RESKILLING

Deliverable D3.2
RESKILLING Use Cases Definition

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List of Acronyms

Acronym	Definition
AB	Advisory Board
AI	Artificial Intelligence
CCAM	Connected, Cooperative and Automated Mobility
GA	Grant Agreement
HMI	Human-Machine Interface
HR	Human Resources
ICT	Information and communications technology
M	Month
OEM	Original Equipment Manufacturer
SME	Small and medium-sized enterprise
T	Task
UC	Use Case
VET	Vocational Education and Training
WP	Work Package

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Executive Summary

This deliverable, D3.2 – RESKILLING Use Cases Definition, defines and describes the Use Cases (UCs) that form the main analytical framework of the RESKILLING project for examining the employment, skills and socio-economic implications of Connected, Cooperative and Automated Mobility (CCAM) across the transport and mobility ecosystem. The Use Cases provide a structured basis for the collection and analysis of relevant evidence and will guide subsequent project activities, in particular the Case Studies under Task 4.4**,** as well as the training-related work in WP4 and the impact assessment and policy-support activities in later work packages.

The development of the final Use Cases builds on the six UCs initially identified in the proposal phase, which were subsequently reviewed and refined in light of project findings. This refinement was shaped by the progress achieved in the project to date, including literature and desk research and an extensive stakeholder consultation process. As a result of this process, the final RESKILLING framework consists of eight Use Cases. The original six were refined to better reflect the service, operational, infrastructure and workforce dimensions of CCAM deployment, while two additional Use Cases were introduced to address important areas of workforce transformation that were not sufficiently visible in the initial structure: Automated Transport Systems Maintenance and Lifecycle Management**,** and Mobility Data, Digital Platforms and Mobility Services**,** the latter functioning as a horizontal Use Case across the wider mobility ecosystem.

The deliverable also introduces a common analytical template for the full analysis of the Use Cases, ensuring consistency and comparability across them. This template covers elements such as operational scenario, professions, roles and skills, actors and stakeholders, employment and socio-economic impacts, enabling conditions, data needs and links to RESKILLING tasks. In addition, the Use Cases are examined through a set of cross-cutting analytical dimensions, including gender, age, vulnerable workforce groups, skill types, job quality, time horizon, value-chain coverage and level of automation.

The RESKILLING Use Cases provide the project with a coherent and evidence-based analytical framework for understanding how CCAM may reshape work across different parts of the mobility ecosystem. Although each Use Case has a distinct analytical focus, a certain degree of overlap is expected, reflecting the interconnected nature of transport automation across service, infrastructure, operational, maintenance and digital layers. Overall, the Use Cases constitute a key reference framework for the next phases of the project and support RESKILLING's broader objective of contributing to a fair and forward-looking socio-economic transition to CCAM**.**

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1. Introduction

1.1. Purpose of the Document

The present document, *Deliverable 3.2: RESKILLING Use Cases Definition*, aims to define and describe the project's Use Cases (UCs), providing a structured framework for the collection and in-depth analysis of relevant data, as well as an analytical basis for the selection, design and interpretation of the Case Studies under Task 4.4. Within RESKILLING, the Use Cases are understood as analytical constructs, whereas the Case Studies constitute the empirical settings for implementation and validation.

1.2. Intended Audience

The RESKILLING Use Cases constitute a reference document for the further development of the project, particularly for the analytical, implementation and validation activities that follow. For this reason, their description is primarily intended for internal use by the project partners, as it also contributes to a common understanding and structuring the different Case Studies, each of which is expected to address one or more of these Use Cases.

The analysis of the Use Cases also has implications for stakeholder engagement activities under WP2**,** since it helps specify the stakeholder groups that are most relevant to the different domains of workforce transformation addressed by the project. In this sense, the Use Cases further support the targeting, monitoring and facilitation of stakeholder interaction across the RESKILLING ecosystem, in line with the stakeholder categories and engagement approach defined in the respective deliverables**.**

1.3. Interrelations

The RESKILLING Use Cases analysed in this report will also serve as a common reference framework for the activities and outputs to be developed throughout the rest of the project. Thus, they are not considered as standalone analytical elements, but as a structured basis guiding subsequent work across the project, including the implementation and validation activities of WP4 and the impact assessment and policy-oriented work of WP5**.**

More specifically, the Use Cases will be translated into the activities and products to be developed primarily within WP4**,** particularly those related to business models and the definition of reskilling journeys, training profiles and training modules for updated and enhanced CCAM-related professional skills. Particular emphasis is placed on their relationship with the Case Studies under Task 4.4, as the Use Cases provide the main guidance for their design and implementation.

In parallel, the emphasis and scope of the Use Cases will also shape the work of WP5, which will build on the project's results and also integrate the outcomes of the case studies validation activities. To this extent, the identified needs and priorities reflected in the Use Cases will feed into the project's impact assessment, the formulation of guidelines and policy recommendations, and the development of the Roadmap, which will set out a structured and forward-looking approach for supporting a fair socio-economic transition to CCAM.

At the same time, the Use Cases also feed back into activities already underway in WP3, contributing in particular to the refinement of the identification and analysis of employment effects under T3.2 and T3.3**,** as well as to the definition of socio-economic effects under T3.4**.**

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2. Methodological Approach

2.1. Use Case selection and refinement process

As a starting point for the development of the final RESKILLING Use Cases were the six Use Cases initially defined during the proposal phase and reflected in the Grant Agreement (GA), namely:

- Urban and peri-urban passenger transport
- Logistics (including urban logistics)
- Mixed passenger and freight transport
- Micromobility and shared transport
- Infrastructure (physical and digital)
- Traffic management (including services involving remotely operated vehicles)

These initial Use Cases provided the first structuring framework for the project. However, they were subsequently reviewed, updated and refined according to the initial outcomes of the project up to Month 17 (M17), in order to ensure that they more accurately reflect the evolving understanding of CCAM-related workforce transformation and the analytical needs of RESKILLING. The resulting Use Cases will serve as a reference framework for the collection and in-depth analysis of relevant data throughout the duration of the project, as well as for the design and implementation of the Case Studies under Task 4.4.

The revision and refinement of the Use Cases was based on the project's initial findings and, in particular, on the work undertaken in WP3, which focuses on the assessment of the short-term (by 2030), medium-term (by 2040) and long-term (by 2050) impacts of CCAM on professions and roles linked to passenger and freight transport services, including specialised workforce groups and the broader CCAM value chain. This work is based on a twofold methodological approach. First, it draws on literature review and desk research, including the analysis of recent reports, policy documents and scientific publications from European and international sources such as CEDEFOP, the European Commission, ITF and OECD, as well as insights from relevant ongoing and completed projects and studies. Second, it is linked to the results of Task 3.1, which identified and structured the professions and jobs associated with the full CCAM value chain.

In addition, the refinement of the Use Cases was informed by an extensive stakeholder consultation process, including the implementation of 48 interviews within WP3. These interviews supported the examination of the direct and indirect impacts of CCAM deployment on different professions and job types across the CCAM value chain (T3.2), while also enabling a more targeted exploration of specific workforce groups and their needs in relation to reskilling, re-employment, competitive advantages and disadvantages, and CCAM-related employment opportunities and risks (T3.3). The interview material was also analysed systematically through a thematic coding approach. Interview transcripts were segmented and coded in Excel against categories related to skills, job transformation, automation impacts and emerging roles, and the coded material was then synthesised into higher-level themes across sectoral domains. A multi-label coding approach was used where interviewees reflected hybrid profiles spanning more than one domain. This qualitative analysis helped translate stakeholder evidence into the final Use Case definitions by identifying recurring patterns, cross-cutting issues and sector-specific transformation dynamics.

Further important input on the expected implications of CCAM for employability and skills in the transport labour force was collected during the first RESKILLING co-creation workshop, held on 8 October 2025 in Brussels. The workshop brought together stakeholders from across the mobility ecosystem to jointly explore the employment effects of CCAM and possible actions to support workers through the transition. Particular attention was also paid to vulnerable or underrepresented workforce groups, including older workers, migrants and workers with low digital literacy, highlighting the need for targeted support, inclusive training pathways and proactive policy measures to ensure that no group is left behind.

