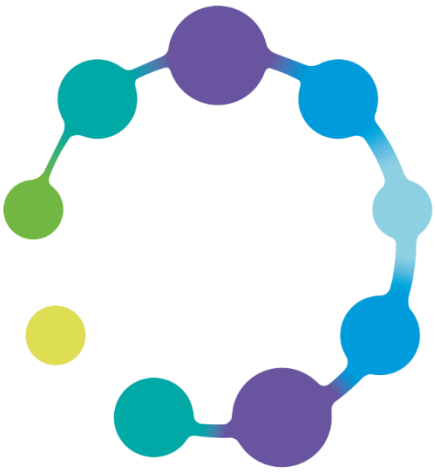

wetransform

Report on co-creation of knowledge

Deliverable 3.3
Dissemination level: PU
Project full title: **WORKFORCE EUROPE - TRANSFORMATION AGENDA FOR TRANSPORT AUTOMATION**

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Author(s): UAEGEAN

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SUMMARY SHEET:

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Abstract	This deliverable analyses the results of the discovery, discussion, formulation and ranking of a list of actions to address barriers, gaps and locate opportunities in relation to the impact of automation and digitalisation on the workforce. The process is the result of collective intelligence and consensus building through structured discussions among stakeholders and partners/experts which took place during a sequence of thematic area group convocations and focus groups organised in the context of workshops and meetings dedicated at this stage of the project to task 3.3. The exploration of the nature of actions to counteract negative impact and strengthen related weaknesses - but also opportunities - required the transcription of over 70 suggestions recorded during over 25 meetings as these were reported through thematic groups and focus group rapporteurs. A two-round Delphi-type of survey was then used to formulate a narrower list of the most significant ones among them where a larger consensus was achieved but also a list of other interesting candidate actions for WP5 of the project responsible will formulating the final policy agenda. Finally, the clusters of actions which emerged through Task 3.3 are compared and contrasted in the penultimate part of the report into trends and actions proposed in the context of recent similar exploratory EU-funded research.

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v1.0	01/03/2023	**POLITO**	Final quality check	Final version

ABBREVIATIONS

AI	Artificial Intelligence
CI	Collective Intelligence
DX.x	Deliverable no x of Work Package X
EC	European Commission
EU	European Union
FG(s)	Focus Group(s)
ICT	Information and Communication Technologies
H2020	HORIZON 2020
ILO	International Labour Office
IPA	Importance Performance (IPA) map
OECD	Organisation for Economic Co-operation and Development
MAD	Median Absolute Deviation
Mx	Month X
TA	Thematic Area
WET	WeTransform (WE-TRANSFORM)
WP	Work Package

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EXECUTIVE SUMMARY

Deliverable 3.3 (D3.3) reports the findings of Task 3.3 and is in the core of the process of building new knowledge within the WE-TRANSFORM project supporting the creation of a policy agenda based on actions relevant to address the impact of the automation and digitalisation of the workforce in transport sector. The main outcome of the report is a list of proposed actions as formulated by experts and stakeholders through collective intelligence built inside the living hub of the project consisting of the Thematic area groups operating through regular sessions and through the organisation of ad hoc focus groups in the context of the project's workshops.

The key output mission of Task 3.3 - as the results of the latter are reported in D3.3 – has been the "Co-creation of knowledge in living hub" through participants in the thematic area groups coming together to create stakeholder-tested knowledge, to validate and prioritise actions and suggest viable solutions. For the completion of this task and the discovery of such actions, the main methodological approach selected - from the ones included in the D2.2 report of the project on methodologies and related tools – has been a Delphi two-round survey of the participants in the living hub consisting of the Thematic Groups (TG)s and their Focus Groups (FG)s. The two survey rounds followed the transcription of the TG materials yielding over 70 suggestions resulting from about 25 transcribed sessions of the TGs themselves and of FGs the latter organised. The selection of Thematic Areas has been itself the result of group discussions of partners involved in WP3 in several stages on the basis of the findings of the initial reports of WP3 on the state of automation and digitalisation in the sectors in question with a focus on the several dimensions and nature of their impact.

Transcribed material from the living hub has been then progressively crystallised into suitable input for the two-stage survey through an ad-hoc team of Task 3.3 under the project leader and have been processed according to the Delphi-survey methodology; findings through the survey of the participants in the living hub were then used to create a mapping based on two key variables: strength of assessed importance and divergence of the evaluation of the latter by the respondents to the two Delphi-rounds.

Results on actions emerging are in no way counter-intuitive: the area of skills, together with the need for a holistic familiarisation of workforce and management alike with change management, are the ones which appear combining both high priority and also a strong degree of consensus suggested by low standard deviation of the results. In its concluding discussion, the report compares the degree to which these findings corroborate the results of recent funded research in the area of transport automation and proposes the further exploration by larger-scale direct polling of an additional set of actions which attract less homogeneous yet significant priority ratings as these result from the Delphi-based mapping of the large range of actions transcribed and surveyed.

1. INTRODUCTION

The report focuses on the creation of a validated and prioritised set of actions created through collective intelligence in a living-hub setting to support the formulation of a policy agenda with a view to balancing the impact of automation and digitalisation of the transport workforce through factual-based measures. As noted in the precursor deliverable reports of Work Package 3 (WP3) - D3.1 and D3.2, which focused on "actions and initiatives related to transport automation and other transitions" and on "workforce barriers, needs, skills and challenges" respectively - automation can be defined as the conversion of a work process, a procedure, or equipment to automatic - rather than human - operation or control (Gerovitch, 2003) involving a deep reorganisation of the work process. Automation, having started by the first Industrial Revolution, has currently reached a new form allowing the full autonomy of operations including the transfer of decision-making to technology enabled by digitalisation; this is a new qualitative stage in terms of the synergetic impact of the combination of the two trends i.e. automation and digitalisation (WE-TRANSFORM, 2022b). The increased introduction and integration of connected and automated vehicles across transport modes with drones, digital applications, and other forms of automation in transport (WE-TRANSFORM, 2022a), is expected to lead to further improved efficiency and also safety allowing for lower levels of human error. Despite the long-established continuity of the process of automation in air transport and segments of land transport, the advent of new technological applications and the focus on limiting human error have propelled the degree of penetration of both automation and digitalisation across transport modes (WE-TRANSFORM, 2022a) including shipping, where autonomous vessels have been constructed already with the potential of totally crewless sailings (SkillSea, 2021).

At a first level, digitalisation has led to changes in the skills and tasks required of transport workers; the use of real-time data and digital communication systems has made it possible for transport companies to optimise their operations. On the one hand, this leads to an increased demand for workers with higher-level skills such as data analysis, programming, and automation management. On the other hand, automation is replacing manual and repetitive tasks and low-skill work tasks in general. Following the assessment of overall challenges these two contemporary trends create barriers and gaps including skills' gaps in terms of skills required for the transition (WE-TRANSFORM, 2022b) raising also concerns over a widespread job displacement as assessed already in the context of the project (WE-TRANSFORM, 2022b).

This new reality is now well-recognised and thus, a great deal of international organisations has been issuing reports researching actions that can be taken to mitigate the negative impacts of automation and digitalisation on the transport workforce (OECD, 2019a; ILO, 2021; WEFORUM, 2022) along with continuing research (Man, 2022) on automation and AI risk recognition and mitigation.

It must be noted that while the social dialogue – with academic literature discussion being no exception - mostly revolves around mitigating related negative impacts, there is also room for focusing on emerging opportunities for new jobs, better pay and career trajectories (Frey and Osborne, 2017); these have been explored also to a large extent through the living hub at this stage of the project through Task 3.3 and are reflected in a number of actions proposed as these emerged through the methodological steps for reaching the final outcome of the D3.3 report which is structured as follows:

Next to the Introduction, Section 2 includes the objectives and the summary of the methodological steps of the deliverable. The analysis in Section 3 includes the presentation of the formulation of the Thematic Areas at the start of the relevant sub-task of Task 3.3 on basis of the findings of D3.1 and of D3.2; also, through relevant literature review, it argues the choice of the D3.3 methodology in order to derive a validated and appropriately prioritised set of actions from the contributed collective partner and stakeholder collective intelligence as this was formulated in the living-hub through a number of Focus Groups organised both internally and externally to the consortium, in the 3rd Workshop. Section 4 presents the process of crystallisation of the proposed actions included in the two Delphi surveys and the results of the two rounds including relevant, yet direct and simple, quantitative measures for the mapping of emerging priority actions to be further explored in the next project tasks. Section 5 concludes highlighting the degree of compatibility of the results with those of recent funded research, the limitations of the research while it proposes ways to explore some of the other categories of actions which emerged through the mapping of results in the next steps of the agenda formulation by WP5.

The deliverable also contains 5 Annexes:

Annex A: Screenshot from WET website on Living Hub formation
Annex B: Workshop-focus groups' invitations
Annex C: Indicative example of TAs' anonymised knowledge briefs
Annex D: 1st round Delphi questionnaire survey design
Annex E: 2nd round Delphi questionnaire survey design

2. OBJECTIVES AND METHODOLOGY

The specific objectives of Task 3.3, within WP3, are presented on the right-hand side of Figure 1.

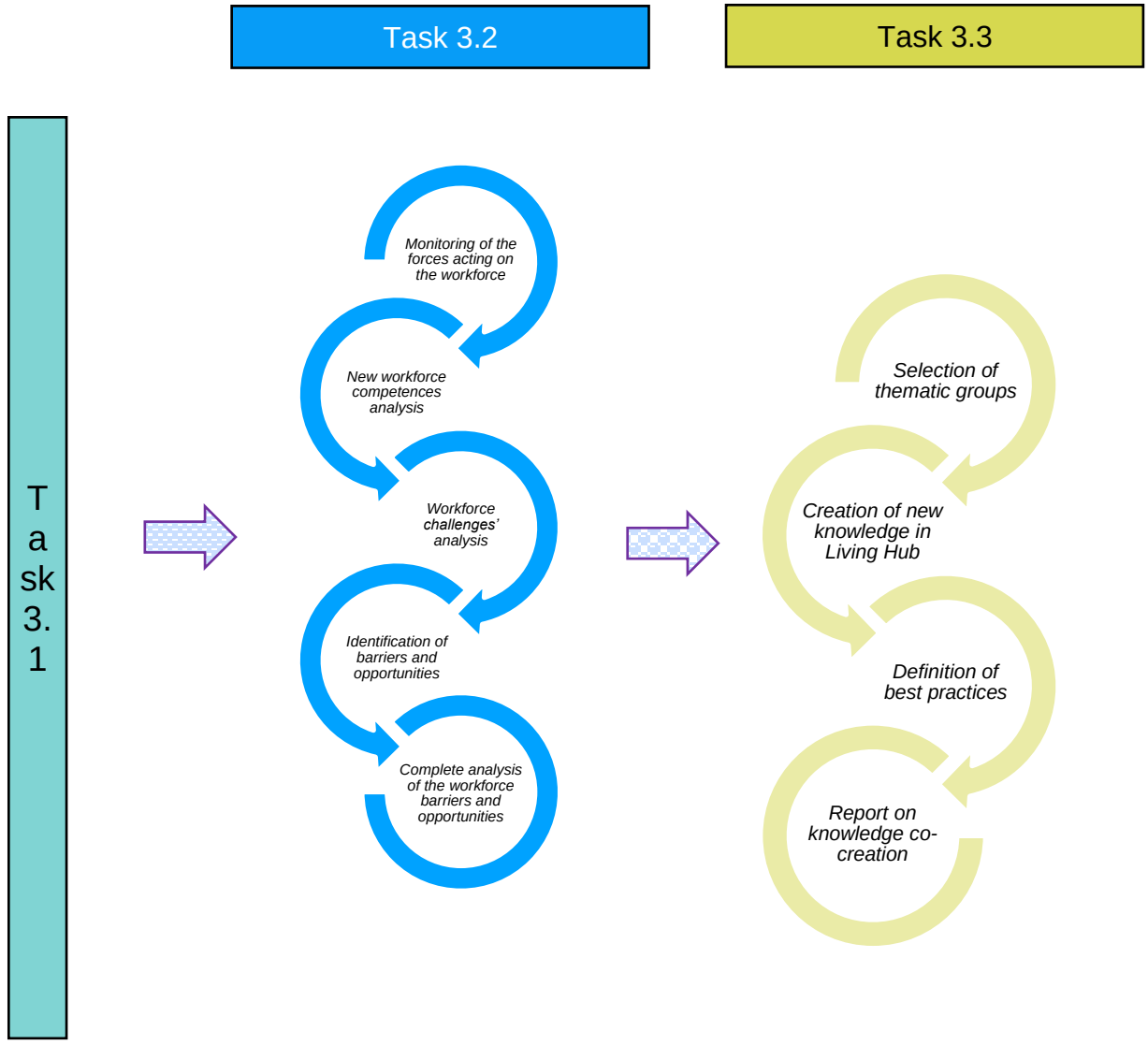


Figure 1: T3.3 subtasks in the sequence of the WP3 implementation plan

As shown in Figure 2, the methodology includes four steps:

1. the appropriate transcription and adjustment of the material obtained through the thematic area reports of the sessions of the FGs run internally to the consortium and in the context of the 3rd Workshop of WE-TRANSFORM, run in Riga, Latvia, in June 2022;
2. the design of the Delphi-round questionnaires;
3. the categorisation and ranking of results obtained in the form of a list of priority actions for potential inclusion in a Policy agenda to address the impact of automation and digitalisation on the workforce in the transport sector;
4. the comparison of the results obtained with the most recent ones obtained within EU funded research.

