concerns—may be even exacerbated by digitalisation and automation, albeit their solution could help mitigate negative effects of more digital and automated work environment.

The ongoing acceleration of digitalisation and automation is expected to significantly impact quantity and quality of employment (World Maritime University, 2019). Many attempts have been made to quantify this impact, sometime yielding divergent results. Research by the European Commission (2019) showed substantial sectorial variation: over 60 % of jobs in agriculture, forestry and fishing and real estate are automatable, compared to 50.9 % in transport. A similar conclusion was drawn by the McKinsey Global Institute (Smit et al., 2020).

The European Parliament's report (Spencer et al., 2021) synthesises findings from several influential studies. One key contribution is from Arntz et al. (2016), commissioned by OECD, which used data from the Programme for the International Assessment of Adult Competencies (PIAAC). It found that only 9 % of jobs are at high risk of automation on

* Corresponding author.
E-mail addresses: cristina.pronello@polito.it (C. Pronello), enrico.fedeli@polito.it (E. Fedeli).

https://doi.org/10.1016/j.trip.2025.101670
Received 22 April 2025; Received in revised form 26 September 2025; Accepted 29 September 2025
Available online 13 October 2025
2590-1982/© 2025 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

average, with automation risk strongly correlated with education: over 50 % of unskilled workers face high automation potential, compared to less than 1 % of highly educated workers. Although Goldman Sachs (2023) estimates that 300 million jobs are threatened by AI, most (60 %) of them did not exist in the 1940 s.

Bessen et al. (2019) identified the transport and storage sector as the second most affected by job loss due to automation. However, they emphasise a time lag of 4–5 years between investments in automation and increase in job loss, arguing that adverse economic conditions have a greater and more immediate impact on the job market. Technology may displace jobs, but the net loss is yet unproven. As Voss and Vitols (2020) argue, digitalisation tend to reshape job profiles rather than eliminate work entirely. Arntz et al. (2019) observed that jobs creation and destruction will accelerate, and this volatility will stress training and education systems. On the same line, a UNESCO report (Boon Ng, 2019) argues that the resulting work environment requires breaking down current boundaries between STEM and non-STEM disciplines. Upskilling, reskilling and lifelong learning will then play a crucial role in competitiveness and productivity, as future employment will comprise more high-skilled job and this will put pressure on meeting better working conditions.

There is no clear evidence of an overall decline in employment due to automation or digitalisation. Instead, increases in productivity have historically led to shorter working hours (Giattino et al., 2020). However, while both labour and multifactor productivity have increased since the late 1970 s in OECD countries, average working hours have only slightly decreased (OECD, 2021). Moreover, highly skilled workers in Europe increasingly report working more than 50 h per week (Berger et al., 2019), likely because the widespread adoption of mobile devices enabled constant connectivity (Wajcman and Rose, 2011). The use of such tools to foster flexibility and work-life balance (ter Hoeven and van Zoonen, 2015) is counterbalanced by the risk of an “always-on” work culture (Gold and Mustafa, 2013)

Furthermore, Walwei (2016) shows that emerging digital technologies may aggravate structural labour market challenges, such as skills mismatches, persistent unemployment, and employment inequality. As new tasks emerge, skill gaps between job requirements and workers’ capabilities are expected to widen. The barriers to re-entering the labour market are also likely to increase. Four key areas of intervention are considered: continuous skill development, smart employment regulations, preventive labour market policies, and a complementary role of social dialogue.

Digitalisation and automation will not affect all workers equally, and disadvantaged workers already fear the foreseeable introduction of automated vehicles (Schuster et al., 2024). For instance, the Institute for Women’s Policy Research (IWPR, 2019) found that office and administrative jobs are disproportionately occupied by women (70 %), while only 5 % of truck drivers are women. Women are also underrepresented in factory jobs. There are 10 women every 7 men working in jobs with over a 90 % risk of being automated. At the same time, social partners recommend increasing female representation from 25 % by 2020 to 40 % by 2035 in order to promote gender equality in urban public transport.

Platform economy workers stand out as a case study: while their roles are directly created through digital and automation technologies, they typically have low-skilled, precarious and questionable working conditions. Gig workers’ schedules are dictated by platforms, customers and clients, despite operating namely as independent contractor (Gold and Mustafa, 2013; Lehdonvirta, 2018), so that travel time and breaks are excluded in the calculation of their work time—leading to greater intensity and lower effective pay (Bell and Tuckman, 2002; Rubery et al., 2015)—schedule is unpredictable (Schneider and Harknett, 2019) and irregular, and work-life conflicts emerges as the ability to disconnect is practically impossible (Barber and Jenkins, 2014; Butts et al., 2015; Gold and Mustafa, 2013).

Older workers, once praised for their experience, are now disadvantaged in a fast-paced high-tech world, where skills quickly become obsolete. Starling (2020) emphasises that the gap in experience is offset by younger workers’ flexibility and learning ability, and Bessen et al. (2019) echo that younger ones have an edge with automation-driven jobs. Yet, Hajkowicz et al. (2016) warn that both new labour market entrants and older displaced workers may struggle to find suitable new employment. A just transition will require tackling inequalities in access to opportunities for poorer and less advantaged people in EU (Eurofound, 2022).

Morandini et al. (2023) argue that the application of new technologies to the workplace determines whether their effects are beneficial or detrimental. Schroten et al. (2020) suggest that new technologies hold positive disruptive potential, provided that public authorities effectively design, implement, and manage the transition.

When is this likely to occur? Impact analysis of previous waves of technological change (Atkinson, 2018) indicate that such transformations typically unfold over thirty years, beginning in a few sectors of the economy before expanding. The substantial productive gains observed during these waves—estimated at around 75 %—translates into a manageable annual increase of 3 %. This is coherent with available scenarios of vehicles automation, predicting a span of at least 25 years, even in fastest cases, for full automation (level 5) to be predominant in the market (Duboz et al., 2025).

Some scholars, however, argue that the current wave of digitalisation and automation represents a structural break from the past. Ford (2013, 2016) advocates that AI and robotics may drive unprecedented level of disruption, while Atkinson (2018) sees no reasonable grounds for this claim. Moreover, as Bessen (2016) highlights, the shift to automation does not inherently lead to job destruction. On the contrary, jobs losses have predominantly occurred in positions less reliant on digital technologies. On the same page, Grosso et al. (2021) argue that while other ongoing processes, such as fleet electrification, can decrease the quantity of work needed in the maintenance and repair sector, we currently do not have enough evidence to quantify the future labour needs in the maintenance sector for automated vehicles.

In summary, literature offers a wide range of estimates on the scale and timeline of labour market disruptions caused by digitalisation and automation, making it difficult to formulate targeted and timely policy responses. This uncertainty contributes to the limited scope of current initiatives addressing the workforce implications of automation, with existing policy frameworks largely fragmented—aside from a few specific European directives and recommendations.

Against this backdrop, the European Commission has funded the WETRANSFORM project,[1] aimed at developing a comprehensive policy agenda to mitigate the potential negative impacts of digitalisation and automation on the transport workforce. The project promotes a structured, inclusive, and socially acceptable transformation process, grounded in stakeholders’ consultation and engagement.

This research presents the core policy recommendations proposed at EU level, developed through a participatory approach that leverage collective intelligence to generate an evidence-based and action-oriented agenda. Furthermore, it assesses the exportability of the policy agenda to a less regulated labour market by comparing EU and US approaches. Before this research, sectorial claims have hindered cross-fertilisation of experiences and practices, by maintaining a silos approach and hurting the creation of transversal tables of discussion.

The paper begins by describing the methodological framework, followed by the presentation of the resulting policy agenda, a discussion on its applicability beyond the EU context, and concluding remarks.

2. Methodology

The construction of the policy agenda followed a rigorous approach

[1] https://wetransform-project.eu/.

articulated in three steps to ensure representation of stakeholders' views in all transport sectors, as depicted in Fig. 1:

1. Creation of a framework, the 'living hub', in which stakeholders meet and discuss thanks to:
   - the sampling plan to select stakeholders from different sectors and countries
   - the knowledge co-creation methods used to define the policies of the agenda
2. Creation of the policies
3. Validation of the policies to finalise the definition of the policy agenda for the European Commission and to analyse its exportability to non-EU countries, with a US specific focus.