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By consolidating these different sources, the final list of RESKILLING Use Cases evolved into a set of eight Use Cases, as presented in Figure 1 below.

More specifically, the original six Use Cases were not discarded, but rather refined and made more precise, in order to better capture the service, operational, organisational and workforce dimensions of CCAM deployment. At the same time, the analysis highlighted the need to introduce two additional Use Cases, in order to address further and important dimensions of workforce transformation. More specifically, the first additional Use Case, *UC7: Automated Transport Systems Maintenance and Lifecycle Management*, was introduced in order to reflect the growing importance of maintenance, diagnostics, technical support and lifecycle functions in increasingly automated, connected and software-enabled transport systems, while the second additional Use Case, *UC8: Mobility Data, Digital Platforms and Mobility Services*, was introduced as a horizontal Use Case in order to capture the increasing role of data-driven coordination, digital platforms, service integration and analytics across the wider mobility ecosystem, as well as consequences for management, governance and organisation. The evidence gathered through the project showed that some of the most significant employment and skills shifts linked to CCAM are likely to emerge not only in vehicle-related functions, but also in the digital layer that connects services, infrastructure, operators and users. For this reason, this Use Case complements the others by addressing the transversal digital and platform-based dimension of workforce transformation.

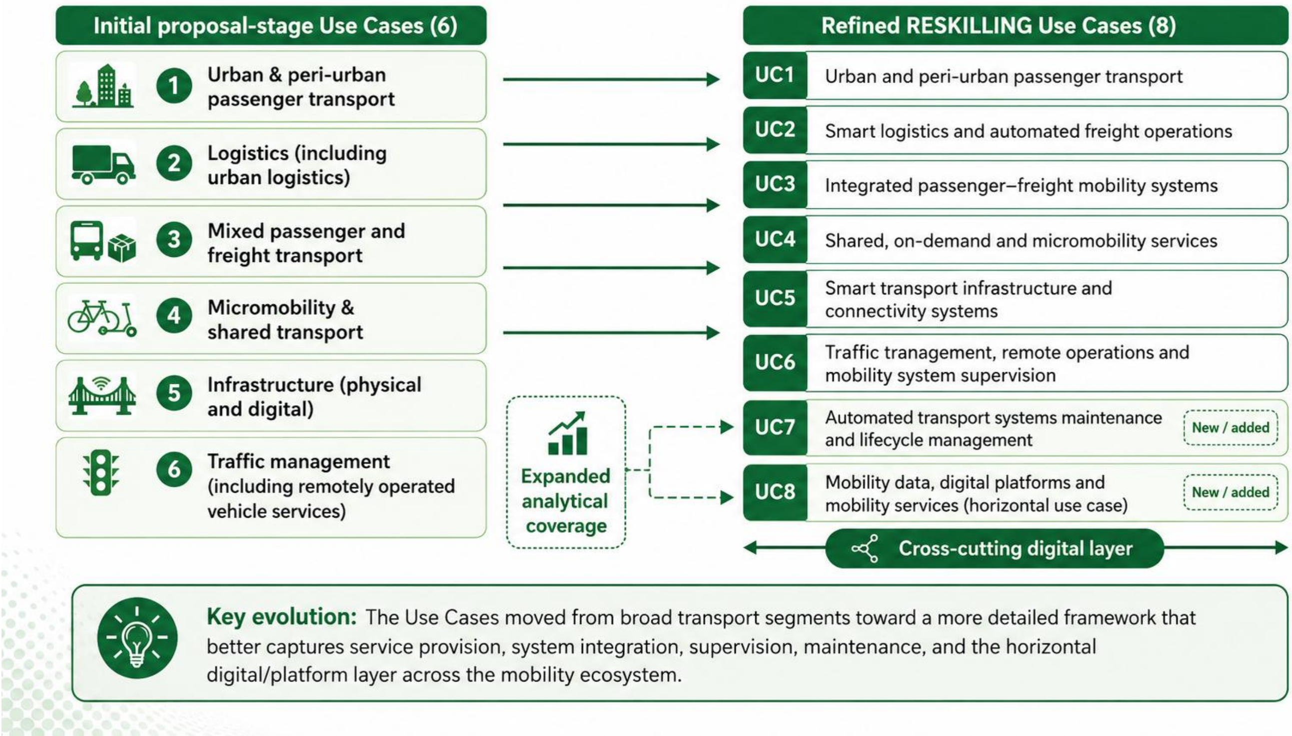

Figure 1: RESKILLING Use Cases correspondence to the GA Use Cases

It should be noted that, within RESKILLING, the Use Cases are not conceived as empirical case studies in themselves. Rather, they function as analytical constructs that define relevant CCAM-related operational and workforce transformation contexts. The Case Studies foreseen under Task 4.4 will build on this analytical framing, but will constitute distinct empirical settings for implementation, validation and further exploration.

At the current stage, the Use Case framework places primary emphasis on the service, operational, infrastructure, maintenance and digital contexts that emerged most clearly from the initial analytical work and stakeholder evidence. As a stable analytical reference structure for the project, the framework is intended to support consistency across subsequent activities, rather than to be further revised. At the same time, some dimensions highlighted through the present analysis—such as differentiated technological

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deployment stages and the links between technological capabilities and workforce implications—will be examined in greater depth through the Case Studies, within concrete empirical settings. This will be particularly relevant for distinguishing between near-term changes associated with digital support and partial automation, medium-term effects linked to hybrid operational models, and longer-term implications that may emerge as more advanced and systemically integrated forms of automation become viable in practice.

To support the full analysis of the RESKILLING Use Cases, a common analytical template was developed and applied across all UCs (see Annex I). The purpose of this template is to ensure a consistent and comparable assessment of the different Use Cases, while also allowing each one to reflect its own specific operational context and workforce transformation dynamics. In this way, the Use Cases are not analysed as isolated thematic areas, but through a shared methodological structure.

More specifically, the Use Cases are examined through a set of cross-cutting analytical dimensions that support comparability and ensure that the analysis captures the broader socio-economic, organisational and labour-related implications of CCAM deployment. These dimensions include, among others, the operational scenario of each Use Case, the professions, roles and skills involved across the RESKILLING value chain, the relevant actors and stakeholders, the expected employment and socio-economic impacts, the enabling conditions and constraints and the key data needs and indicators. Moreover, within RESKILLING, artificial intelligence (AI) is treated as a cross-cutting element of the broader CCAM transition, rather than as a separate analytical category for each Use Case. Its effects are expected to extend beyond technical and engineering roles, also affecting regulatory, administrative, compliance, planning and coordination-related functions, particularly where information processing, decision support and software-enabled management become increasingly important. For this reason, AI is not addressed separately in every Use Case, but is considered where relevant as part of the wider digital and organisational transformation shaping workforce change across the mobility ecosystem.

It should also be noted that the workforce implications examined through the RESKILLING Use Cases extend beyond currently employed workers and immediate organisational settings. They also relate to the wider education and skills formation chain, including schools, vocational education and training providers, higher education institutions, lifelong learning actors and other skills-development structures that shape the future availability and preparedness of the workforce. For this reason, education and training actors are not treated as a separate Use Case in themselves, but as cross-cutting actors relevant to the longer-term development of capabilities across the CCAM ecosystem.

Overall, the template provides a structured analytical framework that strengthens the internal coherence of the Use Case analysis and ensures that the findings generated can be more easily linked to the subsequent activities of the project. More specifically, this template will also provide the basis for structuring data collection in Task 4.4. By reusing it as a common skeleton for the Case Studies, RESKILLING will strengthen comparability across empirical settings and facilitate the translation of analytical findings into implementation, validation and later impact-assessment activities.