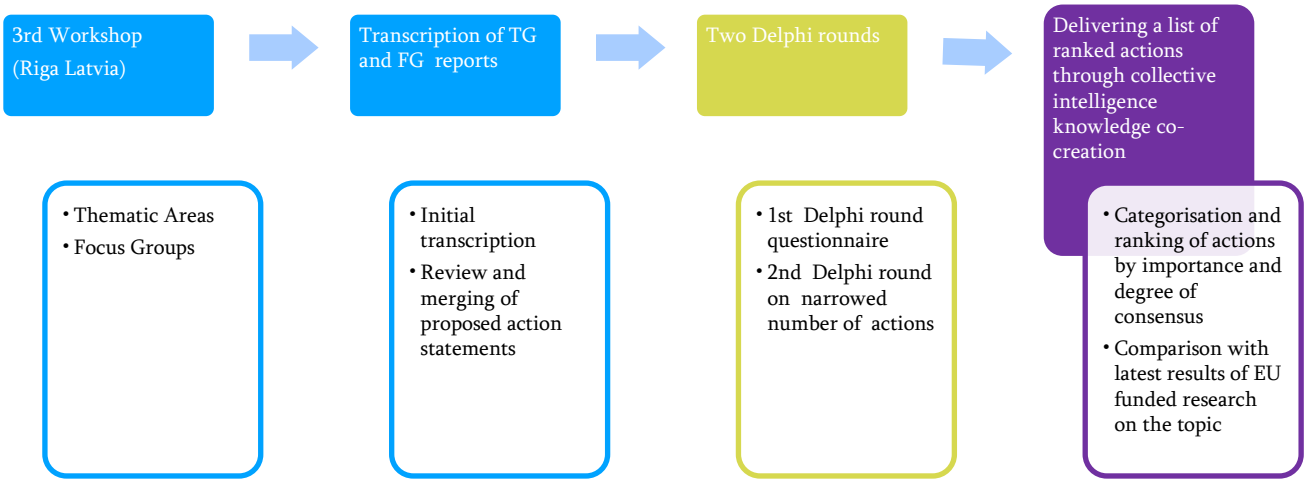


Figure 2: T3.3 in the knowledge creation chain of WE-TRANSFORM and main methodology steps

While the steps in methodology have been sequentially presented in Figure 2, the main outcome of the report, i.e. a list of validated and prioritised actions as candidates for inclusion in the agenda to be formulated by WP5, is one out of a synthetic process (Figure 3), involving the processing of the direct unformulated content to derive a mapping of candidate actions.

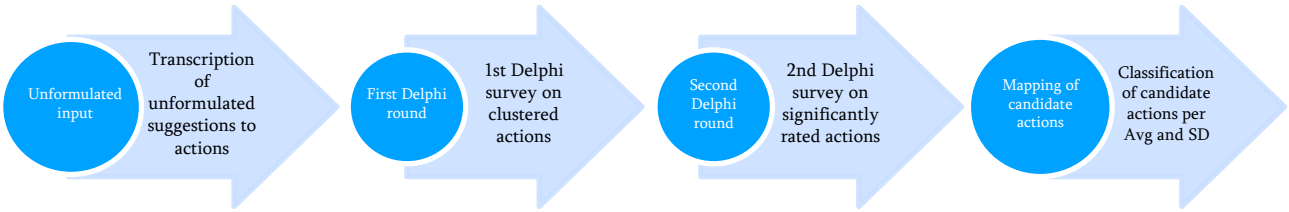


Figure 3: Key input for Task 3.3.

2.1 Knowledge co-creation in a living-hub continuous process

The specific steps followed for successfully extracting collective intelligence results on potential candidate actions in a living-hub setting through project partners-stakeholders interaction and dialogue are summarised below:

A. **Living-hub formation:** The first step was the formation of the WE-TRANSFORM living hub on the basis of the Thematic Areas. Based on the state of the art review (D3.1) and the analysis of barriers, gaps, opportunities, success and failure factors related to automation and digitalisation (D3.2), a brainstorming exercise was made inside the consortium, asking to the internal stakeholders (notably industry, SMEs, operators) to select the most important and crucial topic to discuss and on which apply the knowledge co-creation process.

   The eight Thematic Areas (TAs) were created as follows:
   1. Governance of transition;
   2. Common skills to develop between same-level workers in different sectors of the transport industry;
   3. Minimisation of exclusion processes in the reskilling of the workforce;

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.

B. **Control and reporting**: Following Task 3.3 roadmap briefings, all group leaders from the eight Thematic Areas (TA) were asked to provide updates on the results they had produced so far. TA reports of focus groups organised in the context of the 3rd Riga workshop were submitted to the Task 3.3 leader.

2.2 Processing the Thematic Group results: clustering actions emerging

Both the internal focus groups and those in the 3rd Workshop Focus Groups organised in Riga (Latvia) in mid-June 2022, were transcribed. A report was written for each focus group, containing the transcription followed by the key points, the solutions proposed and the final remarks (see the template of the thematic area report in Annex C). Based on the key points and solutions proposed in the above reports, the Project Leader team selected action proposals and, together with key members of the Task 3.3 team, collaborated to identify clusters of emerging actions.

2.3 Tools for deriving validated and co-created actions: Delphi

In the D2.2 report of WE-TRANSFORM (WE-TRANSFORM, 2021), methodologies and corresponding tools relevant to policy and agenda formulation have been included along with an AHP based adapted tool for the selection of the appropriate ones per case. Suitable methodologies for data collection, processing and decision-making ranged *inter alia* from interviews, Artificial Intelligence techniques and Delphi to Content analysis, back casting and MCDM (Multicriteria decision making) methods.

In the specific case of the material collected within the living-hub of the project, focus groups and content analysis were applied to derive clusters of actions proposed through partners-stakeholders knowledge co-creation. To identify a list of formally validated and prioritized actions as potential candidates for inclusion in the policy agenda aimed at addressing the impact of automation and digitalization on the transport workforce, two critical factors emerged: the significance of the action, and the degree of its acceptance as an agenda item.

From all candidate methodologies, the one emerging as appropriate in a policy agenda context – being accessible to all participants thanks to its straightforwardness - is the Delphi method of surveying in order to promote consensus (Rayens and Hahn, 2000) or define elements on which consensus is significant (Karakikes and Nathanail, 2020), in this specific case as candidate items to potentially include in a policy agenda.

The Delphi method (Linstone and Turoff, 1975) is a structured, qualitative data collection method which requires the participation of a small group of people (commonly a panel of experts). The participants engage in an iterative discussion session, where they answer other participants or the facilitator's questions regarding a specific theme. The general concept of the method, which can be combined with questionnaires, is that the group will sooner or later converge towards a consensus view (that may be broad and inclusive of differences) after deliberatively engaging with other participants and debating potential outcomes. Okoli and Pawlowski (2004) discuss design considerations and common applications of the Delphi method, while Vernon (2009) presents an in-depth review of the method. The Delphi method is commonly used in the context of forecasting and planning (Landeta, 2006) and can prove most useful for critical consensus building at the stage of Agenda creation. Along the same lines, there are effective ways to visualize essential elements of agreement or disagreement in Delphi - and track conflict points as mentioned in Solada et al. (2010); these are argument/cognitive maps which can also prove useful for visualisations in any content, discourse, or narrative analysis with graphics' designers assisting visualisations examples of which can be found in Okada et al. (2008) and Eden and Ackermann (2004).

2.3.1 Delphi survey design and rounds

On the basis of clusters of actions extracted in the transcription phase from the reports of the Thematic Areas, the formulated results were used as a critical input for the first round of Delphi method to identify potential candidate actions for the policy agenda objective of WP5. The Delphi survey in the English language was hosted on Excel sheets to assess actions focusing on the workforce due to the transition to automation in the digital era, prioritise them, and suggest viable solutions to support the creation of a map of potential actions to be considered in the next stage of the project.

The survey consisted of two parts (Annex D). The first part recorded the respondents' organisation activity type (i.e., Road, Rail, Maritime, Air, Other). The second part aimed at measuring the importance of actions, according to stakeholders' experiences and accumulated expertise. This was achieved by assessing each action using a 1–6 Likert scale of importance, where "1" denotes that an action is "Not important at all" and "6" that an action is extremely important. It is noted that all actions were rated based on the question "HOW IMPORTANT do you think the below ACTION is to tackle the challenges connected to the effects of automation on the transport labor force"; thus, the ratings express the level of improvement actions would bring to the workforce upon their adoption as per the perception of the respondent survey participant. At the end, an open option was included in the survey to enable new co-creation of knowledge, and to allow for additional actions to be included beyond the 73 actions that were already identified and cataloged through the transcription of the TAs' reports.

2.3.2 Profile of participants and survey communication

The survey was addressed to two groups of participants; a) participants of the WET TAs, and b) all WET partners (other than researchers in Universities and Research centers). As per the former, the participants of the WET TAs were internal-to-WET stakeholders, i.e., state and private enterprises, municipalities, trade unions, national authorities, industry, transport operators, and external-to-WET stakeholders, i.e. transport authorities, policy makers, citizens' representatives, etc. This diversity of the participants was sought to reflect stakeholder groups' contextual factors diversity.

The Delphi process usually enables a group of experts in advance by requesting their commitment to participating in all survey rounds; however, within this specific survey, it was deliberately decided to enable an open panel of participants i.e., stakeholders and not necessarily experts. In that way, the credibility of Delphi results is increased as influential individual experts cannot bias their responses favorably towards one direction and collected knowledge reflects a broader layer of the topic (Kezar and Maxey, 2014).

Stakeholders were contacted through email. As a first step, TA leaders were contacted by the survey administrators and asked to forward to their groups' members an email containing: a) information about the purpose of the research, instructions on how they can contribute to the research and the time-horizon of the two Delphi rounds; and b) the excel file in which the rating of the actions would take place. The rest of WET partners that were not serving any of the WET TGs were contacted directly by the survey administrator and T3.3 leader. In total, emails were sent to around 95 individuals.

The first round opened on 10 November 2022 and remained open until 27 November 2022. The second round opened on 20 December 2022 and remained open until 11 January 2023.

2.3.3 Data Analysis and Convergence

The analysis of the data was done through descriptive statistics. Sample characteristics – organisation type and membership in a WET TA – were estimated based on the frequency distribution per characteristic.

The indication of the effect of a Delphi survey is the amount of convergence caused by the iteration process, where convergence signifies how much more agreement is achieved on succeeding rounds as opposed to the first-round response (Jones, 2002). Convergence is measured through established criteria that are subjective and relevant to the scope of a survey (Holey et al., 2007). As datasets are nearly symmetric due to the nature of the scale, the convergence will be measured as an expression of standard deviation.

3. RESULTS

In general - not focusing exclusively on the transport domain – such actions for the mitigation of the impact of automation, digitalisation, and of specific trends or shocks on the workforce - can be clustered in wider areas (WE-TRANSFORM, 2022b; European Commission, 2019; OECD, 2019b) of which an indicative range is as follows:

- upskilling and retraining: upskilling and retraining programs for personnel to acquire skills needed to perform and succeed in the new digital and automated transport landscape;
- job creation: job creation programs to help offset the loss of jobs due to automation and digitalisation through e.g. increasing the level of direct service to vulnerable groups, increasing security etc.;
- income support: income support in the form of unemployment benefits or retraining allowances to workforce members who may be eventually displaced by automation and digitalization;
- labour protection: legislation to ensure that workforce members displaced by automation and digitalisation are treated fairly.

Below, the results of the analysis of Tas is reported, followed by the description of the sample to which the Delphi exercise was administered. Finally, the results of Delphi surveys are reported.

3.1 The list of actions

Following the creation of the TAs and based on the textual analysis performed in the reports of the Thematic Groups reports presented in the previous section, the 10 clusters of actions were formulated as *A* to *I,* with each cluster containing a number of actions ranging from 5 to 21, while the clusters covering skills' related actions combined a total of 25 actions extracted through the transcription process.

These clusters, along with the 73 actions transcribed, can be seen in Table 1.