The concept of 'living hub' originates from the theory of "Value Network Analysis" (Allee, 2008), based on value exchange of both tangible (e.g., financial and other capital-based resources) and intangible assets (e.g., knowledge, relationships, expertises and skills, effectiveness of work groups and structure, and trust between people). In the theoretical framework of the living hub social partners, companies, decision makers and governments, and R&D, are the main actors, engaged to: a) elaborate an action-oriented agenda for, at worst, an overall neutral labour market impact of digitalisation and automation; b) increase their involvement in the implementation of the agenda.

Participants were selected using a two-step approach:

- The 'convenience sampling', a non-probability sampling method where the selection of individuals is only based on convenience (Waterfield, 2024). Through this method, the project lead researchers involved directly the 34 partners of the consortium, coming from 10 European countries (Italy, Spain, France, Belgium, Germany, Poland, Latvia, Finland, Bulgari, Greece), United Kingdom, and 4 overseas countries (USA, Canada, Korea, and Japan) covering a large spectrum of competencies across all transport modes (Original Equipment Manufacturers, public transport, logistics, technologically advanced sectors, and new forms of work)
- The 'snowball' sampling plan (Sirwan, 2024), where the consortium partners selected an initial random group of companies, associations, labour psychologists, labour lawyers, unionists, politicians, etc. These groups were in turn asked to randomly identify other operators falling within the target population, and so on. In this phase, attention was given to the balance of the different categories of stakeholders

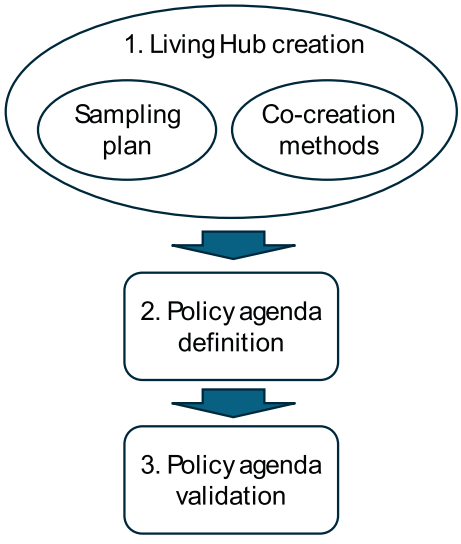


Fig. 1. The methodology steps.

In the first part of the project, consortium partners brainstormed eight thematic areas as follow:

1. Governance of transition
2. Common skills to be developed between same-level workers in different sectors of the transport industry
3. Minimisation of exclusion processes in workforce reskilling
4. Platforms for gig workers: implications on jobs production
5. The role of local and regional authorities
6. Role of workers in Automated Public Transport Settings
7. Regulation of transition in the view of collective bargaining
8. Automation and sustainability

Thematic areas were discussed by creating heterogeneous groups of 5–10 consortium partners, divided according to the typology—companies, R&D, PT operators, authorities, trade unions—the transport mode, and inclusivity (e.g. gender balance), to reach a multi-perspective coverage of each topic.

A brief on each thematic area was filled with the content for discussion with external stakeholders, selected through a stratified sampling plan, using three criteria:

- The specific points of discussion
- The coverage of different legal and cultural contexts
- The coverage of all transport modes and the related specificities

Discussions were conducted with a variety of settings, as local or international focus groups, interviews, workshops. Consortium partners discussed the resulting Policy Briefs and incorporated and refocused the eight original thematic areas into a policy classification set of four thematic areas:

1. Public governance and regulation
2. Industrial governance
3. Training and reskilling
4. Minimisation of labour exclusion and exploitation

2.1. *The agenda definition*

Workshop sessions were used to discuss the thematic areas with the sampled stakeholders and to define the policy agenda. Before each session, participants were given informative and preparatory material consisting of:

- A 'Vademecum' explaining the project, the four thematic area, and the provisional policy agenda.
- A form to collect instinctive impressions about policies, where participants were asked to rank them as 'important', 'not important', or 'controversial'. Potential policies missing from the 'Vademecum' list were requested too.

Each session consisted in:

- a focus groups of 6 to 10 people aimed at criticising, modifying and strengthening the consistency and quality of a provisional policy agenda that was pre-submitted to participants.
- a creative thinking part where groups of 3–4 participants were asked to draft the policies with a white canvas and notes, according to four criteria: content (What), implementation (How), timeframe (When), and responsible of the implementation (Who) of policies.

The workshop moderators were provided with questions for each thematic area and related policies for consistency in the analysis of results.

The policy agenda formulation within the 'living hub' ecosystem

included several events, geographically represented in Fig. 2:

- A workshop in Brussels (January 2023) where participants discussed about the three most important policies according to the scenarios emerged from the previous phase of the project
- A workshop in Vienna (June 2023) and another in Turin (September 2023) where a first complete bundle of policies was discussed and ranked in terms of importance or controversiality within sessions of focus group and creative thinking
- Specific events were held in EU countries and oversea, providing workshops with local stakeholders: Valencia, ES (July 2023); San Francisco, USA (July 2023); Athens, EL (September 2023); Bologna, IT (September 2023); Stuttgart, DE (October 2023); Paris, FR (November 2023); Sofia, BG (November 2023); Brussels, BE (December 2023)

In addition, a citizen engagement process to collect concerned workers' views and proposals was set up through the organisation of five workshops with workers across the EU: Vienna, AT (June 2023); Turin, IT (September 2023); Hamburg, DE (October 2023); Tampere, FI (October 2023); Paris, FR (December 2023). The workshops were intended to lead to initial orientations aimed at nourishing the setting of the policy agenda. They followed a common deliberative process, animation and moderation. Workers were first introduced to the project with an icebreaker activity and discussed the issues they were facing as professionals of the transport sector. Information collected regarded:

- Experiences on the different thematic areas.
- First orientations on policies to solve the issues.
- Fairness (social justice) of proposed policies.

Each workshop lasted three hours, was held and moderated in local language, and included between 10 and 30 workers, with parity and diversity in terms of positions, industry, and social characteristics.

All results allowed to draft a final policy agenda containing the identified policies according to the aforementioned layout: each policy was accompanied by its content (What), implementation (How), timeframe (When), and responsible of the implementation (Who).

2.2. The agenda validation

The agenda themes and priorities were eventually finalised and validated independently by a sample of participants of the living hub and experts of the Advisory Board.[2]

The first draft of policies was validated in a focus group organised in this last phase, held in Washington D.C. (USA) on January 2024 to assess the policies in an extra-EU context. The selected stakeholders were sent the same draft, as a text document paired with a spreadsheet, designed to evaluate the four sections (What, How, When, Who) of each policy in five steps:

- Assessing credibility, goodness, and robustness of policies, highlighting their positive, negative, or controversial aspect. This allowed to see if there was a consensus on policies or a need for their revision according to stakeholders' comments
- Checking the applicability of policies at company, national, and/or EU level
- Validating or revising the proposed timeframe
- Whether the actors proposed to implement the policy were considered adequate or other were suggested
- Ranking the importance of policies on a Likert scale ranging from 1 to 6
- Adding final remarks, if needed

The participants were thus asked to fill in the spreadsheet (mandatory) and optionally intervene directly on the text and add comments, revisions, suggestions.

Specific experts in the topic of transport labour belonging to the different transport modes were selected in a convenience sampling plan on the following profiles: HR and strategy managers from all transport sectors, labour psychologists, labour experts, lawyers, trade unions, politicians. The sample was balanced to represent different EU countries fairly. Experts from UK, USA and South Korea were added for an extra-EU view of highly digitalised and automated countries.

The validation process was structured with the Delphi method. Results were thus examined for significant discrepancies to seek a convergent common view.

3. Results

The living hub created along the project is a stakeholder community, intercontinental and cross-sector ecosystem (Fig. 3) involving the consortium partners (34 stakeholders from all over the world) and more than 600 external stakeholders, covering all transport modes and coming from 450 different organisations in 40 countries (Fig. 4), in addition to workers and workers' representatives.

In total, a balanced sample of 395 people (322 external stakeholders out of 600, with a good representation of social parties and companies, and a few representatives of ministries and political institutions, together with 73 workers) have been directly involved in the co-creation of the first draft of policies, starting from the provisional list of the Vienna and Turin workshops (Table 1).