2.2. Brief description of RESKILLING Use Cases

The RESKILLING Use Cases are designed as analytical contexts through which the project examines the employment, skills and socio-economic implications of transport automation across different parts of the mobility ecosystem. Given the interconnected nature of automated and connected transport systems, some degree of overlap between Use Cases is both expected and unavoidable. This is because technological, operational, organisational and digital developments often cut across multiple service domains and system layers simultaneously.

For this reason, the Use Cases should not be understood as fully isolated or mutually exclusive categories. Instead, each Use Case is defined according to its primary analytical focus—that is, the main service domain, system layer or workforce transformation context it is intended to capture—while acknowledging that certain themes, actors, technologies or functions may also be relevant to other Use Cases. The Use

Case structure therefore aims to provide a clear and workable analytical framework that allows overlap to exist without losing the distinct role of each Use Case within the overall RESKILLING approach.

The main areas of overlap arise where service provision, system coordination, infrastructure, maintenance and digital platforms intersect. In particular, UC1 (Urban and peri-urban passenger transport) and UC4 (Shared, on-demand and micromobility services) partly overlap because both concern urban mobility services, although UC1 focuses on mainstream passenger transport while UC4 focuses on flexible and platform-mediated service models. A second important area of overlap concerns UC1, UC2 and UC4 in relation to UC8, as data platforms and digital coordination increasingly support passenger, freight and shared mobility services, even though in UC8 they are treated as the main analytical object rather than as enabling features of other services. Some overlap is also present between UC5 (Smart transport infrastructure and connectivity systems) and UC7 (Automated transport systems maintenance and lifecycle management), since both address enabling and technical system layers, but with different centres of gravity: UC5 focuses on infrastructure and connectivity as operational enablers, whereas UC7 focuses on diagnostics, maintenance and lifecycle support. Similarly, UC6 (Traffic management, remote operations and mobility system supervision) overlaps partly with UC8, because both involve digital systems and coordination functions; however, UC6 is centred on real-time control and operational oversight, while UC8 addresses the broader data, platform and interoperability layer across the mobility ecosystem.

These overlaps do not weaken the Use Case structure; rather, they reflect the fact that workforce transformation in CCAM is inherently cross-sectoral and multi-layered. For this reason, the Use Cases should be understood as complementary analytical lenses with distinct centres of gravity, rather than as fully isolated categories.

Table 1 below therefore clarifies the main focus and indicative boundaries of each Use Case, in order to support consistency in the analysis and reduce unnecessary duplication across the deliverable.

Table 1: Overview of the RESKILLING Use Cases and their primary analytical focus

Use Case	Primary analytical focus	Mainly includes	Does not focus on
UC1 – Urban and Peri-Urban Passenger Transport and Digital Mobility Services	Mainstream urban/peri-urban passenger transport service delivery	Public and collective passenger transport operations; service delivery; drivers, dispatchers, service coordinators; gradual transition to more automated urban passenger services; traffic management; regulation (on the municipal level)	Shared/on-demand and micromobility service models as such; platform governance as a core topic; remote supervision/control functions as main object
UC2 – Smart Logistics and Automated Freight Operations	Freight, logistics and supply-chain operations and services	Freight transport operations; urban logistics; last-mile delivery; warehousing interfaces; routing, dispatch and logistics coordination roles; traffic management; regulation (on the municipal level)	Data/platform governance as a main object; control-room supervision as primary focus; maintenance/lifecycle support as main focus
UC3 – Integrated Passenger–Freight Mobility Systems	Passenger–freight interface and integrated service environments	Shared or coordinated service environments; multimodal hubs; joint planning and coordination contexts; roles managing interdependencies between passenger and freight functions; traffic management; regulation (on the municipal level)	Passenger or freight services in isolation; general platform governance; purely traffic-control or supervision functions
UC4 – Shared, On-Demand and	Shared, flexible and demand-responsive service models	Bike sharing, e-scooters, demand-responsive transport, distributed fleet operations,	Mainstream public passenger transport; system-level traffic

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Use Case	Primary analytical focus	Mainly includes	Does not focus on
Micromobility Services		charging/light maintenance, local service coordination and customer-facing roles	supervision; digital platforms as a standalone domain
UC5 – Smart Transport Infrastructure and Connectivity Systems	Infrastructure and connectivity environment enabling CCAM and connected mobility	Connected roadside systems, sensors, communication networks, infrastructure-side monitoring, interoperability at infrastructure level, workforce linked to infrastructure operation and support	Maintenance/lifecycle management as such; real-time traffic management/control; digital platform governance as primary focus
UC6 – Traffic Management, Remote Operations and Mobility System Supervision	Real-time control, oversight and operational supervision	Traffic management centres, control rooms, remote operators, system supervisors, incident management, network-level coordination	Direct passenger/freight service delivery; maintenance/diagnostics; data/platform management as a standalone analytical domain
UC7 – Automated Transport Systems Maintenance and Lifecycle Management	Maintenance, diagnostics, testing and lifecycle support	Inspection, servicing, repair, predictive maintenance, technical diagnostics, system troubleshooting, asset monitoring from a maintenance perspective	Infrastructure operation in general; traffic supervision/control; data/platform governance as primary focus
UC8 – Mobility Data, Digital Platforms and Mobility Services *(Horizontal Use Case)*	Horizontal data, platform and digital coordination layer across the ecosystem	Data governance, platform operation, interoperability, analytics, digital service coordination, service integration, cross-sector orchestration	Direct service delivery; real-time control and supervision as such; maintenance/lifecycle functions as such

2.2.1. Use Case #1: Urban and peri-urban passenger transport and digital mobility services

This Use Case addresses workforce transformation in urban and peri-urban passenger transport services, where automation, connectivity and digitalisation are reshaping the organisation and delivery of public and collective mobility. It focuses on the evolution of passenger transport operations in contexts such as bus, shuttle, feeder and other organised urban mobility services, including the gradual coexistence of conventional and increasingly automated vehicles and systems. The Use Case therefore examines how vehicle-related technological change is embedded within the broader operational and service-delivery environment of passenger transport, rather than treating the vehicle as the focus of analysis.

2.2.2. Use Case #2: Smart Logistics and Automated Freight Operations

This Use Case focuses on workforce transformation in logistics and freight transport systems, including urban logistics, last-mile delivery, warehousing interfaces and digitally coordinated supply chains. It examines how automation, connectivity, AI-supported planning and platform-based freight management are reshaping not only vehicle operations, but also the wider service, coordination and operational ecosystem in which freight transport is organised. The Use Case therefore addresses the growing integration of automated transport functions with logistics services, routing and dispatch systems, warehouse operations, remote diagnostics, and real-time digital coordination across the supply chain, taking into account the gradual and uneven transition toward more automated and hybrid logistics environments.

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2.2.3. Use Case #3: Integrated Passenger–Freight Mobility Systems

This Use Case examines workforce transformation in mobility systems where passenger and freight transport functions are increasingly coordinated, co-located or integrated within shared operational environments. Its focus is not on passenger services alone or freight operations alone, but on contexts in which the two interact through common infrastructure, multimodal hubs, joint planning arrangements, digitally coordinated service flows, or new forms of urban and peri-urban transport organisation. The Use Case therefore addresses the implications of automation and digitalisation for transport settings in which the boundaries between passenger and freight functions become more interconnected.

2.2.4. Use Case #4: Shared, On-Demand and Micromobility Services

This Use Case focuses on workforce transformation in shared, on-demand and micromobility services, including services such as bike sharing, e-scooters, demand-responsive transport, and other flexible or platform-mediated urban mobility solutions. Its primary focus is on service models that are organised around shared use, dynamic demand, and distributed fleet operations, rather than on mainstream public passenger transport, traffic control functions, or the wider data ecosystem as such. The Use Case therefore examines how automation, connectivity and digitalisation reshape the operation, maintenance, coordination and customer-facing delivery of these mobility services in urban and peri-urban contexts.