Table 1: Clusters of actions

A. BUSINESS MODELS FOR THE AUTOMATION AND DIGITALISATION ERA	
A1	Encourage a more social approach of business on the impact of Automation and Digitalisation
A2	Explore new models of governance in the new Automation and Digitalisation era
A3	Promote a new business paradigm with more customer care jobs replacing job losses caused by Automation and Digitalisation
A4	Support a holistic local approach of Automation and Digitalisation, combining planning, communication and PPP strategies
A5	Use a stakeholder approach for sharing benefits of Automation and Digitalisation
B. SKILLS AND COMPETENCIES FOR THE NEW ERA	
B1	Encourage the development of stronger soft skills
B2	Identify common competences such as basic digital skills and transport-mode specific new competences required for Automation and Digitalisation
B3	Reskill the workforce to assist placing users at the center of the Automation and Digitalisation transition especially in terms of inclusiveness

B4	Strengthen workforce analytical skills
B5	Strengthen workforce digital skills
B6	Strengthen workforce skills in the areas of communication
B7	Strengthen workforce skills in the areas of decision-making
B8	Strengthen workforce skills in the areas of supervision and monitoring
B9	Strengthen workforce soft skills
B10	Strengthen workforce STEM skills
C. TRAINING STRATEGIES, MENTORSHIP AND AMBASSADORS FOR AUTOMATION AND DIGITALISATION	
C1	Consider training users for the new era of Automation and Digitalisation
C2	Designate peer automation ambassadors from the workforce
C3	Encourage tailor-made, different level, cooperative reskilling strategies
C4	Explore the impact of Automation and Digitalisation on users' behaviour to assist training of the workforce
C5	Introduce mentoring of the ones left behind by Automation and Digitalisation
C6	Support mentorship of members of the workforce for transition in the Automation and Digitalisation era
D. MANAGEMENT TRAINING IN AUTOMATION AND DIGITALISATION	
D1	Address management training in management of changing skills for Automation and Digitalisation
D2	Address management training in soft skills for Automation and Digitalisation
D3	Address management training in technological skills for Automation and Digitalisation
D4	Address training of older management generations in Automation and Digitalisation
E. COOPERATIVE AUTOMATION AND DIGITALISATION TRAINING of MANAGEMENT AND WORKFORCE	
E1	Encourage a participatory Automation and Digitalisation process with workforce representation in company management
E2	Encourage co-creation of innovation related training
E3	Encourage participatory cooperative workforce and management engagement for the Automation and Digitalisation transition
E4	Encourage setting up workforce and management cooperation mechanisms for transition to Automation and Digitalisation
E5	Encourage Automation and Digitalisation training through team cooperation of the workforce
F. RISKS	
F1	Address cybersecurity risks created by transport Automation and Digitalisation

F2	Create a risks' map for the management of the transition to Automation and Digitalisation
F3	Encourage non-structured, non-official and ideological barrier-free communication on Automation and Digitalisation impact
F4	Expand minimum income to mitigate Automation and Digitalisation impact on workforce
F5	Focus on the risk by Automation and Digitalisation for middle-range jobs
F6	Protect life-work balance at risk through 24/7 digitalisation pressure
F7	Provide for health and safety risks for remaining workforce as physical presence is reduced through Automation and Digitalisation
F8	Provide for health and safety risks for users as physical presence is reduced through Automation and Digitalisation
G. WORKERS RELATED	
G1	Address the gaps and difficulties of transition for white collar workers
G2	Address the impact of Automation and Digitalisation on pay of the workforce
G3	Address the specific gaps and difficulties of transition for blue collar workers
G4	Encourage cross-generational training to bridge and exchange knowledge between workforce generations
G5	Encourage workforce training into soft "management-of-change" skills
G6	Explore shift of transport workforce replaced by Automation and Digitalisation to physically present emergency response teams
G7	Introduce new contract typologies to cater for workforce rights in the Automation and Digitalisation new environment
H. COMPANY RELATED	
H1	Explore and define new occupational profiles arising through Automation and Digitalisation
H2	Fill gaps between technological innovation and frontline work current practices
H3	Identify resources and initiatives to create a competences' framework, using latest technology incl. digitalisation and Artificial Intelligence
H4	Introduce continuous upskilling and reskilling training programs
H5	Investigate the sharing of decision responsibility between Artifical Intelligence and human management
H6	Investigate user needs for discovering employment opportunities related to quality of service and transport uses
H7	Promote diverse and engaging training in Automation and Digitalisation
I. HIGH LEVEL REGULATORY DECISIONS AND EXTERNAL AID	
I1	Address increased concentration in industry caused by Automation and Digitalisation with a focus on SMEs

I2	Address the difficulties for public transport operators and small cities recruiting personnel skilled in Automation and Digitalisation
I3	Create a generally acceptable typology to be used for measuring impacts of Automation and Digitalisation on the workforce
I4	Create a map of legal voids to be filled
I5	Create a network of local authorities, users and industry to address the Automation and Digitalisation impact
I6	Directly enforce reskilling/upskilling through government related contracts
I7	Enable local authorities to prepare and educate the public for the Automation and Digitalisation transport transition
I8	European Social Partner Framework[1] (Eurofound, 2019) principles should be used to manage the impact of the Automation and Digitalisation transition on the workforce
I9	Explore the funding of the cost of reskilling the workforce
I10	Factor-in in policy measures a necessary transition period for Automation and Digitalisation
I11	Introduce EU regulation making reskilling of the transport workforce affected by Automation and Digitalisation mandatory
I12	Introduce new definitions of working time and place of work in collective agreements
I13	Introduce regulation and governement intervention to address impact of Automation and Digitalisation on the workforce
I14	Introduce the obligation to provide in collective agreements digital training to the workforce
I15	Invite local authorities to cooperate to cater for Automation and Digitalisation created gaps including legal
I16	Invite research and education cooperation to cater for Automation and Digitalisation created gaps including legal
I17	Prepare an EU-wide legal framework of transport automation from good practices in existing national regulation
I18	Promote a harmonised European policy workforce transition to Automation and Digitalisation
I19	Support public dialogue by local and national authorities on Automation and Digitalisation impact on the workforce
I20	Use a three sides (state, industry, workers) collective bargaining for the Automation and Digitalisation transition to protect the workforce and include new rights possibilities (reskilling, etc.)
I21	Use negotiations between unions and employers to manage the Automation and Digitalisation transition

3.2 Sample characteristics

The final sample size of the first round comprised 23 participants who fully completed the questionnaire and successfully returned the excel with the responses, while 14 participated successfully in both rounds. The noted dropout rate (39%) between the two rounds is considered high according to other e-Delphi studies which ranges from 20 to 25%; however, it is considered satisfactory given that no commitment was pre-

[1] https://www.eurofound.europa.eu/observatories/eurwork/industrial-relations-dictionary/european-social-partners

requested from participants (Hall et al, 2018). The map of the participants' organisation countries can be seen in Figure 4.

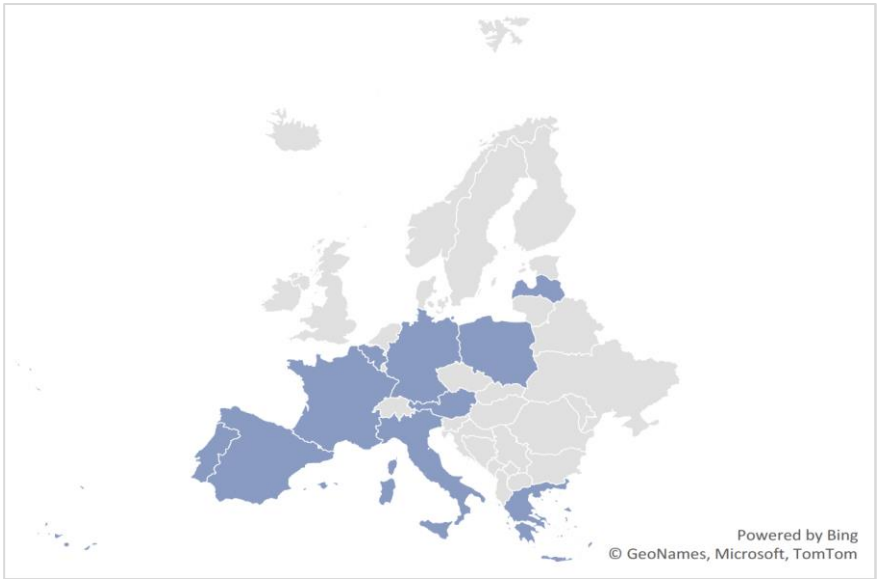


Figure 4: Map of participants' organisation country

Figure 4 shows a very good distribution of respondents' organisation countries across EU, covering different levels and paces toward transport automation and digitalization, including countries that have made more mature steps into embracing and enacting landmark legislation.
The frequency distribution per organisation type and membership in a TA, for each round, can be seen in Figures 5a and 5b.

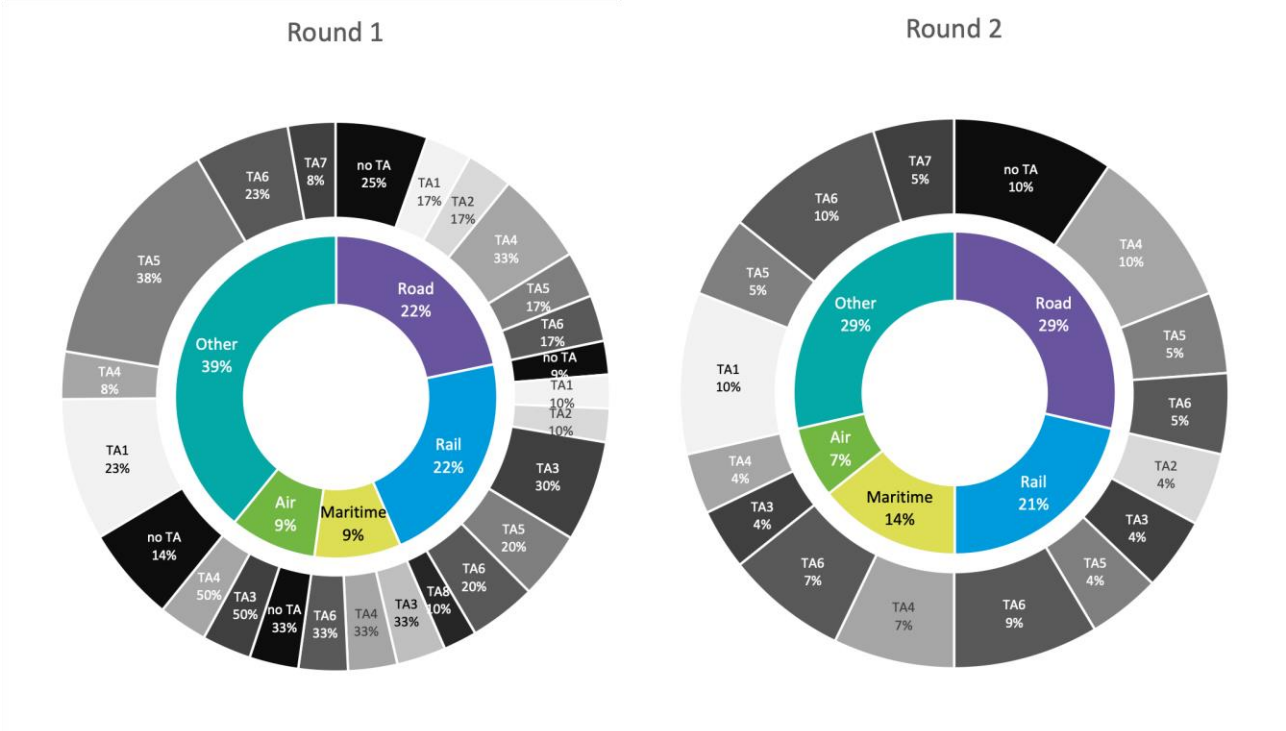


Figure 5a (left) and Figure 5b (right): Participants' distribution per organisation type and TA membership.

In parallel, Figures 5a and 5b show the distribution of respondents' transport modes, as well as their distribution in the eight TAs. Considering that "Other" mainly refers to stakeholders involved in Public Transport – thus Road and Rail – the distribution seems to match the EU modal split of inland transport (Eurostat, 2022).

3.3 Results of the Delphi surveys

The results of the two Delphi rounds are presented below, followed by the analysis of the stability of results between the two Delphi rounds.

3.3.1 Analysis of Delphi Round 1

In Delphi round 1, all 73 actions were rated as per their importance on a 1-6 Likert scale. The average results for all 23 participants per action were estimated and can be seen in Table 2. Other than the average scores, the standard deviation was also estimated to measure the dispersion of the data (Greatorex and Dexter, 2000). Moreover, the last column shows the average value per cluster of actions.