Fig. 5 shows the percentage of stakeholders who identified each policy among the top four in terms of importance or controversy. 'Reskilling' (25 %), 'Stronger/maintaining guarantees of job safety', 'Co-managing of digitalisation and automation processes' (23 %), 'Lifelong learning' (23 %), and 'EU harmonisation' (20 %) were most frequently ranked important and were mostly pointing to threats that are already perceived as generalisable and detrimental to the whole transport sector, directly negatively influenced by automation and digitalisation. The most controversial policies were 'Minimum wage' (23 %) and 'Role of local, regional and transport authorities' (14 %), given the discretion that nowadays Member States of EU have in the setting of their labour legal framework: countries where collective bargaining and trade unions have stronger powers host harsh debates on top-down measures as national or European thresholds and impositions on wage levels and working conditions.

Consensus on the four thematic areas was reached across all workshops, enabling the consolidation of the original 21 policies into a streamlined set of 11.

Following the U.S. focus group in Washington D.C., the validation process involved a broader sample of 43 individuals from 9 EU countries (Italy, Spain, Greece, France, Germany, Belgium, Bulgaria, Latvia, The Netherlands), the UK, the USA, and South Korea, covering all transport sectors and profiles: 8 members of the Advisory Board, 32 representative stakeholders, and 3 policymakers.

Only one round of the Delphi method was required due to the strong convergence of results, likely reflecting the extensive policy definition process. Nonetheless, the 43 experts—along with the 4 participants in the U.S. focus group—provided valuable insight and details that enriched the policy contents and supported the finalisation of the policy agenda, presented in Table 2.

A detailed version of each policy is provided in Appendix A, structured as a policy card with four sections: content, implementation, timeframe, and responsible actors.

[2] The Advisory Board was composed by ten experts of workforce, automation, and digital services from research institutes, academia, public companies, and private business stakeholders (industries and SMEs).

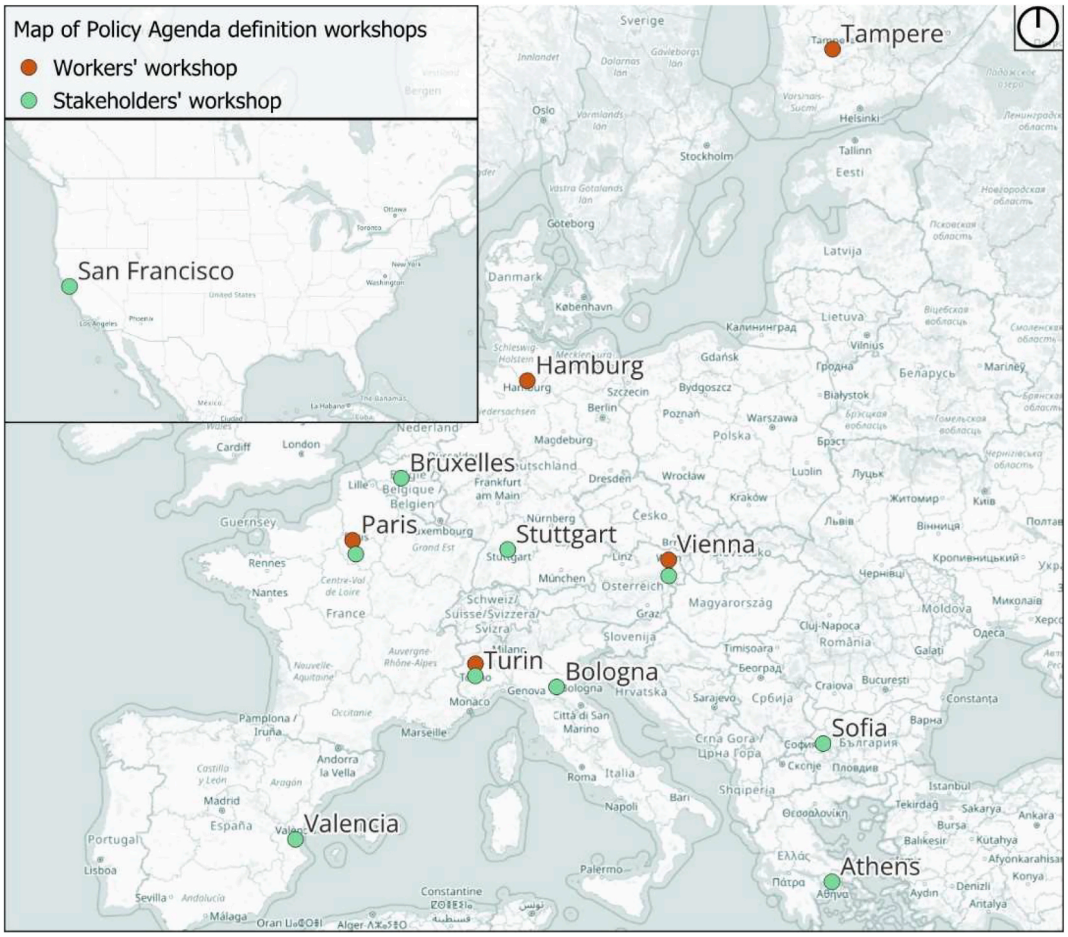


Fig. 2. Places in which policy agenda has been defined.

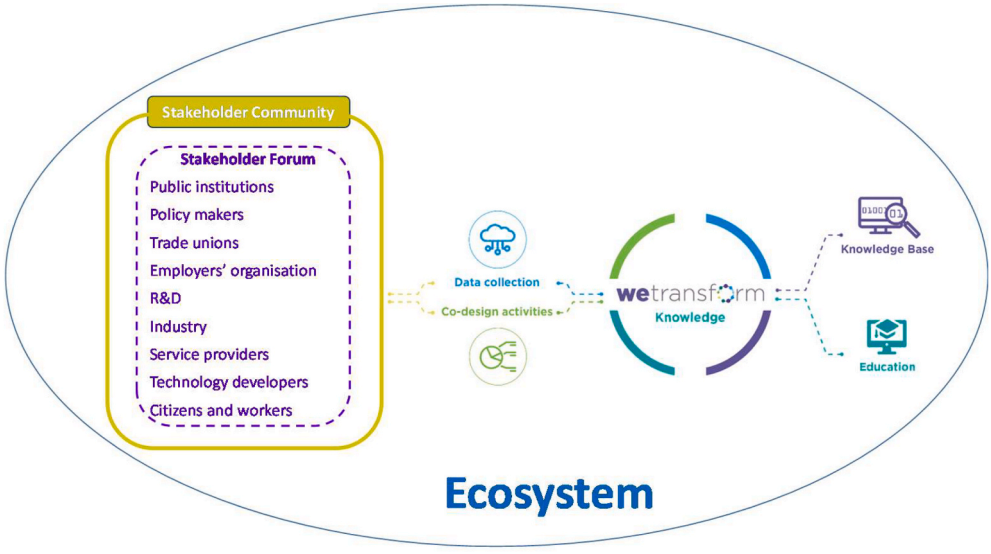


Fig. 3. The 'living hub' in the WE-TRANSFORM project.

3.1. The policy agenda

The policy agenda reflects a clear consensus among stakeholders on the need for a more harmonised approach across Europe. Despite some concerns about national sovereignty, there is broad recognition that only a cohesive European framework can achieve the critical mass needed to compete globally and sustain high levels of technological advancement against major American and Asian players.