2.2.5. Use Case #5: Smart Transport Infrastructure and Connectivity Systems

This Use Case addresses workforce transformation related to smart transport infrastructure and connectivity systems, including connected roadside equipment, communication networks, sensor-enabled infrastructure, traffic signalling interfaces, and other physical and digital systems that support increasingly automated and connected mobility. Its primary focus is on the infrastructure layer of the transport ecosystem, rather than on passenger or freight service delivery, remote operations, or platform governance as such. The Use Case therefore examines how automation and digitalisation are reshaping the planning, operation, monitoring and maintenance of transport infrastructure in urban, peri-urban and corridor contexts.

2.2.6. Use Case #6: Traffic Management, Remote Operations and Mobility System Supervision

This Use Case focuses on workforce transformation in traffic management, remote operations and mobility system supervision, in the context of increasingly automated, connected and digitally coordinated transport systems. Its primary focus is on the control, oversight and coordination layer of the mobility ecosystem, including traffic management centres, remote supervision environments, operational control functions, and other settings in which mobility systems are monitored and managed in real time. The Use Case therefore examines how automation and digitalisation are shifting work from direct physical control towards more supervisory, system-oriented and decision-support roles.

2.2.7. Use Case #7: Automated Transport Systems Maintenance and Lifecycle Management

This Use Case addresses workforce transformation related to the maintenance, diagnostics and lifecycle management of increasingly automated, connected and digitally enabled transport systems. Its primary focus is on the technical support and asset management layer of the mobility ecosystem, covering activities associated with the inspection, servicing, repair, upgrading and long-term management of automated vehicles, connected infrastructure and related digital systems. The Use Case therefore examines how CCAM reshapes maintenance functions, shifting them from predominantly mechanical and routine activities towards more predictive, software-enabled and data-supported practices.

2.2.8. Use Case #8: Mobility Data, Digital Platforms and Mobility Service

This Use Case focuses on workforce transformation related to the data, platform and digital coordination layer of the mobility ecosystem. Unlike the other Use Cases, which are primarily organised around specific operational domains or system functions, UC8 has a horizontal character, as it cuts across multiple transport contexts and supports the integration, orchestration and optimisation of mobility and logistics services. Its primary focus is on the digital systems that enable coordination among operators, infrastructure, users and service providers, including mobility data platforms, service integration environments, decision-support systems, and other digital tools used to connect different parts of the transport ecosystem. The Use Case therefore examines how CCAM reshapes work around data governance, platform management, interoperability, service coordination and data-driven decision-making.

2.2.9. Use Cases cross-cutting analytical dimensions

Taken together, the RESKILLING Use Cases offer the framework for examining how CCAM is expected to reshape professions, roles, skills and working conditions across different parts of the transport and mobility ecosystem. From a RESKILLING perspective, they support the identification of workforce transformation patterns, reskilling and upskilling needs, and differentiated socio-economic implications across service, operational, infrastructure, maintenance and digital environments. As such, they form the basis for the more detailed analysis undertaken in the project and guide subsequent activities related to case study implementation, training development, validation and impact assessment.

In addition to their specific thematic focus, the RESKILLING Use Cases are examined through a set of cross-cutting analytical dimensions that support comparability across Use Cases and ensure that the analysis captures the broader socio-economic, organisational and labour-related implications of CCAM deployment. These dimensions make it possible to assess not only how different transport domains are affected, but also which groups, skills, working conditions and value-chain functions are most exposed to change, and under what time horizons and deployment conditions.

An important cross-cutting dimension concerns the parts of the value chain covered by each Use Case. The RESKILLING approach does not focus only on frontline operational roles, but examines impacts across the wider CCAM ecosystem, including service provision, logistics coordination, infrastructure, traffic supervision, maintenance, digital platforms and governance-related functions. This value-chain perspective is important in order to identify where workforce transformation is concentrated and how different parts of the system interact. In addition, this perspective highlights that workforce transition is not limited to the reskilling and upskilling of those already employed in affected occupations. It also concerns the availability, recruitment and attraction of people into relevant roles and skill domains in the first place, including new entrants and workers who are not currently employed in the affected segments of the mobility ecosystem. This is particularly important for emerging and hybrid roles, where the necessary capabilities may not yet be sufficiently available in the labour market or in existing education and training pipelines.

A first important dimension concerns gender, age and career stage, as workforce transformation is not expected to affect all groups equally. Particular attention is therefore paid to how changing roles and skill requirements may create different opportunities or barriers for women, younger workers entering the labour market, older workers approaching retirement, and workers at different stages of their professional development. Closely linked to this is the consideration of vulnerable or “special” workforce groups, including for example workers with disabilities, migrants, low-skilled workers, workers with low digital literacy, and other groups that may face greater challenges or differentiated impacts in the transition toward automated and connected mobility systems. This dimension is particularly important in order to assess whether CCAM-related workforce change may improve inclusion of all workers, or instead reinforce existing inequalities if adequate support measures are not put in place.

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Another key analytical dimension concerns skill-type distinctions, especially the balance and interaction between technical, digital and soft skills. Across the Use Cases, the analysis examines how occupations are changing not only in terms of technical content, but also in relation to growing digitalisation, data use, regulatory awareness, communication, adaptability and other transversal competences. This allows the project to better understand the emergence of hybrid skill profiles and the implications for reskilling and upskilling pathways. In addition, the analysis considers, where this is applicable, job quality and working conditions, recognising that the effects of CCAM are not limited to employment volume or occupational change alone.

Different time horizons, namely the short term (up to 2030), medium term (up to 2040) and long term (up to 2050) are also considered in the analysis of the UCs, since the effects of CCAM are expected to take place gradually, with conventional and increasingly automated systems coexisting for significant periods. Assessing impacts across these timeframes helps distinguish between near-term adjustments, medium-term restructuring and longer-term workforce transformation.

Finally, the analysis also considers the level of automation relevant to each Use Case, acknowledging that workforce implications vary significantly depending on the market penetration, the maturity and deployment stage of the technologies involved. This includes situations ranging from low or partial automation with human oversight, to more advanced and highly connected operational environments. Considering the level of automation helps ensure that the analysis remains realistic and sensitive to the fact that most transitions are likely to be gradual, hybrid and context-dependent, rather than uniform or linear.

Taken together, these cross-cutting analytical dimensions strengthen the overall RESKILLING framework by ensuring that the Use Cases are not treated as isolated technical domains, but as multidimensional socio-technical contexts through which employment, skills, inclusion and organisational change can be assessed in a structured and comparable manner.

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3. Full description of RESKILLING Use Cases

3.1. Analytical role of the Use Cases within RESKILLING

The role of the RESKILLING Use Cases within the project is not limited to describing different transport domains, but extends to structuring how evidence is collected, compared and translated into project outputs and follow-up activities. In this sense, the Use Cases provide a common reference point linking the analytical work of WP3 with the implementation, validation and skills-oriented activities of WP4, while also informing the impact-oriented and policy-support work to be undertaken in later stages of the project, particularly in WP5.

Taken together, the Use Cases allow RESKILLING to analyse workforce transformation across multiple, interrelated dimensions of the CCAM transition. Their commonality lies in their function as structured analytical contexts linking skills, employment and socio-economic analysis to concrete mobility and operational settings. Their difference lies in the fact that each Use Case focuses on a different part of the mobility ecosystem, such as service delivery, multimodal coordination, infrastructure, supervision, maintenance or digital platforms. In this way, each Use Case helps capture different mechanisms through which CCAM may affect employment and skills. This combination of common analytical structure and differentiated thematic focus is one of the main strengths of the RESKILLING approach, as it allows the project to reflect both the diversity and the systemic interdependence of workforce transformation in the mobility sector.

At the same time, the full analysis of the Use Cases has also highlighted a number of common findings that cut across several of them. One such recurring finding concerns the expectation that CCAM deployment will unfold through long periods of coexistence between legacy and newer systems, rather than through abrupt substitution. This means that workforce transition is likely to take place in hybrid operational environments, where conventional and increasingly automated technologies, procedures and organisational models remain present in parallel for extended periods. As a result, the analysis of the Use Cases does not focus only on end-state automation scenarios, but also on the intermediate conditions under which workers, organisations and institutions must adapt over time.