Table 2: Results of 1st Delphi round

Action	Mean	STDEV	Cluster's Average
Cluster A. BUSINESS MODELS FOR THE AUTOMATION AND DIGITALISATION ERA			
A1: Encourage a more social approach of business on the impact of Automation and Digitalisation	4.50	1.32	4.40
A2: Explore new models of governance in the new Automation and Digitalisation era	4.54	0.96	
A3: Promote a new business paradigm with more customer care jobs replacing job losses caused by Automation and Digitalisation	4.46	1.26	
A4: Support a holistic local approach of Automation and Digitalisation, combining planning, communication and PPP strategies	4.08	1.15	
A5: Use a stakeholder approach for sharing benefits of Automation and Digitalisation	4.42	1.11	
Cluster B. SKILLS AND COMPETENCIES FOR THE NEW ERA			
B1: Encourage the development of stronger soft skills	5.00	0.87	4.65
B2: Identify common competences such as basic digital skills and transport-mode specific new competences required for Automation and Digitalisation	5.08	0.95	
B3: Reskill the workforce to assist placing users at the center of the Automation and Digitalisation transition especially in terms of inclusiveness	4.88	0.78	
B4: Strengthen workforce analytical skills	4.42	1.08	
B5: Strengthen workforce digital skills	4.75	0.92	
B6: Strengthen workforce skills in the areas of communication	4.50	1.35	
B7: Strengthen workforce skills in the areas of decision-making	4.25	1.09	
B8: Strengthen workforce skills in the areas of supervision and monitoring	4.75	1.13	
B9: Strengthen workforce soft skills	4.63	1.15	

Action	Mean	STDEV	Cluster's Average
B10: Strengthen workforce STEM skills	4.21	1.26	
Cluster C. TRAINING STRATEGIES, MENTORSHIP AND AMBASSADORS FOR AUTOMATION AND DIGITALISATION			
C1: Consider training users for the new era of Automation and Digitalisation	4.54	0.91	4.72
C2: Designate peer automation ambassadors from the workforce	4.29	1.14	
C3: Encourage tailor-made, different level, cooperative reskilling strategies	4.63	1.03	
C4: Explore the impact of Automation and Digitalisation on users' behaviour to assist training of the workforce	4.96	1.27	
C5: Introduce mentoring of the ones left behind by Automation and Digitalisation	4.58	1.26	
C6: Support mentorship of members of the workforce for transition in the Automation and Digitalisation era	5.31	1.07	
Cluster D. MANAGEMENT TRAINING IN AUTOMATION AND DIGITALISATION			
D1: Address management training in management of changing skills for Automation and Digitalisation	5.04	1.06	4.74
D2: Address management training in soft skills for Automation and Digitalisation	4.67	1.18	
D3: Address management training in technological skills for Automation and Digitalisation	4.75	1.09	
D4: Address training of older management generations in Automation and Digitalisation	4.50	1.44	
Cluster E. COOPERATIVE AUTOMATION AND DIGITALISATION TRAINING OF MANAGEMENT AND WORKFORCE			
E1: Encourage a participatory Automation and Digitalisation process with workforce representation in company management	4.54	1.22	4.61
E2: Encourage co-creation of innovation related training	4.46	1.32	
E3: Encourage participatory cooperative workforce and management engagement for the Automation and Digitalisation transition	4.67	1.31	
E4: Encourage setting up workforce and management cooperation mechanisms for transition to Automation and Digitalisation	4.75	1.05	
E5: Encourage Automation and Digitalisation training through team cooperation of the workforce	4.63	1.11	
Cluster F. RISKS			
F1: Address cybersecurity risks created by transport Automation and Digitalisation	5.04	1.14	4.52
F2: Create a risks' map for the management of the transition to Automation and Digitalisation	4.92	1.15	

Action	Mean	STDEV	Cluster's Average
F3: Encourage non-structured, non-official and ideological barrier-free communication on Automation and Digitalisation impact	4.29	1.27	
F4: Expand minimum income to mitigate Automation and Digitalisation impact on workforce	3.88	1.17	
F5: Focus on the risk by Automation and Digitalisation for middle-range jobs	4.25	1.16	
F6: Protect life-work balance at risk through 24/7 digitalisation pressure	4.92	1.04	
F7: Provide for health and safety risks for remaining workforce as physical presence is reduced through Automation and Digitalisation	4.33	1.37	
F8: Provide for health and safety risks for users as physical presence is reduced through Automation and Digitalisation	4.54	1.38	
Cluster G. WORKERS RELATED			
G1: Address the gaps and difficulties of transition for white collar workers	4.29	1.27	
G2: Address the impact of Automation and Digitalisation on pay of the workforce	4.46	1.26	
G3: Address the specific gaps and difficulties of transition for blue collar workers	4.83	0.90	
G4: Encourage cross-generational training to bridge and exchange knowledge between workforce generations	5.00	1.00	4.56
G5: Encourage workforce training into soft "management-of-change" skills	4.50	1.29	
G6: Explore shift of transport workforce replaced by Automation and Digitalisation to physically present emergency response teams	4.42	1.11	
G7: Introduce new contract typologies to cater for workforce rights in the Automation and Digitalisation new environment	4.42	1.11	
Cluster H. COMPANY RELATED			
H1: Explore and define new occupational profiles arising through Automation and Digitalisation	5.08	0.95	
H2: Fill gaps between technological innovation and frontline work current practices	4.71	1.24	
H3: Identify resources and initiatives to create a competences' framework, using latest technology incl. digitalisation and Artificial Intelligence	4.63	1.25	
H4: Introduce continuous upskilling and reskilling training programs	5.29	0.98	4.83
H5: Investigate the sharing of decision responsibility between Artifical Intelligence and human management	4.50	1.35	
H6: Investigate user needs for discovering employment opportunities related to quality of service and transport uses	4.67	1.14	
H7: Promote diverse and engaging training in Automation and Digitalisation	4.96	1.10	

Action	Mean	STDEV	Cluster's Average
Cluster I. HIGH LEVEL REGULATORY DECISIONS AND EXTERNAL AID			
I1: Address increased concentration in industry caused by Automation and Digitalisation with a focus on SMEs	4.13	0.97	4.69
I2: Address the difficulties for public transport operators and small cities recruiting personnel skilled in Automation and Digitalisation	4.88	1.01	
I3: Create a generally acceptable typology to be used for measuring impacts of Automation and Digitalisation on the workforce	4.63	1.22	
I4: Create a map of legal voids to be filled	4.75	1.30	
I5: Create a network of local authorities, users and industry to address the Automation and Digitalisation impact	4.46	1.44	
I6: Directly enforce reskilling/upskilling through government related contracts	4.04	1.34	
I7: Enable local authorities to prepare and educate the public for the Automation and Digitalisation transport transition	4.54	1.08	
I8: European Social Partner Framework principles should be used to manage the impact of the Automation and Digitalisation transition on the workforce	4.58	1.26	
I9: Explore the funding of the cost of reskilling the workforce	5.00	1.08	
I10: Factor-in in policy measures a necessary transition period for Automation and Digitalisation	4.54	1.04	
I11: Introduce EU regulation making reskilling of the transport workforce affected by Automation and Digitalisation mandatory	4.75	1.09	
I12: Introduce new definitions of working time and place of work in collective agreements	4.71	1.21	
I13: Introduce regulation and governement intervention to address impact of Automation and Digitalisation on the workforce	4.50	1.12	
I14: Introduce the obligation to provide in collective agreements digital training to the workforce	4.67	1.37	
I15: Invite local authorities to cooperate to cater for Automation and Digitalisation created gaps including legal	4.83	1.03	
I16: Invite research and education cooperation to cater for Automation and Digitalisation created gaps including legal	4.96	0.93	
I17: Prepare an EU-wide legal framework of transport automation from good practices in existing national regulation	4.92	1.08	
I18: Promote a harmonised European policy workforce transition to Automation and Digitalisation	4.71	1.17	
I19: Support public dialogue by local and national authorities on Automation and Digitalisation impact on the workforce	4.88	1.17	
I20: Use a three sides (state, industry, workers) collective bargaining for the Automation and Digitalisation transition to protect the workforce and include new rights possibilities (reskilling, etc.)	5.08	1.11	

Action	Mean	STDEV	Cluster's Average
I21: Use negotiations between unions and employers to manage the Automation and Digitalisation transition	4.96	1.14	

Action C6 "Support mentorship of members of the workforce for transition in the Automation and Digitalisation era" emerged as the most important action as it was rated with 5.31 (STDEV 1.07). The action with the least importance was F4 "Expand minimum income to mitigate Automation and Digitalisation impact on workforce" with 3.8 (STDEV 1.17). On a cluster level, "H. Company related" cluster, demonstrates the highest importance, highlighting the responsibility of the companies to reach down the workforce and fill any gaps between technological innovation and frontline work current practices. Moreover, as participants had been given the opportunity to add missing actions in the last part of the questionnaire, namely cluster J, six actions were brought up by the respondents as follows with minor adjustments of sentence format (but not of content):

1. engage with users to evaluate needs regarding Automation and Digitalisation;
2. evaluate the alternatives for those who are information-excluded;
3. address social acceptance of public transport automation by users and the workforce;
4. update traditional study programs in Universities, introduce new cross-field educational programs to address the emerging need for combined technical and Automation and Digitalisation skills in the workforce;
5. awareness programs, social interactions, advertisements, and deployment of a skillful person within the territory of Digitalisation and Automation usage so that the users which are frequent travellers are skillful enough to use such applications, if they are not familiar with the technology;
6. promotion of generational transition awareness inside companies.

Based on the rates of actions' importance in Round 1 as well as their standard deviation, an adapted Importance Performance (IPA) map was developed (Martilla and James, 1977). In this adapted version of the IPA map, performance is translated into variability. The lower the standard deviation scores are, the higher is the convergence of opinions as per the importance of an action.

The division of the IPA map into quadrants (Figure 6) was performed by setting the threshold lines equal to the average values for importance and variability (standard deviation), respectively.

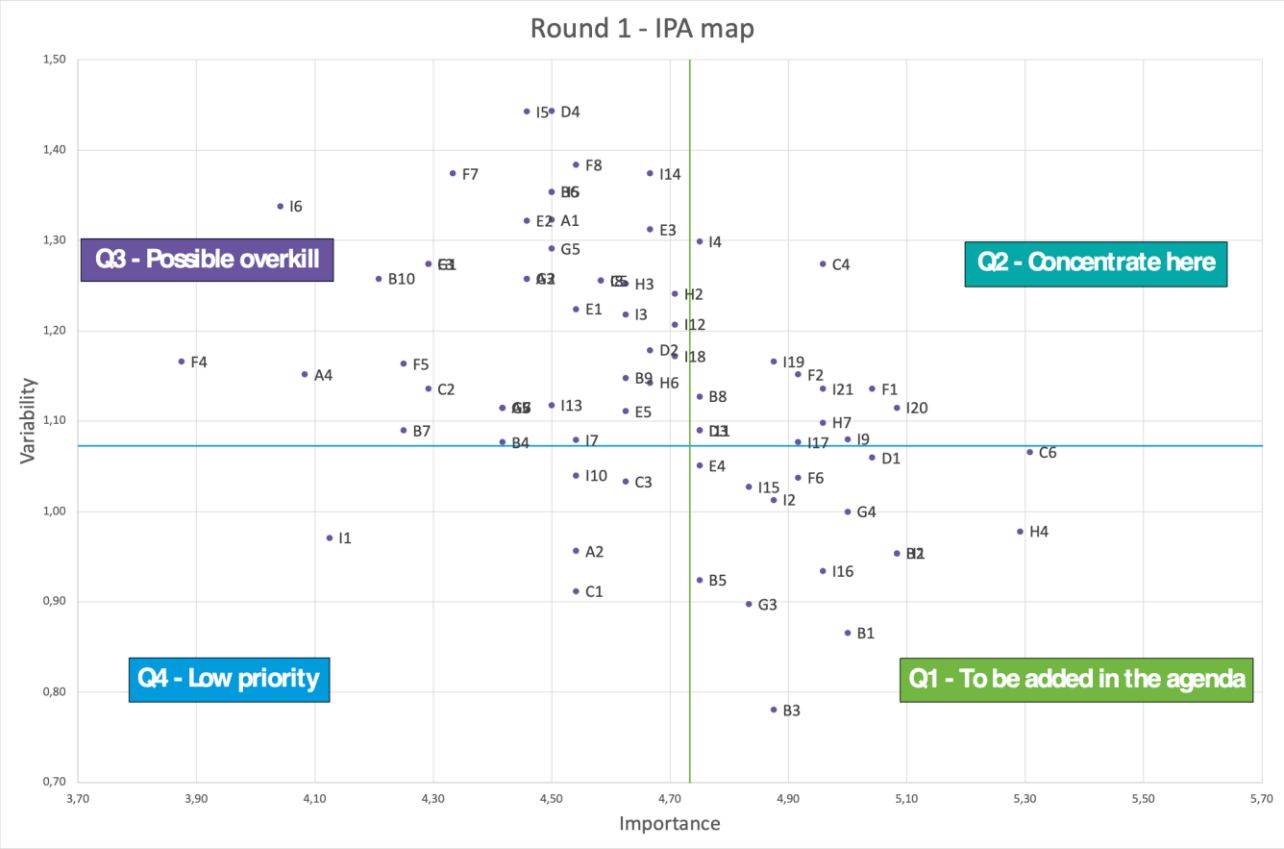


Figure 6: R1 Importance - Variability map (as an adjusted version of the Importance Performance map)

The IPA map in Q1 shows actions that have gathered high importance scores and low variability between respondents' answers. These actions are candidate actions to be included in the agenda and are qualified to proceed in Round 2. Such actions are: “Encourage setting up workforce and management cooperation mechanisms for transition to Automation and Digitalisation”, “Strengthen workforce digital skills”, “Invite local authorities to cooperate to cater for Automation and Digitalisation created gaps including legal”, “Address the specific gaps and difficulties of transition for blue collar workers”, “Reskill the workforce to assist placing users at the center of the Automation and Digitalisation transition especially in terms of inclusiveness”, “Address the difficulties for public transport operators and small cities recruiting personnel skilled in Automation and Digitalisation”, “Protect life-work balance at risk through 24/7 digitalisation pressure”, “Invite research and education cooperation to cater for Automation and Digitalisation created gaps including legal”, “Encourage the development of stronger soft skills”, “Encourage cross-generational training to bridge and exchange knowledge between workforce generations”, “Address management training in management of changing skills for Automation and Digitalisation”, “Explore and define new occupational profiles arising through Automation and Digitalisation”, “Identify common competences such as basic digital skills and transport-mode specific new competences required for Automation and Digitalisation”, “H4: Introduce continuous upskilling and reskilling training programs”, “C6: Support mentorship of members of the workforce for transition in the Automation and Digitalisation era”.
Q2 contains actions that have scored high importance, however, there is high variability between the respondents and thus, further convergence is required in order to be included in the agenda. Q2 actions are also qualified to proceed in Round 2. Such actions are: I4, B8, D3, I11, I19, F2, I17, C4, I21, H7, I9, F1, I20.