The pursuit of fairness and prevention of dumping often conflicts with the current tendency of EU Member States to prioritise national interests and advantages. This inward focus on self-determination has been exacerbated by European-level decisions, which at times reflect

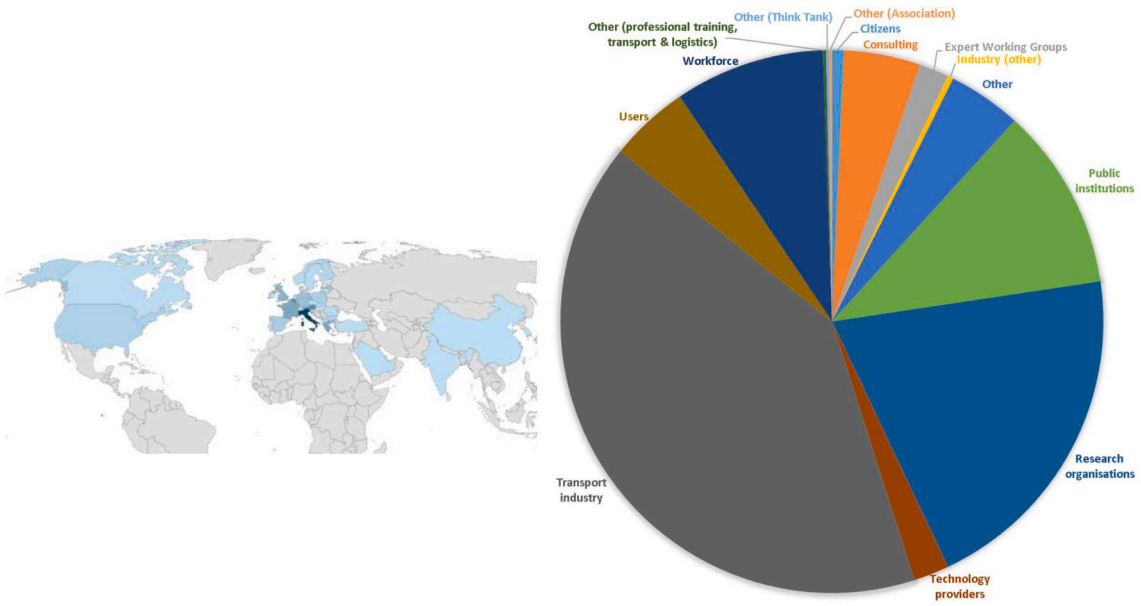


Fig. 4. The stakeholders involved in the project.

Table 1
The provisional list of policies discussed in Vienna and Turin workshop.

No.	Policies	Important	Less important	Counterproductive
1	EU harmonisation			
2	Minimum wage			
3	Rethinking of working hours			
4	Stronger/maintaining guarantees of occupational security			
5	Stronger/maintaining guarantees of job safety			
6	Co-managing of digitalisation and automation processes			
7	Privacy and functional guidelines for remote working			
8	Structured budgeting on digitalization and automation			
9	Role of local, regional, and transport authorities			
10	Company skills plan			
11	Diachronic workforce placement plan			
12	Strengthening of second level (company-level) collective bargaining			
13	Upskilling (quantitative dimension of training)			
14	Reskilling (qualitative dimension of training)			
15	Lifelong learning (length dimension)			
16	Common skills			
17	Specialised skills			
18	Policies to protect gig workers			
19	Policies to protect female workers			
20	Policies to protect workers with disabilities			
21	Policies to protect older workers			

strategic bargaining between Member States, resulting in divisive shifts within European policy. The efforts of Member States to promote freedom, social justice, and the welfare of EU workers depend on moving beyond individualistic approaches and establishing a cohesive common policy. Such a policy would build upon the Lisbon Strategy (2000–2010) to advance Europe's social and technological progress. This spirit guided the creation of this policy agenda, resulting in a framework of highly interconnected policies that require integrated implementation and cross-cutting actions. Fig. 6 illustrates how the 11 policies operate synergically, highlighting the limited effectiveness of isolated implementations and demonstrating how shared actions spanning multiple policies can simplify their execution.

Policy No. 1—EU harmonisation serves as the overarching framework encompassing all other policies. It calls for EU-level intervention to establish uniform legislation across Member States, setting minimum standards for various aspects of work addressed in Policies Nos. 2, 3, and 4 within the first thematic area (Public Governance). The rethinking of wages, working hours and working conditions, the guarantee of occupational safety and job security, and the co-management of digitalisation and automation processes are addressed at both European and national levels, emphasizing the crucial role of involving companies in this dialogue. This is why directives are the appropriate instrument for shaping the EU framework on these issues. Encouraging experimental processes and pilot tests helps fine-tune policies and supports effective, broadly accepted implementation. The notion of 'practices convergence' captures this approach, potentially paving the way for smoother legal harmonisation.

Policies Nos. 2, 3, and 4 require prior harmonisation at the European level (Policy No. 1), while acknowledging that certain elements may be challenging to align across Member States. A significant debate emerged around the minimum wage (Policy No. 2), which was the first topic addressed. Due to its controversial nature—even among trade unions—it evolved into a broader rethinking of wage policies. This shift was agreed upon with a focus on establishing "minimum contractual conditions". Digitalisation and automation further highlight these issues, as they demand a broader set of 'stakes' to prevent inequality and social or economic dumping between countries. Expanding the concept also enables a stronger link between wage levels and the skills required by technological advancements, supporting the notion of a 'proper wage'.

Policy No. 2 (wage, working hours and conditions) defines shared thresholds—giving concrete form to Policy No. 1—and promotes

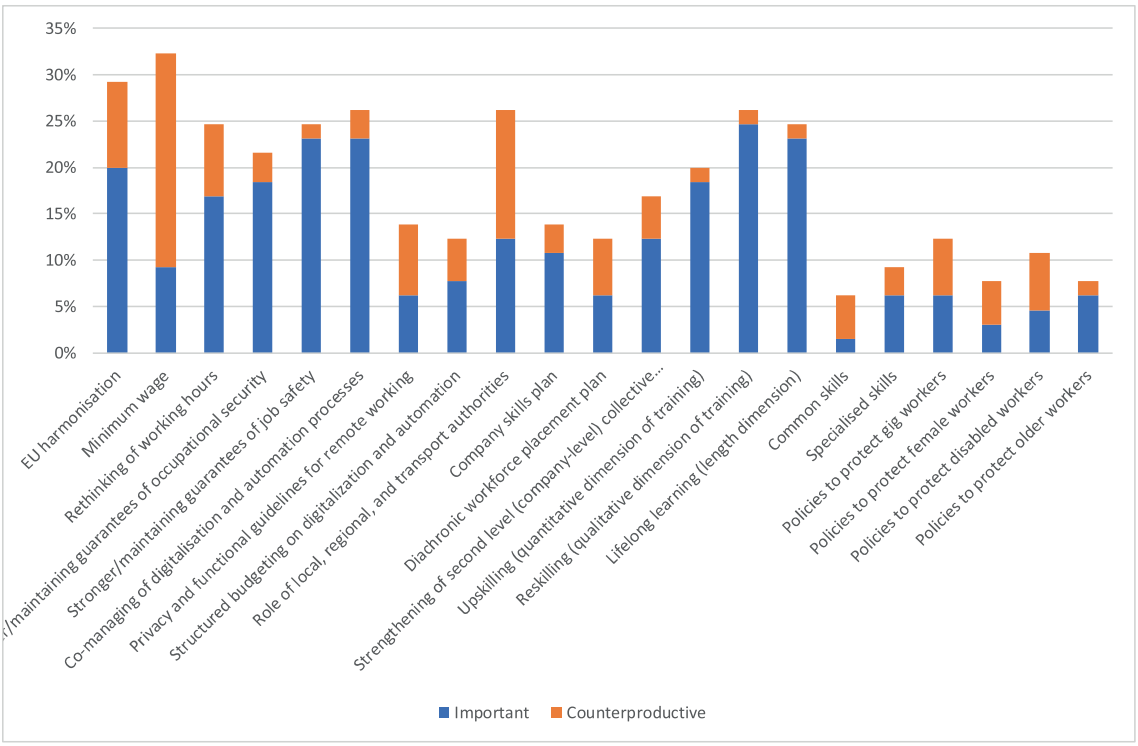


Fig. 5. Stakeholders' choice of most important and most controversial policies.

Table 2
The policy agenda according to the four thematic areas.