A second recurring finding concerns the inclusion implications of changing work organisation. Across several Use Cases, the transition toward more digital, supervisory and coordination-based forms of work may create more accessible roles for some groups by shifting work away from physically demanding operations and toward office-based, monitoring or support environments. At the same time, these emerging roles may also create new barriers for workers with lower digital confidence, limited familiarity with digital tools, or weaker access to reskilling opportunities. In this respect, the Use Cases show that inclusion outcomes will depend not only on technological change itself, but also on whether targeted training, transition support and organisational adaptation measures are put in place to ensure fair access to new and transformed roles.

A first common function of all Use Cases is that they provide applied analytical contexts in which changing professions, roles, skills and organisational requirements can be examined in a structured way. Across all UCs, they support the identification of workforce transformation patterns, the mapping of emerging and declining role profiles, and the analysis of reskilling and upskilling needs linked to different parts of the CCAM value chain. In this respect, they contribute directly to the objectives of WP3, particularly by helping to interpret findings on employment effects, skill shifts and socio-economic implications in relation to concrete service, operational, infrastructure or digital settings. They therefore act as a bridge between broad analytical work on CCAM-related workforce change and the more contextualised understanding required for later validation and application activities.

A second shared role of the Use Cases is their contribution to WP4, especially to the development of case-study-related activities, business-model reflections, and the design of reskilling journeys, training profiles and training modules. Across all UCs, they help identify which professional groups are most affected, what types of skills and competences are likely to become more important, and what kinds of organisational or operational conditions shape the feasibility of workforce transition. In particular, the Use Cases will guide the design and implementation of the Case Studies under Task 4.4, providing the framework through which these empirical settings will be selected, analysed, interpreted and compared. The analytical template developed in D3.2 will also provide the basis for structuring data collection in Task 4.4. By reusing this template as a common skeleton for the Case Studies, RESKILLING will strengthen comparability across empirical settings and facilitate the translation of analytical findings into implementation, validation and later impact-assessment activities.

At the same time, there are important differences in the analytical contribution of the individual Use Cases, reflecting their different centres of gravity within the wider mobility ecosystem. Some Use Cases are primarily oriented toward service delivery and operations, such as UC1 (Urban and peri-urban passenger transport), UC2 (Smart logistics and automated freight operations) and UC4 (Shared, on-demand and micromobility services). These Use Cases are particularly relevant for understanding how CCAM affects frontline and operational roles, service models, local coordination tasks, and customer-serving jobs. Within RESKILLING, they help show how workforce transformation takes place in everyday operational settings, where service continuity, flexibility and gradual adaptation of roles are essential.

Other Use Cases focus more on system coordination and interface management, namely UC3 (Integrated passenger–freight mobility systems) and UC6 (Traffic management, remote operations and mobility system supervision). Their main value lies in highlighting the transition from fragmented or manual operations toward more integrated and supervisory forms of work. Within RESKILLING, these Use Cases contribute especially to the analysis of cross-functional coordination, real-time monitoring, system supervision and the emergence of roles that require stronger systems thinking, cooperation among different organisations and actors, and a combination of operational and digital competences.

An additional group of Use Cases is more closely associated with enabling systems and technical support functions, namely UC5 (Smart transport infrastructure and connectivity systems) and UC7 (Automated transport systems maintenance and lifecycle management). These are important because they broaden the project's scope beyond vehicles and direct service provision, drawing attention to infrastructure, diagnostics, maintenance, interoperability and lifecycle support as crucial areas of workforce transformation. Their role within RESKILLING is to ensure that technical, public-sector and support functions are also considered integral parts of the CCAM transition, rather than secondary elements of change.

Finally, UC8 (Mobility data, digital platforms and mobility services) plays a distinct role as a horizontal Use Case, since it does not correspond to one single operational domain but rather to the transversal digital layer that increasingly connects services, infrastructure, operations and governance across the mobility ecosystem. Its contribution within RESKILLING is therefore broader and more cross-cutting than that of the other UCs. It helps capture emerging roles and skills linked to data governance, analytics, interoperability, platform management and digital coordination, and it provides an analytical lens for understanding how automation-related workforce change is increasingly mediated through software-enabled and data-intensive environments.

Overall, the Use Cases should be understood not simply as examples or thematic categories, but as the main analytical architecture of RESKILLING, supporting the project's internal coherence and ensuring that findings from its different tasks can be interpreted, compared and translated into training, validation, impact-assessment and policy-support activities in a structured and consistent way. As such, they provide a stable analytical reference framework for the project's subsequent work. At the same time, the Case Studies and related validation activities will examine in greater depth certain dimensions highlighted through the present analysis, as for example with regard to differentiated automation maturity levels, technological deployment stages, and the links between specific technological capabilities and workforce implications across different CCAM-related contexts. In this way, the Case Studies can complement and operationalise the Use Case framework in concrete empirical settings.

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3.2. Use Case 1: Urban and peri-urban passenger transport and digital mobility services

3.2.1. Context and Rationale

Urban and peri-urban passenger transport is one of the most visible and close to the society domains of the CCAM transition, as it directly concerns everyday mobility services, public transport accessibility, service reliability and the interaction between transport systems and a wide range of users. This domain includes public and collective passenger transport services such as buses, shuttles, feeder services and other organised forms of urban and peri-urban mobility, where automation, connectivity and digitalisation are expected to progressively reshape not only vehicle-related functions, but also the wider organisation and delivery of services.

The relevance of this Use Case to RESKILLING lies in the fact that this domain combines high workforce intensity, strong public-service obligations and complex operational conditions. It therefore provides an important analytical setting for examining how CCAM may affect a broad range of roles, including drivers, dispatchers, supervisors, planners, coordinators and customer-facing staff, while also raising questions related to safety, user trust, inclusion, service continuity and the gradual coexistence of conventional and increasingly automated systems.

3.2.2. Operational Scenario

UC1 covers urban and peri-urban passenger transport services in which automation-related technologies, digital systems and connected operations are gradually being introduced into everyday service provision. The relevant service environment includes public transport operations, organised shuttle services, feeder and local transport services, and other forms of collective passenger mobility operating in relatively structured and service-oriented contexts. The focus is therefore on how CCAM-related developments affect the organisation and delivery of passenger transport services, including dispatching, service coordination, fleet support, customer interaction and operational oversight.

This Use Case is mainly situated in urban and peri-urban environments, where dense interactions, mixed traffic conditions and public-service requirements make the deployment of CCAM particularly complex.

The scenario is characterised by a gradual and hybrid transition, in which conventional and more automated systems are expected to coexist for a considerable period. In the short to medium term, human supervision remains essential, while higher levels of automation are more likely to emerge only in the longer term, depending on safety validation, regulation, infrastructure adaptation and organisational readiness.

3.2.3. Professions, Roles and Skills across the RESKILLING Value Chain

Table 2: Professions, roles and skills across the RESKILLING value chain in UC1, linked to T3.1 job families

Job family (T3.1)	Example roles in UC1	Type of impact	Skill changes	Reskilling/upskilling needs
Drivers	Bus drivers, shuttle drivers, feeder-service drivers	Transformation / partial decline	Reduction of manual driving tasks; increased need for supervision, handover management, monitoring and exception handling	Training in HMI, automation awareness, safety protocols, supervision of automated systems
Remote operations	Dispatchers, control-room personnel,	Strong transformation / expansion	Greater reliance on real-time data, monitoring tools,	Upskilling in situational awareness, remote supervision, digital