3.3.2 Analysis of Delphi round 2

The purpose of the second Delphi round is to build further convergence between actions that have collected high-importance scores. Following this rationale, 28 high importance scored actions were returned to the respondents, asking them to revise (if appropriate) their ratings, considering the results of the first round. Specifically, respondents were asked to revise their previous scores (their Round 1 scores were available to

them) to converge towards the average scores of the other participants. The revision of the scores was optional and there was no specific consensus threshold to be reached. A color indication was used in order to establish an easy detection of those actions that diverge more than one unit as compared to the average values. The questionnaire for the second round can be found in Annex E.

The average results for all 14 participants per action were estimated and can be seen in Table 3. The same table shows the respective values of round 1 to allow comparisons and draw conclusions.

Table 3: Results of 2nd Delphi round

Action	Mean (Round 2)	STDEV (Round 2)	Mean (Round 1)	STDEV (Round 1)
B1	5.00	0.88	5.00	0.87
B2	5.04	0.95	5.08	0.95
B3	4.83	0.76	4.88	0.78
B5	4.74	0.94	4.75	0.92
B8	4.65	1.09	4.75	1.13
C4	4.87	1.26	4.96	1.27
C6	5.13	1.02	5.31	1.07
D1	5.00	0.98	5.04	1.06
D3	4.78	0.93	4.75	1.09
E4	4.70	0.95	4.75	1.05
F1	5.13	0.95	5.04	1.14
F2	4.91	1.02	4.92	1.15
F6	4.78	1.02	4.92	1.04
G3	4.78	0.88	4.83	0.90
G4	4.96	1.00	5.00	1.00
H1	5.00	0.93	5.08	0.95
H4	5.35	0.87	5.29	0.98
H7	4.91	1.10	4.96	1.10
I2	4.87	0.90	4.88	1.01
I4	4.83	1.13	4.75	1.30
I9	5.04	0.91	5.00	1.08
I11	4.70	1.04	4.75	1.09
I15	4.74	0.99	4.83	1.03
I16	4.91	0.93	4.96	0.93
I17	4.83	1.05	4.92	1.08
I19	4.78	1.06	4.88	1.17
I20	5.04	1.12	5.08	1.11
I21	4.91	1.14	4.96	1.14

Based on the results of the second round, most of the respondents revised their ratings downwards. This can be attributed either to their willingness to achieve higher convergence or to their personal perception shifting towards lower importance of the actions compared to their initial thought. In both cases, higher convergence rates have been achieved in the second round as variability has lowered almost for every action. Exceptions to this rule are B1 “Encourage the development of stronger soft skills”, B5 “Strengthen workforce digital skills” and I20 “Use three sides – state, industry, workers – collective bargaining for the Automation and Digitalisation transition to protect the workforce and include new rights possibilities – reskilling, etc.” where standard deviation slightly increased and B2 “Identify common competences such as basic digital skills and transport-mode specific new competences required for Automation and Digitalisation”, H7 “Promote diverse and engaging training in Automation and Digitalisation” and I21 “Use negotiations between unions and employers to manage the Automation and Digitalisation transition” where standard deviation remained steady.

Similarly, like before, the IPA map of round 2 can be seen below in Figure 7.

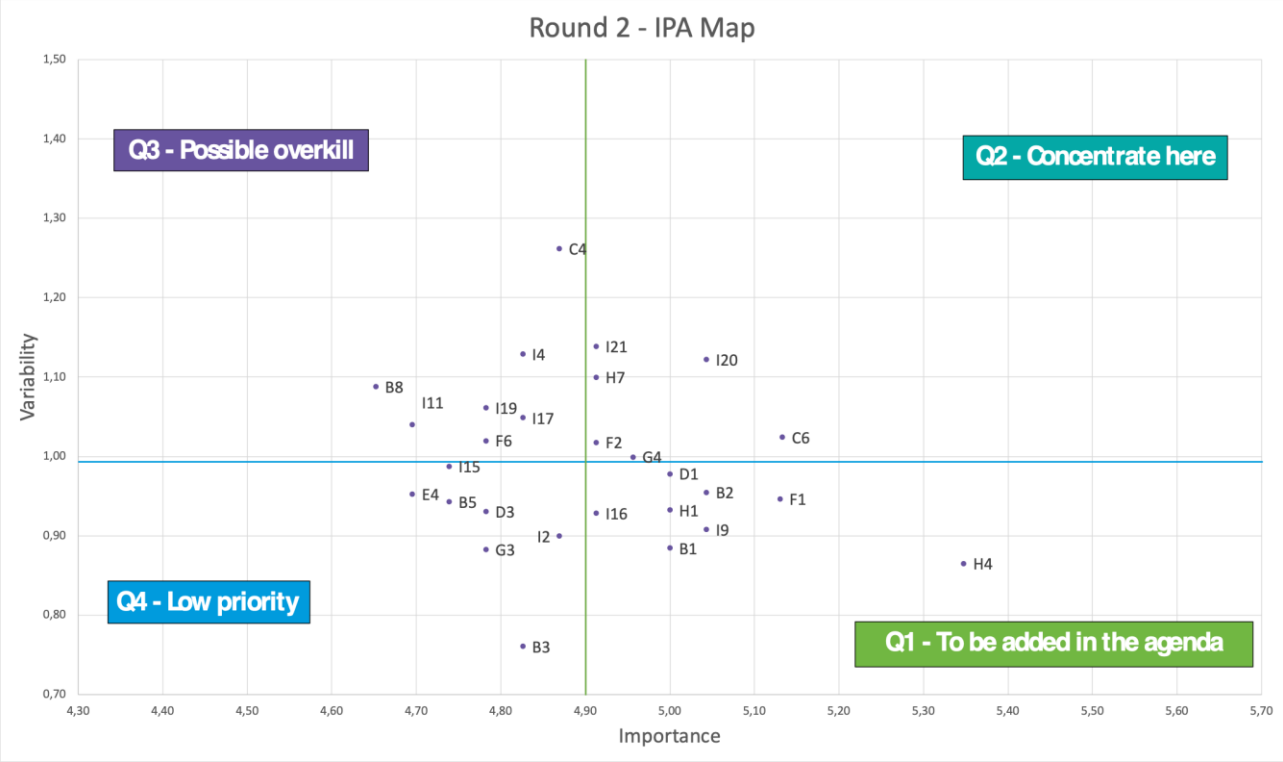


Figure 7: R2 Importance - Variability map

Based on the results of the second round IPA map, actions which emerge as candidates for inclusion in the agenda that will define the European strategy for dealing with the social impact on the transport workforce transition are shown in Table 4. The importance and variability of the actions per type of participants’ organisation can be also found in the same table.

Table 4: Set of agenda actions as emerged of 2nd Delphi round

Action name		Type	Mean R2	STDEV R2
B. SKILLS AND COMPETENCIES FOR THE NEW ERA				
B1	Encourage the development of stronger soft skills	All types	5.00	0.88
		Road	4.20	0.98

Action name		Type	Mean R2	STDEV R2
		Rail	5.40	0.80
		Maritime	5.00	0.95
		Air	5.00	0.00
		Other	5.22	0.63
B2	Identify common competences such as basic digital skills and transport-mode specific new competences required for Automation and Digitalisation	All types	5.04	0.95
		Road	5.00	0.89
		Rail	5.20	1.17
		Maritime	4.91	1.08
		Air	4.50	0.50
		Other	5.00	0.94
D. MANAGEMENT TRAINING IN AUTOMATION AND DIGITALISATION				
D1	Address management training in management of change skills for Automation and Digitalisation	All types	5.00	0.98
		Road	5.20	0.40
		Rail	4.80	1.47
		Maritime	4.82	1.27
		Air	5.50	0.50
		Other	4.67	0.82
F. RISKS				
F1	Address cybersecurity risks created by transport Automation and Digitalisation	All types	5.13	0.95
		Road	4.20	0.40
		Rail	5.20	0.75
		Maritime	5.09	0.79
		Air	5.50	0.50
		Other	5.33	1.05
H. COMPANY RELATED				
H1	Explore and define new occupational profiles arising through Automation and Digitalisation	All types	5.00	0.93
		Road	5.20	0.75
		Rail	5.40	0.80
		Maritime	4.64	1.07
		Air	4.00	1.00
		Other	5.00	0.94
H4	Introduce continuous upskilling and reskilling training programs	All types	5.35	0.87
		Road	5.40	0.49
		Rail	5.80	0.40

Action name		Type	Mean R2	STDEV R2
		Maritime	5.27	0.86
		Air	4.50	0.50
		Other	5.33	1.05
I. HIGH LEVEL REGULATORY DECISIONS AND EXTERNAL AID				
I9	Explore the funding of the cost of reskilling the workforce	All types	5.04	0.91
		Road	5.20	0.75
		Rail	5.40	1.20
		Maritime	5.00	1.04
		Air	4.00	1.00
		Other	5.00	0.67
I16	Invite research and education cooperation to cater for Automation and Digitalisation created gaps including legal	All types	4.91	0.93
		Road	5.00	1.10
		Rail	5.00	0.63
		Maritime	4.82	1.03
		Air	4.50	0.50
		Other	4.89	0.99

3.3.3 Stability of results between the two Delphi rounds

To check the stability/convergence between the Delphi rounds, i.e. whether there is more consensus overall in round 1 as compared to round 2 or not, the McNemar change test was used; the null hypothesis in its case dictates that there is no change at all between results of round 1 and round 2:

$H\,0$: $R_1 = R_2$
$H\,1$: $R_1 \neq R_2$

The Chi-Square test results indicated a p-value of 0.0001 which is less than the general significance level of 0.05 (see Annex F). Thus, the null hypothesis can be rejected for the 28 actions (see Table 3) that were qualified in the second round. Checking the direction of change it can be concluded that overall convergence increased between the two rounds.

4. KEY FINDINGS ON EMERGING ACTIONS

The actions that were identified in Task 3.3 of WE-TRANSFORM as the best candidates for a policy agenda to mitigate the impact of automation and digitalisation on the transport workforce primarily focus on the area of skills and management of change, particularly in relation to training, reskilling, upskilling, and the provision of funding support. It is not surprising that at least half of the proposed actions concentrate on these areas. In addition to these actions, a couple of closely related ones must be added, such as the exploration and definition of occupational profiles, and the need for further research on the required knowledge and skills, except for cybersecurity risks, all of which are heavily skill-oriented actions. These actions have been evaluated at the top and are listed and discussed in more detail below.

Action 1: Encourage the development of stronger soft skills

The development of soft skills, such as communication, collaboration, and problem-solving, has become increasingly important in the face of automation and digitalisation in the transport industry. Automated systems and technology can handle many routine tasks, but they still require human input to operate effectively and efficiently. As such, workers who possess strong soft skills are better equipped to adapt to changing roles and new technologies and are more likely to remain employable in an increasingly automated and digitalised work environment.

To encourage the development of stronger soft skills among the transport workforce, policy makers can take several sub-actions such as to:

- promote the importance of soft skills training and development in existing educational and training programs;
- create initiatives that provide workers with opportunities to develop their soft skills, such as mentorship programs, workshops, and online courses;
- work with employers to incorporate soft skills into recruitment and selection processes, and to provide opportunities for employees to continually develop these skills on the job.

Action 1 is crucial for ensuring that the transport workforce remains adaptable and employable in the face of automation and digitalisation and able to take full advantage of opportunities created by the technological advancements. In particular, the evidence is mounting that measurable and coachable social-emotional skills have a significant impact on the performance of individuals and organizations. Emotional Quotient (EQ) can be a key differentiator for organizations and leaders around the world, who to date are competing in an increasingly complex and challenging marketplace. Emotional Intelligence (EI) is the ability to use emotions effectively. Since the publication of the first research on the subject in 1990, innovative organizations have begun experimenting with how to integrate EI into training and selection processes to gain competitive advantage. It has become increasingly clear that these skills form the foundation of top-performing organizations (Freedman, 2018).

Action 2: Identify common competences such as basic digital skills and transport-mode specific new competences required for Automation and Digitalisation

To effectively mitigate the impact of automation and digitalization on the transport workforce, it is important to identify common competencies required for the new technological landscape; this includes both basic digital skills and transport-mode specific competencies needed to effectively operate and maintain new systems and technologies.

To carry out this action, policy makers can:

- work with industry experts, employers, and workers to assess the current state of competencies in the sector, and to identify the specific competencies that are required to support automation and digitalization;
- develop training and education programs that target these competencies, and work with employers to encourage the uptake of these programs by their workers;
- engage with educational institutions to ensure that the necessary competencies are included in their curricula, and work with existing training and development providers to align their offerings with the changing needs of the sector.

By identifying and developing the necessary competencies, Action 2 can contribute to ensure that workers are equipped with the skills and knowledge they need to thrive in the new technological landscape, and that the transport workforce is able to adapt and respond to the challenges posed by automation and digitalisation.

Action 3: Address management training in management of changing skills for Automation and Digitalisation

The rapid pace of automation and digitalisation in the transport sector will require significant changes in the way work is organised and managed. To effectively mitigate the impact of these changes on the workforce, it is important to address the need for management training in change management skills. This will enable managers to effectively lead their teams through the transition, and to support workers as they adapt to new technologies and processes.