Thematic areas	Policies
AREA 1: Public governance and regulation	• Policy n° 1: EU harmonisation. • Policy n° 2: Rethinking wage, working hours and working conditions (Reciprocity between countries, competition, antidumping policies). • Policy n° 3: Improving/preserving guarantees of occupational safety and job security. • Policy n° 4: Co-managing of digitalisation and automation processes / Structured budgeting on digitalisation and automation
AREA 2: Industrial governance	• Policy n° 5: Sustainability of working conditions (follow up of policy n° 2). o Policy n° 5.1: Joint committee on working conditions. o Policy n° 5.2: The worker at the centre of the technological evolution of the company. • Policy n° 6: Replacement tables: Company skills plan / Intertemporal workforce placement plan Strengthening of second-level collective bargaining.
AREA 3: Training and reskilling	• Policy n° 7: The up skilling, reskilling and lifelong learning Policy n° 11: Protecting workers with disabilities.
AREA 4: Minimisation of workforce exclusion and exploitation	• Policy n° 8: Implement governments awareness in the work nature changes. • Policy n° 9: Fostering female representation in the transport sector. • Policy n° 10: Protecting older workers from the challenges of reskilling. • Policy n° 11: Protecting workers with disabilities.

improved working conditions through a system of incentives and penalties, while reinforcing social dialogue wherever possible. Social dialogue should serve as the primary mechanism for facilitating implementation, supported by coordination among countries through a "Framework Collective Agreement". To this end, the establishment of an EU platform for cross-border cooperation is proposed, supported by experimental processes and testing, as outlined in policy No. 1.

Policy No. 3—occupational safety and job security—shares the same approach by requiring social dialogue and a regulation intersecting with training policies (Policy No. 7), and guidelines on responsibility and accountability for safety and security. Governments, companies, and regulatory bodies are the backbone of this process, while the EU shall provide guidelines. Policy No. 4—co-management of digitalisation and automation processes—calls for strong and continuous trade unions involvement, particularly in the establishment and monitoring of joint bilateral committees. Effective cooperation between trade unions and company requires supportive regulatory policies and, as in Policy No. 2, a cross-border platform, to facilitate transnational dialogue and information exchange.

The common, cross-cutting feature of the policies in the first thematic area (Policies No. 1 to 4) is the establishment of ongoing social dialogue, including cross-country information exchange, which could be supported by an EU-level cross-border platform. The creation of joint bilateral committees under policy No. 4 further strengthens the connection between this thematic area and industrial governance. As illustrated in Fig. 6, the policies in the first thematic area are closely linked to those in the second, particularly regarding the sustainability of working conditions (Policy No. 5) and replacement tables/company skills plans (Policy No. 6).

Policy No. 5 proposes the establishment of joint committees between companies and trade unions, similarly to Policy No. 4, as well as the creation of a dedicated company-level role responsible for addressing the issues outlined in Policy No. 2. This figure could help to anticipate technology-related problems and contribute to shaping its implementation. As a follow-up of policy No. 2, Policy No. 5 focuses specifically on dedicated profiles within companies, while requiring the active cooperation of all key actors—ILO, trade unions, companies—and formal endorsement at the EU level.

Policy No. 6 moves to the core of corporate governance by

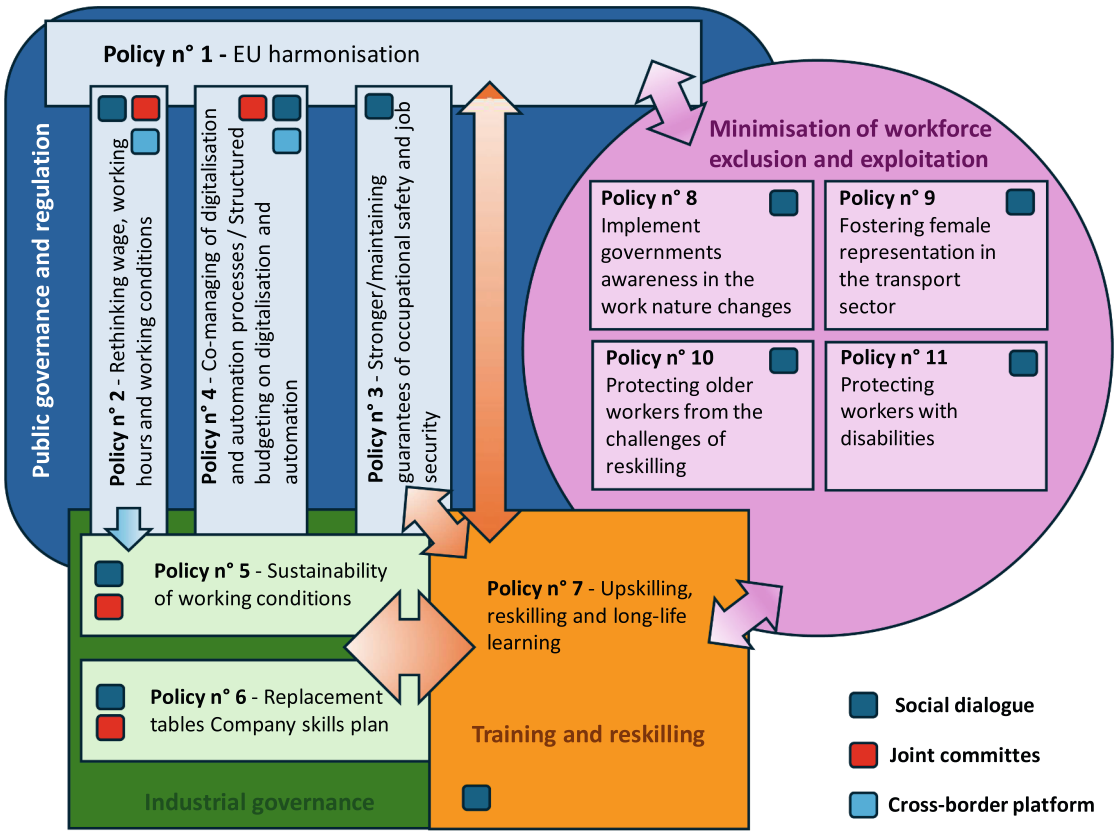


Fig. 6. The structure of the policy agenda.

reinforcing social dialogue through the establishment of a dedicated team tasked with managing replacement tables and collaborating with trade unions via the joint committee. It also introduces the role of a special commissioner for training, thereby anticipating Policy No. 7, which addresses upskilling, reskilling, and lifelong learning. The policy introduces a system of incentives for both workers and companies that develop structured skills plans. The main actors here are companies and trade unions, with no direct involvement of national governments or the EU—reflecting an approach similar to the US.

The third thematic area consists of a single integrated policy (Policy No. 7) focused on upskilling, reskilling, and lifelong learning. This policy cuts across many others involving training—namely Policies Nos. 3, 5, and 6—with a particularly strong connection to Policy No. 6, which links company training plan to broader company strategic plans. Furthermore, Policy No. 7 also reinforces the principle set out in Policy No. 1, advocating for the harmonisation of training systems—including professional training, diplomas, degrees, grades, certificates—, drawing inspiration to existing systems like ECTS and Erasmus. As in other areas, the policy encourages joint development of training plans and competence plans by trade unions and companies. A key emphasis is placed on tailoring training to individual workers, recognising the unique background and experience, and learning trajectory of each person—so that a personalised approach is even more crucial in technological adaptation.

Policies Nos. 8 to 11, which make up the last thematic area focused on minimising exclusion and exploitation of the workforce, heavily rely on social dialogue and the development of new regulations for non-standard forms of employment. This approach aligns to recent legislative advancements, such as the Platform Workers Directive, adopted on 24 April 2024, which ensures correct classification of employment status and discourage false self-employment of platform workers. The overarching aim of these policies is to "reset" traditional categories of gender, age or disability, and instead focusing on identifying the right worker profile based on when and where their skills are needed. This neutral, needs-bades approach helps reframe employment practices around capabilities and "diverse" abilities, rather than on personal characteristics of workers unrelated to job performances.

Policy No. 8 represents a significant paradigm shift in the cultural approach to work, enabling governments to respond more swiftly or proactively to technological disruptions. Crucially, this adaptation relies on continuous dialogue with social partners. This policy is deeply rooted in national politics and must be led by governments, closely interacting with trade unions, regions/local authorities, and companies, in a choral work at national level. In contrast, Policies Nos. 9 to 11 address specific issues related to gender, age, and disability, requiring both collective bargaining and government funds to support targeted training initiatives—related to Policy No. 7. Among these, Policy No. 10 on older workers is the only one in this thematic area that calls for EU intervention in its implementation, due to the lack of harmonisation on retirement age and its potential correlation with offshoring problems.