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Job family (T3.1)	Example roles in UC1	Type of impact	Skill changes	Reskilling/upskilling needs
	remote support staff		digital coordination and decision-support systems	platforms, rapid decision-making
Mobility and services platform managers	Service coordinators, fleet managers, urban mobility service managers	Job expansion	Shift toward data-driven coordination, service optimisation and platform-supported mobility operations	Advanced digital skills, service-platform management, analytics, operational coordination
On-site mobility assistance roles	Passenger-support staff, travel assistants, accessibility support staff	Transformation	Greater emphasis on customer interaction, support in automated environments and use of digital service interfaces	Training in accessibility, customer experience, digital interfaces, support in hybrid service environments
Traffic control & signalling	Operational coordinators, route supervisors, service control staff	Strong transformation	More interaction with digitally supported signalling, route-control and service coordination systems	Training in traffic coordination tools, service management systems, incident handling
Data science & analytics experts	Mobility data analysts, service performance analysts	Job creation / expansion	Increased use of predictive analytics, service optimisation and operational data interpretation	Advanced data skills, AI/data analytics, operational data governance
Software & systems development	Mobility app developers, service-system integrators	Job creation	Development and integration of digital mobility systems and user-facing passenger service tools	Advanced ICT skills, software development, system integration training
Legal & regulatory professionals / Policy makers	Municipal mobility authorities, regulatory and compliance staff	Transformation	Greater relevance of regulatory oversight, safety compliance and public-service governance in automated passenger services	Training in CCAM regulation, procurement, liability, safety and governance

The findings, as presented in Table 2 above suggest that workforce adaptation in UC1, as also in most UCs, will depend on continuous and progressive reskilling, rather than isolated training interventions. Priority areas include digital skills for frontline and operational staff, understanding of connected and automated systems, safety and compliance awareness, customer interaction in technology-rich service environments, and the ability to work effectively within hybrid human–machine operational settings. The stakeholder consultation evidence also points to the need for modular, flexible and practice-oriented training approaches, including workplace-based learning, micro-credentials and targeted support for workers who may face greater transition difficulties, particularly older workers and those with lower digital familiarity.

More broadly, reskilling in this Use Case should support not only skill acquisition, but also role transition, organisational adaptation and inclusive participation in increasingly digitalised passenger transport services.

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3.2.4. Actors and Stakeholders

The actors and stakeholders associated with UC1 can be distinguished according to their degree and type of involvement in the operational scenario and workforce transition. Primary actors are those directly involved in the delivery, operation, use or immediate management of urban and peri-urban passenger transport services and are therefore the groups most directly affected by changes in tasks, roles and skill requirements. Secondary and indirectly affected stakeholders include actors who shape, enable, regulate, support or influence the transition through governance, policy, infrastructure, technology provision, training, labour representation or organisational coordination.

Primary actors in UC1 mainly include:

- drivers and other frontline operational staff involved in passenger transport service delivery;
- dispatchers, control-room personnel and service coordinators responsible for daily operational management;
- depot and operational support staff;
- maintenance and technical support personnel linked to passenger transport operations;
- passengers and users of urban and peri-urban passenger transport services;
- public transport operators and service managers;
- municipal and regional public transport planners and authorities directly responsible for the planning and provision of passenger mobility services.

Secondary and indirectly affected stakeholder groups mainly include:

- municipalities and public administrations with broader mobility, infrastructure and governance responsibilities;
- infrastructure managers and telecom/connectivity providers supporting the enabling environment;
- technology providers and system developers;
- regulators, standardisation bodies and relevant governance actors shaping deployment conditions;
- labour unions and worker representatives;
- training providers, education actors and skills-development organisations;
- HR, organisational development, legal and compliance actors within relevant organisations;
- civil society or user-representation bodies where relevant, particularly in relation to accessibility, inclusion and public acceptance.

3.2.5. Employment and Socio-economic Impacts

In urban and peri-urban passenger transport, CCAM is expected to produce gradual but structurally important workforce effects, rather than sudden disruption. In the short term (up to 2030), the main changes are likely to concern digitalisation of operational processes, revised procedures, and early role adaptation. In the medium term (up to 2040), demand is expected to increase for staff able to work with more technologically complex, connected and safety-critical systems. In the longer term (up to 2050), if higher levels of automation become operationally and regulatory feasible, some traditional operational roles may decline, while supervisory, assistance, validation and system-support functions expand. Overall, the evidence points more strongly to role transformation and task reallocation than to simple workforce elimination.

Potential job creation opportunities in relation to this Use Case include mainly functions linked to remote assistance, digital operational support, fleet monitoring, validation, safety assurance and technology-enabled passenger service management. At the same time, some roles centred on direct physical control, repetitive operational tasks or low-digital support functions may be progressively reduced or reconfigured. The stakeholders' consultation suggests that public transport and other operator-dependent mobility services may be among the areas where automation pressures are strongest, partly because of labour shortages and the need to maintain service continuity. However, the transition is expected to remain prolonged and hybrid, with human oversight continuing to play a central role for a considerable period.

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The findings form the interviews and the workshop suggest that automation and digitalisation in passenger transport may improve accessibility for some workforce groups by reducing physical demands and creating more office-based, remote or hybrid roles. Women and younger workers may benefit from the creation of less physically demanding and more digitally oriented roles, while persons with disabilities may gain from more adaptable and technology-supported work environments. At the same time, older workers and workers with lower digital familiarity may face greater transition difficulties unless targeted training and support measures are provided. More broadly, the evidence suggests that inclusion in future passenger transport roles will depend increasingly on access to digital skills and adaptive capacity, rather than only on physical capability.

From a socio-economic perspective, the quality-of-work implications seem to be mixed, as also indicated above. Potential benefits include reduced physical strain, broader accessibility for some worker groups, more knowledge-intensive work and improved operational support. Risks include intensified monitoring, higher cognitive load, digital stress, uneven access to reskilling and exclusion of workers who struggle to adapt to digital systems. According to stakeholders' consultation, it is highly probable that inclusivity improves in some roles as they become less physically demanding, but new inequalities will emerge if digital and cognitive requirements become the main access barrier.

3.2.6. Enabling Conditions, Constraints and Influencing Factors

Passenger transport automation depends heavily on regulatory and policy conditions, including safety requirements, liability rules, data protection obligations, validation procedures, public procurement choices, vehicle availability and wider policy direction on public-service mobility. These conditions shape not only what can be deployed, but also how quickly and under which labour and governance arrangements. The RESKILLING findings indicate that public authorities are likely to play a major enabling role, especially where automation is linked to public transport, special transport services and other socially important mobility functions.

Important technical and operational conditions include technology readiness, infrastructure adaptation, telecom and connectivity reliability, availability of affordable vehicles, interoperability between vehicles and infrastructure, and safe functioning in dense urban environments. A recurring theme is that passenger transport automation will unfold in long transition periods during which legacy systems, newer vehicles and intermediate technologies coexist. This makes hybrid operation, fall-back capacity and resilient communication systems especially important.

At the organisational level, readiness depends on workforce planning, change management, internal coordination, cooperation with labour representatives, capacity to redesign jobs, and the ability of different public and private actors to work across institutional silos. Management and governance functions need to have capabilities to take decisions for mixed/hybrid traffic. The stakeholder consultation focuses on the fact that organisational barriers may be as significant as technical ones, particularly in public or multi-actor mobility settings. In addition, successful transition will require learning-by-doing, gradual adaptation and sustained organisational support.

Finally, social acceptance and user-related factors remain central. Workers trust, public perceptions of safety, willingness to use automated services, and broader social confidence in hybrid systems will all influence deployment. Human oversight and, in certain roles presence, remains important – at least in the transition phase- not only operationally but also socially, since both workers and users may be more willing to accept automation where roles remain clear and safety accountability remains evident.

3.2.7. Data Needs and Indicators

UC1 is highly relevant for T4.4 case studies, since urban and peri-urban passenger transport offers a strong applied setting to examine how CCAM affects public-service delivery, workforce adaptation, inclusion and reskilling needs under real institutional and organisational constraints.

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The analysis of each Use Case requires a combination of quantitative and qualitative evidence in order to capture workforce, skills, operational and socio-economic implications of CCAM deployment**.** Table 3 below presents indicative indicators and pertinent data sources that may support the analysis of UC1, while also informing the selection and design of relevant T4.4 case studies.