To carry out this action, policy makers can:

- work with industry associations, employers, and educational institutions to develop training programs that target management skills for change management. These programs can cover topics such as communication, conflict resolution, team building, and change leadership;
- include practical exercises and case studies to assist managers develop the necessary skills and knowledge;
- engage with employers to encourage the uptake of these programs by their managers, and to create opportunities for managers to continually develop their change management skills; this could include workshops, online courses, and coaching sessions.
- encourage attendance-specific emotional intelligence programs to support teams in managing even emotional change. Replacing old habits with new habits requires important efforts and energy for everyone. Identifying this challenge and generating the energy is the first step that every individual, organisation, and government should make before embarking.

By addressing the need for management training in change management, Action 3 can ensure that managers are equipped with the skills they need to effectively lead their teams through the transition, and that the workforce is able to adapt to the changing technological landscape in an adequately supported manner.

Action 4: Address cybersecurity risks created by transport Automation and Digitalisation

The increasing reliance on automation and digitalisation in the transport sector creates new cybersecurity risks, which need to be addressed to ensure the safe and secure operation of these systems. This includes risks related to data breaches, cyber-attacks, and unauthorized access to sensitive information.

To carry out this action, policy makers can:

- enable a collaboration among industry experts, employers, and workers to overcome the insufficient education available for the work force in general to cope with the rapidly growing cybersecurity risks posed by automation and digitalisation in the transport sector. There is a lack of professional trainers/specialists, who can properly educate the workers/the management (see specific challenges related to AI and self-learning machines). Specific education needs for all part of the mobility system as well as for the interfaces with other sectors need to be identified;
- develop guidelines and best practices for addressing these risks;
- provide training and education to workers and managers on how to prevent and respond to cyber incidents- This task should be addressed by specialized agencies/specialized departments of industry. Joint framework on European level may be necessary as due to the geopolitical situation a single enterprise may no longer be able to cope with the high risks on their own;
- enable a work with employers to ensure that cybersecurity measures are integrated into the design and operation of new systems and technologies, and that regular security audits are carried out to identify and address system vulnerabilities;
- encourage the development of new technologies and solutions that enhance cybersecurity in the sector.

By addressing cybersecurity risks created by automation and digitalisation, Action 4 can contribute to the safe and secure operation of these systems and help protect sensitive information and critical infrastructure from cyberattacks and other security incidents if funding/setting up specific innovation schemes/programs

(industry, national government, European Commission) is provided, together with establishing specific agencies (that can also help industry in case of a cyber threat).

Action 5: Explore and define new occupational profiles arising through Automation and Digitalisation

Automation and digitalisation are rapidly changing the nature of work in the transport sector, and it is thus important to explore and define the new occupational profiles which are emerging as a result; this includes identifying skills and competencies required for these new roles and ensuring that workers are equipped with the necessary training and education to perform these new jobs effectively.

To carry out this action, policy makers can:

- enable the collaboration among industry experts, employers, workers, trade unions and societal groups to assess the current state of the workforce, and to identify the new occupational profiles that are emerging as a result of automation and digitalization. Need driven approach is required. Needs must be defined by stakeholders, industry, society, universities, work force. Involvement of society is important, especially related to issues relevant for certain groups (including disabled, poor, blind, gender, access to work and education (much self-learning is required in low densely populated areas). Also demographic change aspects need to be taken into account;
- define, at the next stage, the key competencies required for these roles, and develop training and education programs that target these competencies. Education ministers need to define how universities should be reshaped and evolve in an interdisciplinary way and how postgraduate inter sector education can create additional assets;
- enable a collaboration with employers to encourage the uptake of these programs by their workers, and to create opportunities for workers to continually develop their skills and competencies;
- engage educational institutions to ensure that the necessary competencies are included in their curricula, and work with existing training and development providers to align their offerings with the changing needs of the sector.

By exploring and defining new occupational profiles, Action 5 will enhance career clarity and attractiveness and ensure that skills and knowledge are provided to allow them to adapt and respond to the new needs.

Action 6: Introduce continuous upskilling and reskilling training programs

The rapid pace of automation and digitalisation in the transport sector requires the members of the workforce to continually upskill and reskill to keep pace with the changing technological landscape and shifting occupational profiles. This relates to previously mentioned actions among the proposed ones as a result of Task 3.3 as it involves both acquiring new technical skills and knowledge, as well as developing soft skills and competencies that are required for success in an increasingly automated and digital world of production of transport services.

To foster this action, policy makers can:

- enable the collaboration among industry experts, employers, workers and trade unions to assess the current state of the workforce, and to identify the skills and competencies required by the current workforce for success in the new technological landscape;
- develop training and education programs that target these skills and competencies, and encourage the uptake of these programs by both employers and employees to create opportunities for workers to continually upskill and reskill, including on-the-job training, online courses, and other forms of development, structuring a long life learning process;
- encourage the development of flexible and accessible training programs tailored to the needs of employees and employing organisations that can be delivered in a variety of formats to suit different learning styles and work schedules.

By introducing continuous upskilling and reskilling programs, Action 6 will help to ensure that the members of the workforce are equipped with the skills and knowledge they need to thrive in the new technological landscape. It will also enable more flexibility within the work force and strengthen the adaptation capability to future changes introduced or inspired by continuous innovation and societal change. The workers will also be better equipped for mobility within their existing sectors or beyond them. This section is related to Action 3 suggesting that training courses related to soft skills enhancement cannot ignore the inclusion of emotional intelligence as a key competency for improving leadership in challenging and changing contexts. Interventions must be preceded by individual, team and whole-organization assessments that map key needs, which will be responded to with customized projects using integrated training, coaching and mentoring methodologies.

Action 7: Explore the funding of the cost of reskilling the workforce

The cost of reskilling the workforce to meet the demands of automation and digitalisation in the transport sector can be significant, and it is important to explore ways to define the sources and modalities to fund these costs to ensure that the members of the workforce have realistic sufficient opportunities to upskill and reskill. Such funding sources/modalities may include government funding, employer contributions, or partnerships between employers and educational institutions.

To carry out this action, policy makers can:

- work with industry experts, employers, and the workforce to assess the current state of funding for reskilling in the sector, and to identify the challenges and opportunities associated with funding these costs;
- explore different funding models, including government subsidies, employer contributions, and public-private partnerships, and develop recommendations for funding reskilling that are tailored to the needs of the transport and shipping sectors;
- work with employers to encourage the uptake of reskilling programs by their workers, and to create opportunities for workers to access these programs;
- engage with educational institutions to ensure that reskilling programs are aligned with the needs of the sector, and that they provide the workforce with the skills and competencies required for success in the new automation and digitalisation landscape.

By exploring the funding of reskilling costs, Action 7 will help to ensure that the members of the workforce have realistic and systematically provided opportunities to upskill and reskill.

Action 8: Invite research and education cooperation to cater for Automation and Digitalisation created gaps including legal ones

As the transport sector continues to evolve due to automation and digitalisation, there is a strong probability that gaps in knowledge, skills, and expertise that need to be addressed will appear. These gaps may include legal, technical, and management issues, and may require research and education cooperation to resolve.

To carry out this action, policy makers can:

- work with experts from industry, academia and workforce organisations promoting exchange of knowledge and cooperation among them to assess the current state of change in knowledge, skills, and expertise requirements in the sector in order to identify the gaps that need to be addressed;
- engage research and education institutions to collaborate – and cooperate with policy makers – to address such gaps, including through research on the design of gaps' monitoring mechanisms assisting in turn to the design and organisation of training programs targeting gaps;
- encourage the development of the appropriate legal framework to support the transition to automation and digitalisation address the related needs of all stakeholders focusing on the workforce in the context of the sector as a whole;
- foster mechanisms of cooperation between industry and educational institutions to ensure that the content of education and training programs follows the needs of the sector at an appropriate pace.

By encouraging research and education cooperation, Action 8 will help to fill gaps that create barriers to the adaptation of the workforce, all in minimising negative impact, to the challenges posed by the pace of automation and digitalisation developments in the areas of shipping and transport.

5. COMPARING BUT NOT CONTRASTING? A SIMILARITY TEST WITH RECENT FUNDED RESEARCH RESULTS

Results emerging by the analysis presented in the previous section highlight the need to revisit perceptions on the efficiency of actions that can address an on-going process. The Ecorys and Hellenic Institute of Transport (European Commission, 2021) constitutes the most recent effort to focus on the social dimension of the impact of automation and digitalisation on the future of the workforce in these sectors. The time of the research on which that report was based is quite close to the 2022 Delphi survey conducted by the WE-TRANSFORM project; thus, comparing the results of the two reports can add to the picture emerging from the latest research through the comparison of measures proposed as ranked and presented in the relevant reports.

Table 5 highlights the existence of a significant degree of similarity between the results of the two reports in terms of proposed measures emerging in the case of report prepared by Ecorys and Hellenic Transport Institute (European Commission, 2021) from literature review complemented by the needs for guidance emerging from surveys and interviews of experts of relevant organisations and the proposals emerging in a living-hub environment through interaction and the collective intelligence of partners with transport stakeholders.

To this end the 6 main policy recommendations, as prioritised on a cost-benefit basis by the authors of the report (European Commission, 2021), are compared in Table 5 to the ranked by level of importance (mean values) results emerging from the final Delphi round from the survey questionnaires which drew from the content analysis of the living-hub reports by the D3.3.

It must be noted also, that in terms of the material obtained directly in the Delphi surveys of this report and more indirectly, through the measures reported in the 2021 Ecorys and Hellenic Transport Institute study, the main area of needs for measures which emerged was also skills related.

Table 5: Comparative rankings of results on proposed actions (measures) for automation and digitalisation 2021 and 2022

WET D3.3 proposed actions' results 2022	Ecorys and Hellenic Transport Institute 2021
H4. Introduce continuous upskilling and reskilling training programs	To raise awareness among companies in the transport sector of the social impact of automation and digitalisation
F1. Address cybersecurity risks created by transport Automation and Digitalisation	To develop and implement a system of lifelong learning to prepare for the substantial changes in work and working environments because of automation and digitalisation in the transport sector
I9. Explore the funding of the cost of reskilling the workforce	To attract female workers to and retain them in the transport sector, grasping the opportunities provided by automation and digitalisation
B2. Identify common competencies such as basic digital skills and transport-mode specific new competencies required for Automation and Digitalisation	To use the changing nature of work resulting from automation and digitalisation to attract young people to the transport sector, thus reducing the shortage of workers

WET D3.3 proposed actions' results 2022	Ecorys and Hellenic Transport Institute 2021
B1. Encourage the development of stronger soft skills	To use EU and national funds to support the transport sector, with a focus on SMEs, in managing the social impact of the transition to automation and digitalisation
H1. Explore and define new occupational profiles arising through Automation and Digitalisation	To provide mandatory periodic training for the transport workforce on skills relevant to automation and digitalisation

Both the WET D3.3 proposed actions' results for 2022 and the Ecorys and Hellenic Transport Institute 2021 report focus on the social impact of automation and digitalization in the transport sector and propose actions to mitigate these impacts. Both reports highlight the need for upskilling and reskilling programs to prepare the workforce for changes in work resulting from automation and digitalization. Additionally, both reports emphasize the importance of lifelong learning and continuous training to enable workers to adapt to new technologies and remain competitive in the labor market.

One notable difference between the two reports is that WET D3.3 proposed actions' results for 2022 places a greater emphasis on addressing cybersecurity risks created by transport automation and digitalization. Additionally, the WET report highlights the need to develop stronger soft skills, explore new occupational profiles, and identify common competencies required for automation and digitalization in the transport sector.

Overall, while there are some differences in the specific proposed actions, both reports emphasize the need for proactive measures to manage the social impact of automation and digitalization in the transport sector, and to ensure that the workforce is adequately prepared for the changes ahead.

6. CONCLUSIONS

The report presents a list of proposed actions formulated by experts and stakeholders through collective intelligence built inside the living hub of the project. The results suggest that the area of skills, together with the need for a holistic familiarisation of workforce and management alike with change management, are the ones which appear combining both high priority and a strong degree of consensus suggested by low standard deviation of the results.

The study did not capture the position of the participants in their respective organizations to ensure participant anonymity during data collection. This resulted in a potential gap in the first round Delphi results, where increasing the minimum income to mitigate automation and digitalization impact on workforce received the lowest score. This could be partially attributed to the lack of active participation of lower-income workers or worker associations in EU research projects or think tanks/living hubs such as the WET Thematic Areas.

The above limitation can be addressed by planning exposure of proposed actions for validation by larger numbers through parallel dissemination activities, whereby expert and larger audience rankings can be compared and contrasted to the Delphi results emerging from the collective intelligence created in the context of living hub interaction. Parallel dissemination activities can involve various strategies, such as organizing workshops, webinars, online surveys, or focus groups, to disseminate information on the proposed actions and collect feedback from different audiences. These activities can help to reach a larger and more diverse group of people, including experts and non-experts, who can provide valuable insights and feedback on the proposed actions.

Comparing and contrasting the results obtained from different sources can help identify commonalities, discrepancies, and agreement and disagreement among the responses. By synthesizing these inputs, the collective intelligence created in the context of living hub interaction can be further enhanced, and more robust and valid recommendations can be generated.

As per the next steps, the list of highly prioritised candidate for agenda inclusion as these emerged through the descriptive statistics' based mapping, through high importance ratings combined with low variability, is not necessarily restricting options totally: the next stages of the project can explore other quadrants of the constructed map, especially the one including actions with high significance, looking – through further processing – into their potential for inclusion in a policy agenda.