All 11 policies are considered urgent, despite their complexity and paradigms shift require time to implement. A timeframe of 2–3 years is seen as realistic for most policies, with a maximum extension of 5 years. However, the implementation of some policies might take longer, especially when involving a cultural change—e.g. Policy No. 9 on gender equality. Similarly, Policy No. 1 may suffer from delays due to the reception of the proposed EU-wide legislation in national legislations. Fig. 7 provides an overview of the timeframe of the 11 Policies.

The actors responsible for implementing the 11 Policies are largely consistent, albeit with different levels of engagement. While EU is frequently mentioned, without a choral work at national level and EU endorsement, these policies are unlikely to achieve their intended impact. Policies are complex, articulated, requiring the factual involvement of all actors. In some cases, regulatory bodies play a complementary but decisive role. Fig. 8 shows the distribution of responsibilities among actors for each policy.

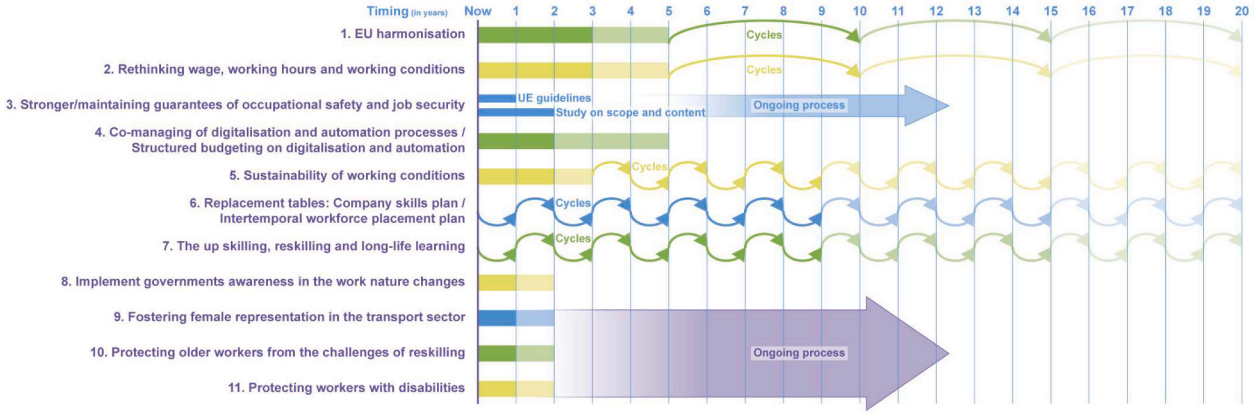


Fig. 7. Timeframe for the implementation of policy agenda.

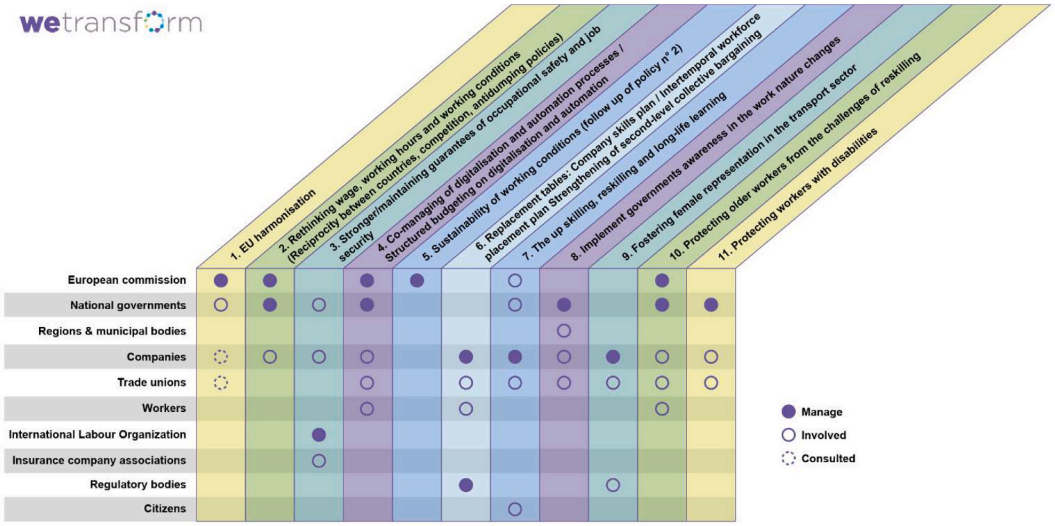


Fig. 8. Repartition of implementing actors depending on each policy.

4. Discussion and conclusions

While the Policy Agenda was tailored for the EU environment, the focus groups organised in San Francisco and in Washington D.C. have shown the different challenges in the US context, suggesting a partial enforceability of the Policy Agenda outside the EU. In the US, labour laws, as in Europe, vary significantly between states, creating a multitude of regulations—e.g., California prohibits non-compete clauses, while other states may enforce them as part of employment agreements.

Beside this apparent similarity, cultural and legal environments of the EU and the US are deeply different. The US federal system let states foster in a competitive environment and regulate by themselves most fiscal and labour matters, while EU, not as politically strong as a federation itself, focuses on a smoother, albeit challenging, harmonisation across Member States.

The approaches of the EU and the US to automation and the transport labour market diverge significantly. The US generally adopts a market-driven strategy characterised by minimal government intervention, prioritising innovation, economic growth, and a competitive business environment. This approach emphasises limited regulation and flexibility, placing responsibility largely on individuals to upskill and adapt to evolving job markets. In contrast, the EU favours a comprehensive and proactive framework that integrates social protection and worker rights alongside technological advancement. The European approach safeguards fair treatment of workers amid automation and invests heavily in reskilling and upskilling through government-supported programs, ensuring that the workforce is equipped with the necessary skills to thrive in an increasingly automated future. This fundamental difference highlights the US focus on market flexibility versus the EU's emphasis on coordinated social protection and workforce preparedness.

Furthermore, the issue of social rights and benefits—such as health insurance—highlights the US distinctive reliance on employment as the primary access point to these protections. This stands in contrast to several EU countries, where healthcare and other social benefits are provided universally, independent of employment status.

While the US faces a critical debate on preserving jobs that offer dignified living without a college degree, the federal government could level opportunities through investments in education and training, raising the standard of living across states. This strategy could benefit from the EU's approach to labour market integration and robust apprenticeship and vocational training systems, which emphasises universal access to social protections and strong social dialogue among key stakeholders.

In summary, while there are disparities in labour law approaches within the US and across the EU, there are also opportunities for learning and synergy, particularly in enhancing labour market supports and coordinated training systems. To summarise, Table 3 provides a concise overview of the modifications needed to adapt the WE-TRANSFORM Policy Agenda for implementation in the U.S. context.

The Policy Agenda is the result of a three-year effort grounded in a

Table 3
Comparison between WE-TRANSFORM Policy Agenda for EU and US context.