Table 3: Suggested indicators and pertinent data sources for the analysis of UC1

Analytical dimension / indicator	Indicative data sources	Relevance for case-study analysis
Employment structure and occupational distribution	HR records, labour market data, organisational records	Tracks workforce exposure and change
Role and task transformation	Interviews, focus groups, internal job descriptions	Helps identify affected professions and transition pathways
Skills gaps and training needs	Surveys, training needs assessments, training records	Supports reskilling strategy design
Inclusion and accessibility outcomes	Equality data, workforce surveys, interviews	Assesses differentiated impacts across workforce groups
Safety, reliability and operational performance	Safety reports, service logs, authority data	Links workforce change to operational conditions
SME / fleet renewal / organisational investment capacity	Company records, sectoral associations, operator interviews, fleet age data, investment plans	Shows who can genuinely invest in electrification, digitalisation and CCAM upgrades,
Data-sharing and interoperability practices	Platform documentation, ICT architecture documents, governance agreements, interviews	Shows whether technical and organisational conditions for integration are in place
Cross-organisational coordination capacity	Interviews, governance documents, cooperation agreements, meeting records	Assesses the institutional readiness required for integrated service models
Inclusion indicators across interface and coordination roles (e.g. gender, age, digital readiness)	HR data, equality/diversity monitoring, workforce surveys, interviews	Supports assessment of whether integration-related roles are accessible across workforce groups
Quality-of-work indicators in integrated service environments (e.g. workload, role clarity, autonomy, coordination pressure)	Worker surveys, interviews, organisational assessments, labour representation inputs	Helps capture whether integration improves or complicates work organisation
User acceptance and service uptake indicators	User surveys, service usage data, city mobility data	Connects service model evolution to broader social acceptance and viability

These are needed to understand not only employment effects, but also how organisational and service models evolve under the development and deployment of CCAM. However, it needs to be noted that many of the data needs and indicators presented below may be relevant across more than one Use Case. However, in each table (of the different UCs) the emphasis is placed on those considered most important for the specific analytical focus of the respective UC. The tables should therefore be read as prioritised rather than exhaustive.

3.3. Use Case 2: Smart logistics and automated freight operations

3.3.1. Context and Rationale

Smart logistics and automated freight operations represent a major domain of workforce transformation within the CCAM transition, as freight transport is increasingly shaped by automation, connectivity, platform-based coordination and data-driven management across the supply chain. This domain includes

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not only vehicle movement, but also urban logistics, last-mile delivery, warehousing interfaces, terminal coordination, dispatch and routing functions, and the broader operational ecosystem through which goods transport is organised and monitored.

The relevance of this Use Case to RESKILLING is particularly strong because freight and logistics combine economic importance, operational diversity and uneven organisational readiness across the sector. It therefore provides an important context for examining how CCAM-related change may affect drivers, dispatchers, warehouse staff, coordinators, supervisors and emerging digital roles, while also reflecting the differentiated pace of transition across large operators and smaller firms with more limited capacity to invest in fleet renewal, electrification, digitalisation and automation-related upgrades.

3.3.2. Operational Scenario

UC2 addresses operational environments in which freight transport, logistics coordination and supply-chain functions are increasingly shaped by automation, connectivity and data-driven management. The Use Case covers not only vehicle movement, but also the wider operational chain through which freight services are planned, dispatched, monitored and delivered, including urban logistics, last-mile delivery, warehouse interfaces, terminal coordination and digitally supported routing and scheduling. In this sense, the operational scenario is defined by the growing integration of transport operations with logistics systems, digital platforms, real-time monitoring tools and increasingly automated decision-support functions.

More specifically, this Use Case captures a transition from labour-intensive and often fragmented logistics operations toward more connected, monitored and system-integrated service environments. This transition is expected to be gradual and uneven, with conventional and increasingly automated operations coexisting for a prolonged period. In the short to medium term, automation is likely to be introduced first in structured, repetitive or route-based contexts, while human workers continue to perform supervisory, coordination and exception-handling functions. This unevenness is also linked to the structure of the logistics sector itself, which includes many small and medium-sized enterprises and small operators with very limited fleets, sometimes consisting of only one or two vehicles. For these actors, the financial and organisational capacity to invest simultaneously in fleet renewal, electrification, digitalisation and CCAM-related upgrades may be limited, making adoption slower and more uneven across the sector. The operational scenario therefore reflects a hybrid logistics environment in which automation does not eliminate the need for labour, but reshapes work across driving, dispatch, warehouse coordination, documentation, traffic control and system monitoring functions.

3.3.3. Professions, Roles and Skills across the RESKILLING Value Chain

Table 4: Professions, roles and skills across the RESKILLING value chain in UC2, linked to T3.1 job families

Job family (T3.1)	Example roles in UC2	Type of impact	Skill changes	Reskilling/upskilling needs
Drivers	Truck drivers, delivery drivers, urban freight drivers	Transformation / partial decline	Reduction of routine driving tasks; stronger role in exception handling, system monitoring and safety oversight	Training in supervision of automated systems, HMI, route-system interaction, safety protocols
Freight, warehouse & port workers	Warehouse operators, loading/unloading staff, smart-hub assistants	Strong transformation	Shift from manual handling toward interaction with automated sorting, loading and dispatch systems	Training in digital warehouse systems, safe interaction with automation, system alerts and basic diagnostics
Logistics managers	Logistics coordinators,	Strong transformation	Greater reliance on digital coordination,	Upskilling in logistics platforms, real-time

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Job family (T3.1)	Example roles in UC2	Type of impact	Skill changes	Reskilling/upskilling needs
	transport clerks, freight planners, dispatchers		telematics, electronic documentation and platform-based planning	coordination, digital documentation, compliance and analytics
Remote operations	Fleet monitoring staff, remote support operators	Job expansion / creation	Increased use of tele-supervision, real-time monitoring and exception management	Training in remote operations, digital monitoring tools, situational awareness, decision-support systems
Mobility and services platform managers	Platform-enabled logistics coordinators, fleet orchestration staff	Job expansion	Shift toward integrated, data-driven freight coordination and platform-enabled service management	Advanced digital skills, platform management, data analytics, service optimisation
Maintenance & repair operators	AV-ready freight technicians, connected fleet maintenance staff	Strong transformation	Transition toward diagnostics, sensor systems, predictive maintenance and software-enabled servicing	Training in digital diagnostics, sensor calibration, predictive maintenance tools
Data science & analytics experts	Freight data analysts, route optimisation analysts	Job creation	Increased demand for predictive planning, routing analytics and performance optimisation	Advanced skills in AI/data analytics, logistics data use, data governance
Legal & regulatory professionals	Compliance staff, documentation and safety personnel	Transformation	Greater importance of regulatory compliance, data protection and safety procedures in digital freight operations	Training in digital compliance, freight regulation, cybersecurity awareness
Human Resources & Organisational Development	Recruitment and workforce-planning staff in logistics firms	Transformation	Greater need to manage labour shortages, hybrid job redesign and training uptake	Training in workforce transition planning, recruitment for hybrid logistics roles, organisational adaptation

The findings, as summarised in Table 4 above suggest that workforce adaptation in UC2 will depend on continuous and structured reskilling, particularly for workers moving from routine, manual or low-digital roles toward more supervisory, data-supported and coordination-based functions. Priority areas include digital logistics tools, electronic documentation, monitoring systems, AI-supported planning, compliance and safety literacy, and the ability to operate effectively in hybrid human–machine logistics environments. The interview evidence also indicates the need for modular and practice-oriented training approaches**,** supported by organisational transition measures, internal mobility pathways and targeted inclusion policies for workers at risk of digital exclusion, especially low-skilled workers and those less familiar with digital systems. More broadly, reskilling in this Use Case should support not only competence development, but also role transition, organisational adaptation and equitable access to emerging logistics occupations**.**

3.3.4. Actors and Stakeholders

The actors and stakeholders associated with UC2 can be distinguished according to their degree and type of involvement in logistics and freight operations, and in the broader workforce transition linked to

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automation and digitalisation**.** Primary actors are those directly involved in the delivery, coordination, execution or immediate management of freight and logistics services, and are therefore the groups most directly affected by changes in tasks, roles and skill requirements. Secondary and indirectly affected stakeholders include actors who shape, regulate, support or influence the transition through governance, infrastructure, technology provision, labour representation, training, compliance or organisational coordination.