REFERENCES

Eden, C. and Ackermann, F. (2004). Cognitive mapping expert views for policy analysis in the public sector. European Journal of Operational Research, 152(3), pp.615-630.

Eurofound, 2019. European observatory of working life. Available here: https://www.eurofound.europa.eu/observatories/eurwork/industrial-relations-dictionary/european-social-partners, last accessed, December 12, 2022.

European Commission (2019). Future of Work: Towards a Job-rich Recovery. European Commission.

European Commission (2021). Study on the social dimension of the transition to automation and digitalisation in transport, focusing on the labour force. Ecorys and Hellenic Institute of Transport. Brussels.

Eurostat (2022). Modal split of passenger transport. Available at https://ec.europa.eu/eurostat/databrowser/view/tran_hv_psmod/default/table?lang=en, last accessed January 25, 2023.

Freedman J. (2018), Intelligenza Emotiva. Al Cuore della Performance, Six Seconds, Freedom.

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.

Gerovitch, S. (2003). Automation. Massachusetts Institute of Technology, (pp. 122-126).

Greatorex, J. and Dexter, T. (2000), An accessible analytical approach for investigating what happens between the rounds of a Delphi study. Journal of Advanced Nursing, 32: 1016-1024. https://doi.org/10.1046/j.1365-2648.2000.t01-1-01569.x

Hall, D.A., Smith, H., Heffernan, E., Fackrell, K. (2018). Core Outcome Measures in Tinnitus International Delphi (COMiT'ID) Research Steering Group Recruiting and retaining participants in e-Delphi surveys for core outcome set development: Evaluating the COMiT'ID study. *PLoS ONE*, *13*, e0201378.

Holey, E.A., Feeley, J.L., Dixon, J., Whittaker, V.J. (2007). An exploration of the use of simple statistics to measure consensus and stability in Delphi studies. BMC Medical Research Methodology, *7,* 1-10.

ILO (2021). Shaping skills and lifelong learning for the future of work. Report. Available at https://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_813696.pdf, last accessed January 20, 2023.

Jones, G.C. (2002). A Delphi Evaluation of Agreement between Organizations. In The Delphi Method. Techniques and Applications; Linstone, H.A., Turoff, M., Helmer, O., Eds.; Addison-Wesley Publishing Company, Inc.: Reading, MA, USA, pp. 155–161. Available at https://web.njit.edu/~turoff/pubs/delphibook/ch3b4.pdf, last accessed January 24, 2023.

Karakikes, I., Nathanail, E. (2020). Using the Delphi Method to Evaluate the Appropriateness of Urban Freight Transport Solutions. Smart Cities. 2020; 3(4):1428-1447. https://doi.org/10.3390/smartcities3040068

Kezar, A., and Maxey, D. (2014). The Delphi technique: An untapped approach of participatory research. *International Journal of Social Research Methodology, 19*, 143–160.

Landeta, J. (2006). Current validity of the Delphi method in social sciences. Technological Forecasting and Social Change, Volume 73, Issue 5, June 2006, Pages 467-482.

Linstone, H. A., and Turoff, M. (1975). The Delphi Method: Techniques and Applications. Addison-Wesley, Reading, Massachusetts.

Man, J. (2022). *Towards the Future of Work: Managing the Risks of AI and Automation* (Doctoral dissertation, Massachusetts Institute of Technology).

Martilla, J.A.; James, J.C. (1977). Importance-performance analysis. J. Mark. 1977, *41*, 77–79.

OECD (2019a). Governments should step up their efforts to give people skills to seize opportunities in a digital world. Report. Available at https://www.oecd.org/newsroom/governments-should-step-up-their-efforts-to-give-people-skills-to-seize-opportunities-in-a-digital-world.htm, last accessed January 21, 2023.

OECD (2019b). Upskilling pathways: New Opportunities for Adults. OECD Publishing.

Okada, H, Tokunaga T, Liu X, Takayanagi S, Matsushima, A, Shimohigashi, Y. (2008). Direct evidence revealing structural elements essential for the high binding ability of bisphenol A to human estrogen-related receptor-gamma. Environ Health Perspect. 2008 Jan;116(1):32-8.

Okoli, C., Pawlowski, S. D. C. (2004). The Delphi method as a research tool: An example, design considerations and applications. Information and Management, 42(1), 15-29.

Rayens, M. K., Hahn, E. J. (2000). Building consensus using the policy Delphi method. *Policy, politics, and nursing practice*, *1*(4), 308-315.

SkillSea, (2021). Measuring evaluation strategies in Maritime Education and Training. Report.

Vernon, W. 2009. The Delphi technique: A review. International Journal of Therapy and Rehabilitation 2009 16:2, 69-76.

WE-TRANSFORM (2021). D2.2. Methodology and knowledge creation tools.

WE-TRANSFORM (2022a). D3.1. Report of actions and initiatives related to transport automation and other transitions.

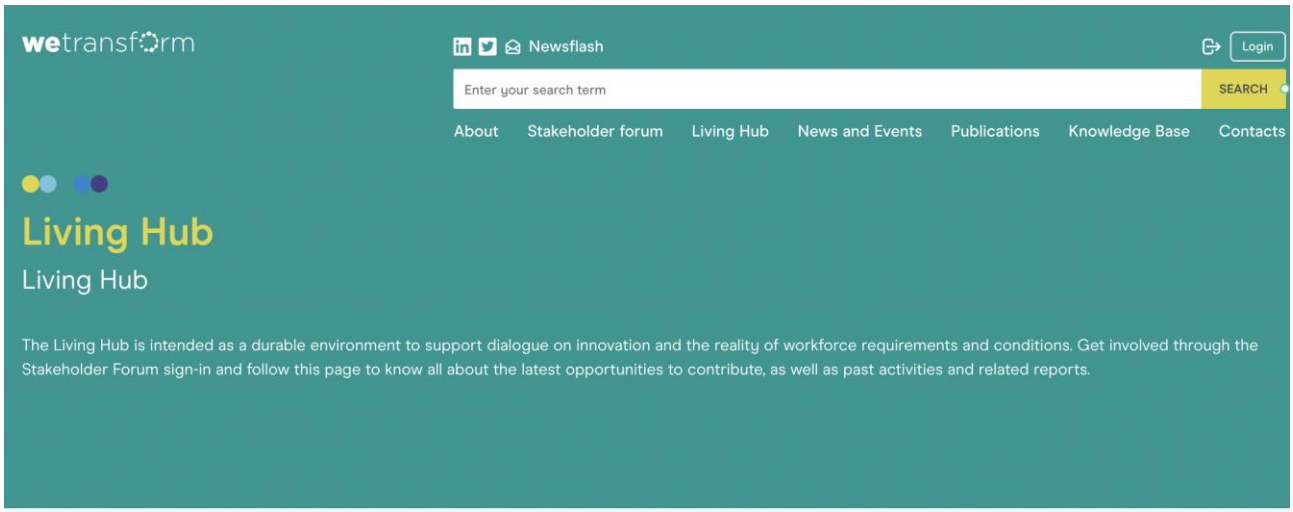
WE-TRANSFORM (2022b). D3.2. Analysis of workforce barriers, needs, skills and challenges.

WEFORUM, 2022. Here's why companies need to bridge the skills gap to benefit both business and society. Available here: https://www.weforum.org/agenda/2022/09/upskilling-why-businesses-need-to-bridge-the-skills-gap/, last accessed, January 10, 2023.

ANNEXES

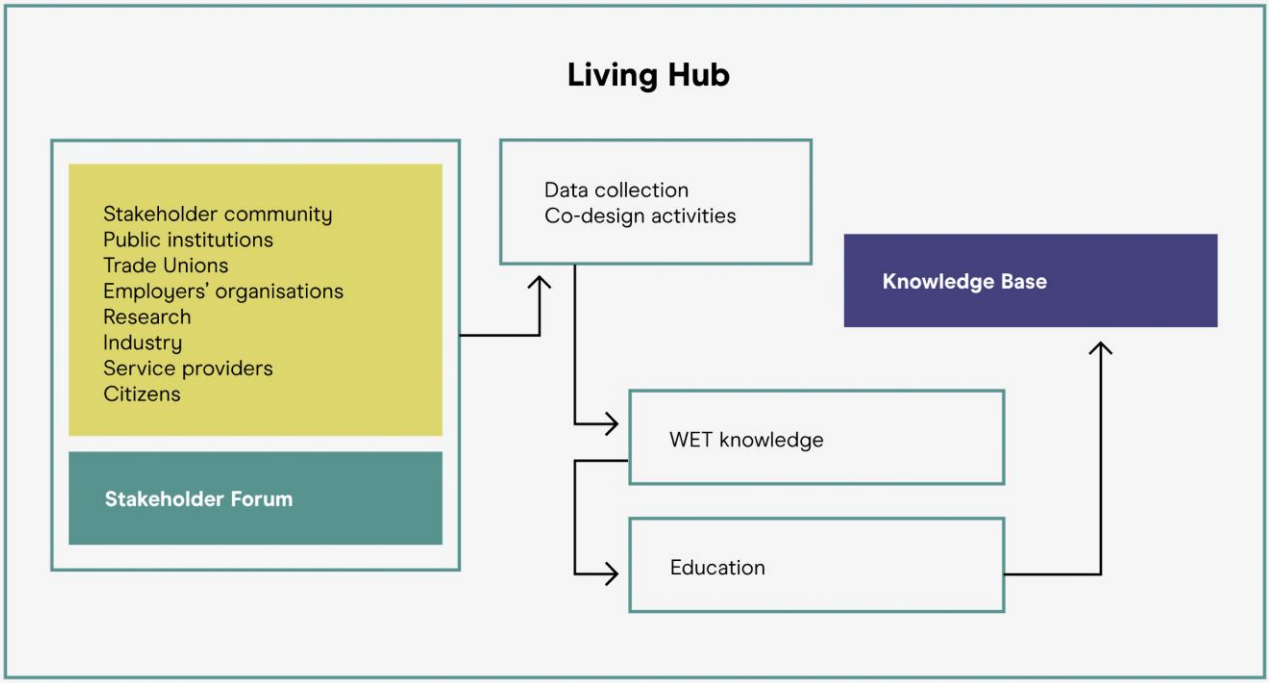
Annex A: Screenshot from WET website on Living Hub formation
Annex B: Workshop-focus groups' invitations
Annex C: Template of Thematic Areas (TAs') report
Annex D: 1st round Delphi questionnaire survey design
Annex E: 2nd round Delphi questionnaire survey design
Annex F: McNemar stability test results

Annex A: Screenshot from WET website on Living Hub formation - https://www.wetransform-project.eu/living-hub/



WE-TRANSFORM Living Hub is the ecosystem that comprises:

- The key stakeholders, across all transport modes impacted by automation and related sectors (indirect/ induced effects), whose expertise and knowledge the project needs to leverage on. These stakeholders include researchers, decision makers, trade unions and workers' associations but also citizens, who are workers, across all regions of the world.
- The Living Hub is also how these stakeholders are brought together, namely through workshops, focus groups, interviews, debates, to co-create new knowledge related to automation impacts on transport labour.
- Finally, it comprises all the knowledge collected and collectively defined in the project (shared through WE-TRANSFORM Knowledge Base), which will lead to the formulation of an action-oriented agenda to minimise the potential negative effects of automation on labour force.



Annex B: Workshop-focus groups' invitations

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101006900

SAVE-THE-DATE

3rd Stakeholder Forum Workshop

Impacts of digitalisation and automation on the transport workforce

15 June 2022

09:00 – 18:00 (CEST+1)

Transport and Telecommunication Institute (TSI)

Riga (Latvia)

Hybrid workshop

Register

The EU H2020 project WE-TRANSFORM aims at creating a policy agenda to prepare for the digitalisation automation transition and the related transformation of the workforce in the transport sector. To do so, WE-TRANSFORM wants to establish an effective dialogue with all parties involved, including workers and employers across all transport modes, and leverage stakeholders' knowledge and experiences in order to co-create an action-oriented agenda.

The first phase of the project has focused on reviewing state-of-the-art literature and analysing initial stakeholders' input regarding barriers created by digitalisation/automation, and its negative/positive impacts, on workforce, related to skills and needs to facilitate the transition.

This workshop marks the start of the second phase, focusing on the analysis of transport automation impacts on the workforce, and the following thematic areas will be used as a basis to start up discussions:

1. Governance of transition;
2. Common skills to develop between same-level workers in different sectors of the transport industry;
3. Minimisation of exclusion processes in the reskilling of the workforce;
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.

www.wetransform-project.eu

For this workshop, we are targeting interested stakeholders across all transport modes and countries, from workforce organisations, trade unions to transport and technology industry and public authorities.

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Twitter
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wetransform

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101006900

Draft Agenda

www.wetransform-project.eu

09:00	Opening & welcome by the Project Coordinator and the Host
09:10	Presentation of WET objectives and working approach
	• Presentation of the thematic areas
09:30	Discussion in parallel break-out groups: thematic areas 1, 4
11:15	Discussion in parallel break-out groups: thematic areas 2, 5
12:45	Networking lunch
14:15	Discussion in parallel break-out groups: thematic areas 3, 7
15:45	Discussion in parallel break-out groups: thematic areas 6, 8
17:15	Final statements & next steps
18:00	Workshop close

Join the discussion! Register for the workshop and check here the latest updates on the programme.