EU Approach (WE-TRANSFORM)	US approach
THEMATIC AREA 1: Public governance and regulation	
Policy n° 1: EU harmonisation	
Emphasizes convergence, standardisation, and harmonisation of regulations across EU Member States to create a cohesive framework. Centralised coordination aims to avoid regulatory fragmentation and ensures uniform compliance.	Prefers market-driven solutions with minimal centralised regulation. Relies on voluntary industry standards and self-regulation. Labour laws are decentralised, with states setting their own rules, resulting in a patchwork of regulations and varied enforcement across states.
Policy n° 2: Rethinking wage, working hours and working conditions	
Promotes harmonised standards for minimum wage, working hours, and conditions to protect workers' rights and ensure fair competition within the single market. Flexibility is balanced with standardised protections.	Regulation primarily occurs at the state level, with minimal federal oversight. Flexible working hours are supported to adapt to changing work environments, focusing on enhancing work-life balance. Emphasis on allowing flexibility rather than harmonisation.
Policy n° 3: Improving/preserving guarantees of occupational safety and job security	
Centralised and coordinated regulations emphasise mandatory social dialogue, collective bargaining, and worker protections in automated environments. Strong emphasis on risk assessments, safety equipment, and formal training programmes.	Federal (e.g., OSHA) and state agencies regulate workplace safety, often through industry-specific standards. They emphasise risk mitigation and voluntary safety initiatives. Worker reintegration programs exist but tend to be less coordinated nationally. Insurance for accidents related to new technologies is supported but varies by region.
Policy n° 4: Co-managing of digitalisation and automation processes / Structured budgeting on digitalisation and automation	
Compulsory, structured collective bargaining is promoted across sectors, ensuring workers' representation in decision-making about automation and labour conditions. Centralised governance supports social dialogue initiatives.	Collective bargaining is voluntary and primarily enterprise-level. Industry-specific collaborations exist but are not mandated. There is cautious support for enhancing social dialogue, with concerns about government interference and company autonomy.
THEMATIC AREA 2: Industrial governance	
5.Sustainability of working conditions (follow up of policy No. 2)	
Establishes joint committees and licensing systems to oversee workforce adaptation and technology integration, promoting cooperation between employers, workers, and regulators. These are centrally coordinated and often mandatory.	Joint committees vary by industry and region. Some businesses and unions support them, but concerns about autonomy and practicality limit widespread adoption. Licensing systems for labour adaptation are generally voluntary or non-existent.
6.Replacement tables: Company skills plan / Intertemporal workforce placement plan. Strengthening of second-level collective bargaining	
Implements comprehensive Replacement Tables and sectoral bargaining as central tools for workforce adaptation to technological changes. Coordination occurs at sector and EU levels.	Replacement Tables are mostly enterprise-level initiatives, if used at all, and vary widely across industries. Sectoral bargaining is rare; collective bargaining happens predominantly at the firm level. Large companies may have resources for such planning; small firms often lack capacity.
THEMATIC AREA 3: Training and reskilling	
7.The up skilling, reskilling and lifelong learning	
Coordinated national and EU-wide strategies drive upskilling and reskilling programmes, often involving public funding, government mandates, and labour union participation to ensure broad access and consistency.	Upskilling is largely driven by individual companies or industry associations. Training plans are decentralised, tailored to company or sector needs, and motivated by competitiveness and talent retention rather than government policy. Government involvement is limited.
THEMATIC AREA 4: Minimisation of workforce exclusion and exploitation	
8.Implement governments awareness in the work nature changes	
Adopts proactive, centralised regulation to standardise protections for gig and platform workers, aiming to minimise precarity and unacceptable work conditions before issues arise.	Policies and laws evolve reactively, addressing gig work and platform economy concerns after they emerge. Regulations vary widely by state, with few standardised protections in advance.
9.Fostering female representation in the transport sector	
Strong legal frameworks mandate gender-neutral employment policies, supported by EU-wide initiatives promoting inclusivity, flexible working arrangements, and family-friendly policies.	Similar anti-discrimination laws and affirmative action policies exist. Private and public sector initiatives promote diversity, mentorship, and inclusivity. Remote work and flexible scheduling are widely advocated.
10. Protecting older workers from the challenges of upskilling/reskilling	
Focus on active ageing through policy frameworks that promote reskilling, phased retirement, and mentorship programmes. EU law prohibits age discrimination and supports workforce inclusion for older employees.	Age discrimination is prohibited by federal and state laws. Workforce development programmes provide job training and placement. Flexible work arrangements and phased retirement are encouraged to support older workers' participation.
11.Protecting workers with disabilities	
Legal mandates across Member States require reasonable accommodations and promote diversity and accessibility. Government-funded programmes provide training and employment support for individuals with disabilities.	Federal and state laws prohibit discrimination and require accommodation. Numerous programmes support employment, training, and accessibility, with an emphasis on inclusion and diversity in the workplace.

rigorous methodology, including comparative analysis between the EU and countries with more deregulated labour markets, such as the United States.

The 11 policies reflect the European perspective—with all its internal tensions—which, in the current historical moment, risk undermining European cohesion and competitiveness. A unified and consistent approach is essential for Europe to strengthen its economy and remain competitive in a global market, especially within today's fragile geopolitical landscape.

The comparison with the U.S. highlighted the divergence in perspectives between the two regions and the challenges of exporting the European approach to different socio-economic and regulatory contexts. This leads to a crucial conclusion: a policy agenda for workforce conditions in the transition to a digitalised and automated working environment in the European Union must be firmly anchored in EU values. Technological progress, while essential for preserving and enhancing European competitiveness, must not come at the expense of social justice. Whether this process is socially disruptive depends largely on how it is governed.

The Policy Agenda must therefore pursue not just a technological transition, but a just technological transition—one that aligns with the EU's social and environmental goals and responds to the urgency of current challenges. The next steps involve moving toward implementation, continuing structured dialogue with key stakeholders, including the European Parliament, national governments, and all social partners.

CRediT authorship contribution statement

Cristina Pronello: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Enrico Fedeli:** Writing – review & editing, Methodology, Data curation.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Cristina Pronello reports financial support was provided by European Commission. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

This work has been supported by the WE-TRANSFORM project (https://wetransform-project.eu/) and has been funded within the EC H2020 Research and Innovation Programme (grant agreement No 101006900).

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.trip.2025.101670.

Data availability

The data that has been used is confidential.

References

Allee, V., 2008. Value network analysis and value conversion of tangible and intangible assets. J. Intellect. Cap. 9 (1), 5–24. https://doi.org/10.1108/14691930810845777.

Arntz, M., Gregory, T., Zierahn, U., 2016. The risk of automation for jobs in OECD countries: a comparative analysis. OECD Social, Employment and Migration Working Papers No. 189, 2016. https://doi.org/10.1787/5jiz9h56dvq7-en.

Arntz, M., Gregory, T., Zierahn, U., 2019. Digitalization and the Future of Work: Macroeconomic Consequences. IZA—Institute of Labor Economics, Discussion Paper No. 12428, Germany. Prepared for the Handbook of Labor, Human Resources and Population Economics (edited by Klaus F. Zimmermann). URL: https://docs.iza.org/dp12428.pdf. (Accessed 21 February 2025).

Atkinson, R.D., 2018. Shaping structural change in an era of new technology. In: Neufeind, M., O'Reilly, J., Ranft, F. (Eds.), Work in the Digital Age: Challenges of the Fourth Industrial Revolution. London and New York, Rowman and Littlefield, pp. 103–116. Available at SSRN: https://ssrn.com/abstract=3264136.

Barber, L.K., and J. S. Jenkins. Creating technological boundaries to protect bedtime: examining work–home boundary management, psychological detachment and sleep. Stress&Health, 30(3): 259-264. Doi: 10.1002/smi.2536.

Bell, E., Tuckman, A., 2002. 'Hanging on the Telephone: Temporal Flexibility and the Accessible Worker', Making Time: Time and Management in Modern Organizations (Oxford, 2002; online edn, Oxford Academic, 31 Oct. 2023). Doi: 10.1093/oso/9780199253692.003.0008.

Berger, T., Frey, C.B., Levin, G., Danda, S.R., 2019. Uber happy? work and well-being in the 'Gig Economy'. Econ. Policy 34 (99), 429–477. https://doi.org/10.1093/epolic/eiz007.

Bessen, J.E., 2016. How computer automation affects occupations: technology, jobs, and skills boston univ. School of Law, Law and Economics Research Paper No. 15–49. https://doi.org/10.2139/ssrn.2690435.

Bessen, J., Goos, M., Salomons, A., van den Berge, W., 2019. Automatic reaction - what happens to workers at firms that automate? Boston University School of Law, Law and Economics 2019. https://doi.org/10.2139/ssrn.3328877.

Boon Ng, S., UNESCO International Bureau of Education, 2019. Exploring STEM competences for the 21st century. Series title and vol / issues: In-Progress reflection on current and critical issues in curriculum, learning and assessment, 30 [44]. Document code: IBE/2019/WP/CD/30 REV. URL: https://unesdoc.unesco.org/ark:/48223/pf0000368485. (Accessed 22 February 2025).

Butts, M.M., Becker, W.J., Boswell, W.R., 2015. Hot buttons and time sinks: the effects of electronic communication during nonwork time on emotions and work-nonwork conflict. Acad. Manag. J. 58 (3), 763–788. https://doi.org/10.5465/amj.2014.0170.