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Twitter
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Annex C: Template of Thematic Area report

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THEMATIC AREAS BRIEF

INDICATIONS TO BE FOLLOWED BY THE THEMATIC AREAS COORDINATORS

24/03/2022
Author(s): POLITO

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101006900.

INSTRUCTIONS TO WRITE THE BRIEF

To provide structure and focus for the process of the Living Hub, a set of Thematic Areas has been defined, allowing an exploratory study, to call attention to the relevance, and to encourage reflection and more work on this thematic area (i.e., it does not seek to provide an exhaustive study of the topic).

The eight thematic areas defined so far and described in the document sent to all partners detail will be formed by a group of partners of WE-TRANSFORM who will co-create knowledge inside the group and will expand such knowledge consulting stakeholders, with whom, again, co-creating a Knowledge or Policy Brief or some Policy recommendations, to feed development of WE-TRANSFORM policy agenda.

To ensure the highest quality possible, and coherence in the output from eight different areas, the guidelines to prepare the knowledge brief are presented below.

1. The document: objectives and rules

The document produced for each Thematic Area will be designated as "Knowledge Brief" for the specific Thematic Area. This document will be prepared and shared with a common template provided by WE-TRANSFORM, following the project's directives. The spacing, font size and structure must be followed correctly, and the first and last page should be left untouched except for the title.

The Knowledge Brief has two objectives:

1. briefly articulate the available knowledge on issues relevant to the Thematic Area, to make it easy to summarize and understand;
2. provide basic content for the subsequent development of WE-TRANSFORM's action-oriented agenda and the related Working Packages.

The Knowledge Brief must be:

1. reasonably short – with a length of between 8 and 12 pages (not counting pages dedicated to cover, table of contents, or bibliographic references);
2. easy to read – with plain, direct, and concrete language, avoiding jargon as much as possible. It is essential not to assume that the reader already knows the topic, so (s)he should be accompanied during the read (usage of jargon is allowed when indispensable, and in that case a footnote is welcome, to explain the meaning of the word).

2. The template to follow

All Knowledge Briefs must be structured according to the same template, as follows:

1. **Introduction** containing these main points: a) description of the issue explored in the Thematic Area; b) method followed to collect and generate information; c) importance for the transport sector. Please, do not provide subsections in the Introduction.
2. **Key points**. This section presents the main elements related to the thematic area; this is what is observed so far: problems, challenges, relations with other topics, implications. This part must follow a logical scheme, helping to draft a clear story telling emphasising key points, problems, barriers. This must be factual.
3. **Solutions and discussion**. This is the outcome of the brainstorming and proposes and comments potential solutions to the problems raised in section 2.
4. **Conclusion and recommendations**. These are the main takeaways from the discussion and propose possible recommendations to consider in the policy agenda.

Annex – recommended reading (no more than 10 key references).

Every chapter can include, if necessary, a few subchapters. It is not recommended to have too many and too short subsections, because they would fragment too much the discourse. The chapters do not need to have a similar size, nor must have equivalent numbers of subchapters.
Opening and closing chapters should be shorter that the core of the document (sections 2 and 3). These two main sections can be, if necessary, subdivided into different parts to increase the readability and clarity of the presentation, to support content categorisation and understanding also for those readers who are not directly involved in the transport sector.

WE-TRANSFORM CONSORTIUM

WE-TRANSFORM is a consortium of 34 partners that include relevant institutions, universities, companies, and workers unions.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101006900.

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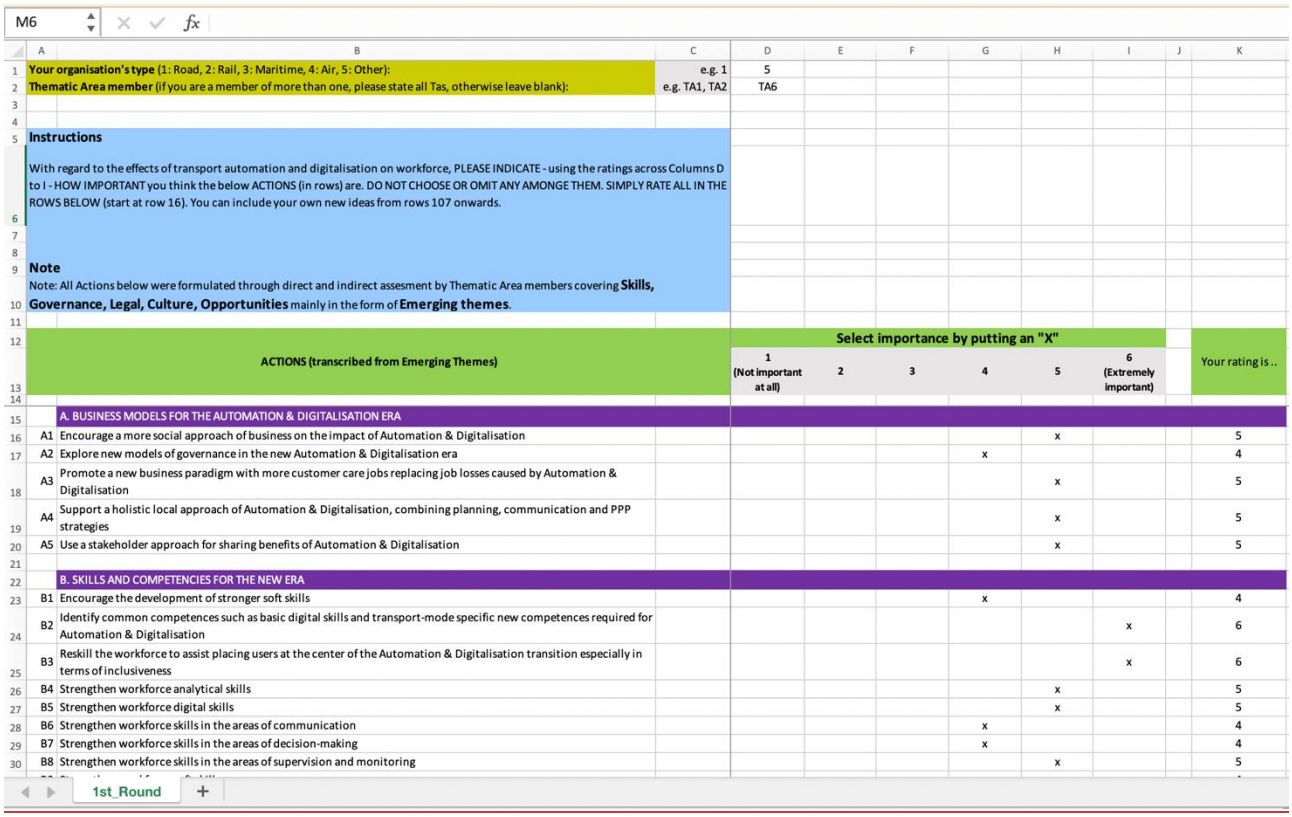
Annex D: 1st round Delphi questionnaire survey design



M6

	A	B	C	D	E	F	G	H	I	J	K
1		**Your organisation's type** (1: Road, 2: Rail, 3: Maritime, 4: Air, 5: Other):	e.g. 1	5							
2		**Thematic Area member** (if you are a member of more than one, please state all Tas, otherwise leave blank):	e.g. TA1, TA2	TA6							
3											
4											
5		**Instructions**									
6		With regard to the effects of transport automation and digitalisation on workforce, PLEASE INDICATE - using the ratings across Columns D to I - HOW IMPORTANT you think the below ACTIONS (in rows) are. DO NOT CHOOSE OR OMIT ANY AMONGE THEM. SIMPLY RATE ALL IN THE ROWS BELOW (start at row 16). You can include your own new ideas from rows 107 onwards.									
7											
8											
9		**Note**									
10		Note: All Actions below were formulated through direct and indirect assesment by Thematic Area members covering **Skills, Governance, Legal, Culture, Opportunities** mainly in the form of **Emerging themes**.									
11											
12				**Select importance by putting an "X"**							
13		**ACTIONS (transcribed from Emerging Themes)**		**1 (Not important at all)**	**2**	**3**	**4**	**5**	**6 (Extremely important)**		Your rating is ..
14											
15		A. BUSINESS MODELS FOR THE AUTOMATION & DIGITALISATION ERA									
16	A1	Encourage a more social approach of business on the impact of Automation & Digitalisation						x			5
17	A2	Explore new models of governance in the new Automation & Digitalisation era					x				4
18	A3	Promote a new business paradigm with more customer care jobs replacing job losses caused by Automation & Digitalisation						x			5
19	A4	Support a holistic local approach of Automation & Digitalisation, combining planning, communication and PPP strategies						x			5
20	A5	Use a stakeholder approach for sharing benefits of Automation & Digitalisation						x			5
21											
22		B. SKILLS AND COMPETENCIES FOR THE NEW ERA									
23	B1	Encourage the development of stronger soft skills					x				4
24	B2	Identify common competences such as basic digital skills and transport-mode specific new competences required for Automation & Digitalisation							x		6
25	B3	Reskill the workforce to assist placing users at the center of the Automation & Digitalisation transition especially in terms of inclusiveness							x		6
26	B4	Strengthen workforce analytical skills						x			5
27	B5	Strengthen workforce digital skills						x			5
28	B6	Strengthen workforce skills in the areas of communication					x				4
29	B7	Strengthen workforce skills in the areas of decision-making					x				4
30	B8	Strengthen workforce skills in the areas of supervision and monitoring						x			5

1st_Round

Annex E: 2nd round Delphi questionnaire survey design

W24

Your organisation's type (1: Road, 2: Rail, 3: Maritime, 4: Air, 5: Other): 5*

Thematic Area member (if you are a member of more than one, please state all Tas, otherwise leave blank): TA4, TA5, TA6

*all modes of PT on road and rail

Instructions

With regard to the effects of transport automation and digitalisation on workforce, PLEASE INDICATE - using the ratings across Columns D to I - HOW IMPORTANT you think the below ACTIONS (in rows) are. DO NOT CHOOSE OR OMIT ANY AMONGE THEM. SIMPLY RATE ALL IN THE ROWS BELOW (start at row 16). You can include your own new ideas from rows 107 onwards.

Note

Note: All Actions below were formulated through direct and indirect assesment by Thematic Area members covering **Skills, Governance, Legal, Culture, Opportunities** mainly in the form of **Emerging themes**.

Row		ACTIONS (transcribed from Emerging Themes)	ROUND 1 (R1) Your rating in R1 was ..	23 experts participated in R1 The mean score of R1 is	STDV of R1 is	Does your rating in R1 diverge 1 scale unit or less from the mean score?	ROUND 2 (R2) Do you want to revise your rating in view of the results of the first round? If YES, revise your score in Column K by adding below a new score for the respective ACTION. Otherwise leave blank!	Does your rating in R2 diverge 1 scale unit or less from the mean score?
15		A. BUSINESS MODELS FOR THE AUTOMATION & DIGITALISATION ERA						
22		B. SKILLS AND COMPETENCIES FOR THE NEW ERA						
23	B1	Encourage the development of stronger soft skills	6	5,00	0,87	YES		NO
24	B2	Identify common competences such as basic digital skills and transport-mode specific new competences required for Automation & Digitalisation	6	5,08	0,95	YES		NO
25	B3	Reskill the workforce to assist placing users at the center of the Automation & Digitalisation transition especially in terms of inclusiveness	5	4,88	0,78	YES		NO
27	B5	Strengthen workforce digital skills	5	4,75	0,92	YES		NO
30	B8	Strengthen workforce skills in the areas of supervision and monitoring	4	4,75	1,13	YES		NO
33								
34		C. TRAINING STRATEGIES, MENTORSHIP & AMBASSADORS FOR AUTOMATION & DIGITALISATION						
38	C4	Explore the impact of Automation & Digitalisation on users' behaviour to assist training of the workforce	5	4,96	1,27	YES		NO
40	C6	Support mentorship of members of the workforce for transition in the Automation & Digitalisation era	4	5,31	1,07	NO		NO
41								
42		D. MANAGEMENT TRAINING IN AUTOMATION & DIGITALISATION						
43	D1	Address management training in management of change skills for Automation & Digitalisation	5	5,0	1,1	YES		NO
45	D3	Address management training in technological skills for Automation & Digitalisation	4	4,8	1,1	YES		NO
47								
48		E. COOPERATIVE AUTOMATION & DIGITALISATION TRAINING of MANAGEMENT AND WORKFORCE						
52	E4	Encourage setting up workforce and management cooperation mechanisms for transition to Automation & Digitalisation	5	4,75	1,05	YES		NO
54								
55		F. RISKS						
56	F1	Address cybersecurity risks created by transport Automation & Digitalisation	6	5,04	1,14	YES		NO
57	F2	Create a risks' map for the management of the transition to Automation & Digitalisation	4	4,92	1,15	YES		NO
[illegible]	[illegible]	Protect life-work balance at risk through 24/7 digitalisation pressure	4	[illegible]	1,04	YES		NO

2nd_Round

Annex F: McNemar stability test results

R1 * R2 Crosstabulation

Count

		R2		
		1	2	Total
R1	1	3	22	25
	2	3	0	3
Total		6	22	28

Where “1” indicates higher standard deviation in one of the two rounds, while “2” indicates lower.

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		<.001[a]
N of Valid Cases	28	

a. Binomial distribution used.

WETRANSFORM CONSORTIUM

The WE-TRANSFORM Consortium is composed by 34 partners from the whole globe, marking the interest in comprehending the topic from every point of view.

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