Duboz, L., Cristinel Raileanu, I., Krause, J., Norman-López, A., Weitzel, M., Ciuffo, B., 2025. Scenarios for the deployment of automated vehicles in Europe. Transp. Res. Interdiscip. Perspect. 32. https://doi.org/10.1016/j.trip.2025.101530.

Eurofound, 2022. Access to essential services for people on low incomes: Energy, public transport and digital communications, Eurofound, Dublin. URL: https://www.eurofound.europa.eu/en/publications/2022/access-essential-services-people-low-incomes-energy-public-transport-and-digital. (Accessed 27 February 2025).

European Commission, 2011. White Paper: Roadmap to a Single European Transport Area—Towards a competitive and resource efficient transport system. 28.3.2011 COM(2011) 144 final. Brussels. URL: https://op.europa.eu/en/publication-detail/-/publication/f92333f7-da0d-4fd6-9e62-389b0526e2ac. (Accessed 31 January 2024).

European Commission: Directorate-General for Employment, Social Affairs and Inclusion, LSE Consulting and Lordan, G., 2019. What work disappears?—Automation and the changing nature of work, Publications Office, 2019, https://data.europa.eu/doi/10.2767/362889.

Ford, M., 2013. Viewpoint: could artificial intelligence create an unemployment crisis? Commun. ACM 56 (7), 37–39. https://dl.acm.org/doi/epdf/10.1145/2483852.2483865.

Ford, M., 2016. The Rise of the Robots: Technology and the Threat of Mass Unemployment. Oneworld, Richmond.

Giattino, C., Ortiz-Ospina, E., Roser, M., 2020. Working Hours. Published online at OurWorldInData.org. 2020. URL: https://ourworldindata.org/working-hours. (Accessed 30 January 2025).

Gold, M., Mustafa, M., 2013. 'Work always wins': Client colonisation, time management and the anxieties of connected freelancers. N. Technol. Work. Employ. 28 (3), 197–211. https://doi.org/10.1111/ntwe.12017.

Goldman Sachs. Generative AI could raise global GDP by 7%, 2023. https://www.goldmansachs.com/intelligence/pages/generative-ai-could-raise-global-gdp-by-7-percent.html. (Accessed 30 March 2025).

Grosso, M., Cristinel Raileanu, I., Krause, J., Alonso Raposo, M., Duboz, A., Garus, A., Mourtzouchou, A., Ciuffo, B., 2021. How will vehicle automation and electrification affect the automotive maintenance, repair sector? Transp. Res. Interdiscip. Perspect. 12. https://doi.org/10.1016/j.trip.2021.100495.

Hajkowicz, S., Reeson, A., Rudd, L., Bratanova, A., Hodgers, L., Mason, C., Boughen, N, 2016. Tomorrow's Digitally Enabled Workforce: megatrends and scenarios for jobs and employment in Australia over the coming twenty years. CSIRO, Brisbane, 2016. URL: https://www.voced.edu.au/search/site/all_creators:%22Rudd%2C%20Lachlan%22. (Accessed 27 February 2025).

Institute for Women's Policy Research (IWPR). 2019. Women, Automation, and the Future of Work. URL: https://iwpr.org/wp-content/uploads/2020/08/C477_Women-and-Automation_Executive-Summary_ADA-Compliant.pdf. (Accessed 3 February 2025).

Lehdonvirta, V., 2018. Flexibility in the gig economy: managing time on three online piecework platforms. New Technology, Work and Employment, 2018. 33(1): 13-29. Doi: 10.1111/ntwe.12102.

Morandini, S., Fraboni, F., De Angelis, M., Puzzo, G., Giusino, D., Pietrantoni, L., 2023. The impact of artificial intelligence on workers' skills: Upskilling and reskilling in organisations. Informing Sci.: Int. J. an Emerging Transdiscipline 26, 39–68. https://doi.org/10.28945/5078.

OECD. 2021. OECD Employment Outlook 2021: Navigating the COVID-19 Crisis and Recovery, OECD Publishing, Paris. Doi: 10.1787/5a700c4b-en. (Accessed 30 January 2025).

Rubery, J., Grimshaw, D., Hebson, G., Ugarte, S.M., 2015. 'It's all about time': time as contested terrain in the management and experience of domiciliary care work in England. Hum. Resour. Manage. 54 (5), 753–772. https://doi.org/10.1002/hrm.21685.

Schneider, D., Harknett, K., 2019. Consequences of routine work-schedule instability for worker health and well-being. Am. Sociol. Rev. 84 (1), 82–114. https://doi.org/10.1177/0003122418823184.

Schroten, A., Van Grinsven, A., Tol, E., Leestemaker, L., Schackmann, P.P., Vonk-Noordegraaf, D., Van Meijeren, J., Kalisvaart, S. 2020. The impact of emerging technologies on the transport system. Study requested by the TRAN Committee. European Parliament, Policy Department for Structural and Cohesion Policies. Brussels. URL: https://www.europarl.europa.eu/thinktank/en/document/IPOL_STU(2020)652226 (Accessed 3 March 2025).

Schuster, A.M., Van Fossen, J.A., Agrawal, S., Wang, S., Mack, E.A., Tidwell, M.L., Cotton, S.R., 2024. Disadvantaged workers are not all alike in attitudes towards automation. Transp. Res. Interdiscip. Perspect. 26. https://doi.org/10.1016/j.trip.2024.101164.

Sirwan, K.A., 2024. (2024) how to choose a sampling technique and determine sample size for research: a simplified guide for researchers. Oral Oncology Reports 12, 100662. https://doi.org/10.1016/j.oor.2024.100662.

Smit, S., Tacke, T., Lund, S., Manyika, J., Thiel, L., 2020. The future of work in Europe - Automation, workforce transitions and the shifting geography of employment, McKinsey Global Institute. URL: https://www.mckinsey.com/~/media/mckinsey/featured%20insights/future%20of%20organizations/the%20future%20of%20work%20in%20europe/mgi-the-future-of-work-in-europe-discussion-paper.pdf. (Accessed 27 February 2025).

Spencer, D., Cole, M., Joyce, S., Whittaker, X., Stuart, M., 2021. Digital automation and the future of work. EPRS | European Parliamentary Research Service Scientific Foresight Unit (STOA) PE 656.311—January 2021. URL: https://www.europarl.europa.eu/RegData/etudes/STUD/2021/656311/EPRS_STU(2021)656311_EN.pdf . (Accessed 24 February 2025).

Starling, R., 2020. Designing the future—sustainability, digitisation and employment insecurity. International Conference on Engineering and Product Design Education, 10-11 September 2020, Herning, Denmark. URL: https://oda.oslomet.no/oda-xmlui/bitstream/handle/10642/9792/Starling_EPDE2020_1186.pdf?sequence=1. (Accessed 20 March 2025).

ter Hoeven, C.L., van Zoonen, W., 2015. Flexible work designs and employee well-being: examining the effects of resources and demands. New Technology, Work and Employment 30:3. John Wiley & Sons Ltd. Doi: 10.1111/ntwe.12052.

Voss, E., Vitols, K., 2020. Digital transformation and social dialogue in urban public transport in Europe. Final Report. EVA—Europäische Akademie für umwelt-orientierten Verkehr gGmbH Reinhardtstraße 23 10117 Berlin, Germany. URL: https://www.etf-europe.org/wp-content/uploads/2020/10/Final-report-Digital-transformation-and-social-dialogue-in-urban-public-transport-EN.pdf. (Accessed 31 January 2025).

Wajcman, J., Rose, E., 2011. Constant connectivity: rethinking interruptions at work. Organ. Stud. 32 (7), 941–961. https://doi.org/10.1177/0170840611410829.

Walwei, U., 2016. Digitalization and structural labour market problems: The case of Germany. International Labour Office (ILO) Research Paper No. 17. URL: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/%40dgreports/%40inst/documents/publication/wcms_522355.pdf. (Accessed 3 February 2025).

Waterfield, J., 2024. Convenience sampling. In: The SAGE encyclopedia of educational research, measurement, and evaluation, chapter DOI: Doi: 10.4135/9781506326139.n155.

World Maritime University, 2019. Transport 2040: Automation, Technology, Employment - The Future of Work. Report No. 58. International Transport Workers' Federation (ITF), London, UK. DOI: https://doi.org/10.21677/itf.20190104.