Primary actors in UC2 mainly include:

- truck drivers and other freight vehicle operators;
- last-mile delivery workers and urban logistics personnel;
- dispatchers, traffic controllers and route coordinators;
- warehouse, terminal and depot staff linked to freight operations;
- logistics coordinators, fleet managers and operational planners;
- documentation, back-office and customer-interface staff involved in freight service execution;
- freight operators, logistics companies and service managers directly responsible for delivery and supply-chain operations; SME hauliers
- clients and business users whose freight and logistics services depend on these systems.

Secondary and indirectly affected stakeholder groups mainly include:

- infrastructure managers and terminal operators supporting freight movement and operational environments;
- technology providers, software firms and digital/platform service providers;
- regulators, standardisation bodies and governance actors shaping safety, liability, labour and data conditions;
- labour unions and worker representatives;
- training providers, education organisations and skills-development actors;
- HR, organisational development, legal and compliance functions within freight and logistics organisations;
- municipalities and public authorities, especially where urban logistics, curb management or last-mile delivery regulation is concerned;
- telecom and connectivity providers supporting digital freight operations and monitoring systems.

3.3.5. Employment and Socio-economic Impacts

In UC2, the introduction of CCAM and related digitalisation is expected to result primarily **in** progressive role transformation across the freight and logistics value chain, rather than in immediate large-scale job destruction. In the short term (up to 2030), the main effects are likely to concern operational optimisation, the increasing use of digital monitoring and routing tools, and the gradual redistribution of tasks between drivers, dispatchers, warehouse staff and coordination functions. In the medium term (up to 2040), higher levels of system integration and automation are expected to increase the complexity of logistics operations, leading to greater demand for workers able to combine operational knowledge with digital, analytical and supervisory competences at the expense of low-skilled, often entry level, jobs. In the longer term (up to 2050), if automated freight operations expand in more structured and predictable environments, some routine driving, manually coordinated and repetitive tasks may shrink, while new or strengthened roles linked to fleet monitoring, system supervision, digital planning, exception management and data-enabled coordination are likely to expand. This suggests that the most significant impact of automation in freight transport will concern the reconfiguration of work content and occupational profiles, with job mobility and internal role transition becoming more important than outright job loss, provided that workers are supported in moving toward emerging functions.

The socio-economic implications of UC2 are likely to extend beyond employment aspects as well. Potential positive effects, such as improved operational efficiency, lower physical strain and broader access to certain roles may support greater participation of women, younger workers and, in some cases, workers with disabilities, especially where roles shift toward office-based, supervisory or coordination functions. At the same time, the transition may also intensify existing inequalities if access to emerging roles depends heavily on digital literacy, continuous training and prior educational advantage. Low-skilled workers,

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workers with weak digital familiarity and some migrant workers facing language barriers may be particularly exposed to exclusion risks if reskilling pathways are not proactively designed.

Quality-of-work outcomes in UC2 are therefore expected to be mixed and highly dependent on implementation choices. On the positive side, automation may reduce some of the more monotonous, repetitive or physically demanding aspects of freight work and create more knowledge-intensive and better supported roles. On the negative side, increased reliance on monitoring systems, algorithmic management, electronic documentation and real-time performance control may lead to higher cognitive demands, stronger surveillance, reduced autonomy and new forms of work-related stress. Most stakeholders suggest that the ultimate employment and socio-economic effects of CCAM in logistics will depend to a large extent on governance choices, including worker consultation, training provision, job redesign, internal mobility opportunities and the extent to which technological change is introduced in an inclusive and socially managed way.

In this respect, UC2 highlights that the transition toward smart logistics and automated freight operations is not simply a technical process, but also a labour, organisational and social transition. Its outcomes will depend on how effectively companies, authorities and training actors can support workers in adapting to more connected, data-driven and supervisory forms of work while preventing the emergence of new exclusion patterns within the sector.

3.3.6. Enabling Conditions, Constraints and Influencing Factors

The transition toward smart logistics and automated freight operations is shaped by a combination of regulatory, technical, organisational and social conditions, which together determine both the pace of deployment and the quality of workforce adaptation. In UC2, these factors are particularly important because freight and logistics systems operate across complex value chains involving multiple actors, infrastructures, technologies and organisational interfaces. As a result, automation does not enter a single operational setting, but rather affects a highly interconnected system in which transport, warehousing, traffic coordination, documentation and platform-based management are increasingly interdependent.

From a regulatory and policy perspective, the deployment of automated freight and logistics functions depends on liability frameworks, safety and operational rules, labour-related regulation, documentation requirements, data governance provisions and the evolving legal treatment of automation-assisted or remotely supervised operations. These factors are especially relevant in freight transport, where responsibilities are often distributed across carriers, logistics providers, contractors, warehouse operators and digital service providers. The RESKILLING analysis suggest that regulation can act both as a constraint and as an enabler: while unclear liability, uneven standards or insufficient regulatory adaptation may delay deployment, well-designed governance frameworks can provide the stability needed for investment, experimentation and workforce planning. In this sense, the regulatory environment affects not only technological feasibility but also the extent to which workforce transition can be anticipated and managed.

At the technical and operational level, important enabling conditions include technology readiness, connectivity quality, interoperability between vehicles, warehouses, fleet management systems and logistics platforms, as well as the suitability of different operational environments for automation. The evidence suggests that automation is most likely to advance first in structured, repetitive and route-based freight contexts, while more variable or complex logistics environments may remain dependent on hybrid human–machine arrangements for longer. This makes operational heterogeneity a key constraint: the logistics sector includes many different settings, and not all can be automated at the same pace or in the same way. In addition, increasing reliance on sensors, digital monitoring systems, AI-supported planning and electronic documentation means that resilience, system integration and exception-handling capacity become central operational requirements.

Organisational and institutional conditions are equally significant. Stakeholders' feedback indicates that the transition toward more automated logistics environments requires strong change-management

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capacity, coordination across departments and organisations, and the ability to redesign roles rather than simply replace tasks. If the different actors are not aligned, technological deployment may produce fragmentation rather than efficiency gains. Organisational barriers may therefore include weak internal coordination, insufficient workforce planning, limited training provision and lack of structured transition pathways for workers whose roles are changing. Conversely, organisations that invest in reskilling, internal mobility and gradual adaptation are more likely to manage the transition successfully and limit exclusion risks.

Finally, social acceptance and user-related factors also influence this Use Case, although in a different way than in passenger-facing contexts. In freight and logistics, acceptance is closely linked to worker trust in automated systems, perceptions of job security, willingness to adopt new digital tools, and confidence that automation will improve rather than undermine working conditions. Worker resistance may emerge where automation is associated with increased surveillance, loss of autonomy or uncertainty about future employment prospects.

More broadly, UC2 shows that successful deployment depends not only on technical feasibility, but also on whether workers and organisations perceive the transition as manageable, legitimate and socially fair.

Overall, UC2 highlights that the move toward smart logistics and automated freight operations is enabled or constrained by the interaction of governance choices, operational conditions, organisational preparedness and workforce acceptance. These factors should therefore be understood not as external background conditions, but as core determinants of whether automation in logistics leads to inclusive upgrading of work or to fragmented and unequal transition outcomes.

3.3.7. Data Needs and Indicators

To support a structured analysis of workforce and system transformation in UC2, a set of indicative indicators and pertinent data sources is proposed in Table 5 below. These are intended to capture not only employment and skills effects, but also operational, organisational and socio-economic dimensions of automation and digitalisation in freight and logistics services.

Table 5: Suggested indicators and pertinent data sources for the analysis of UC2

Analytical dimension / indicator	Indicative data sources	Relevance for case-study analysis
Employment structure across passenger–freight interface roles	Operator HR records, organisational charts, labour statistics, public authority data	Helps identify which occupational groups are directly affected by integrated service environments
Role and task transformation in multimodal coordination, hub management and service integration functions	Interviews, job descriptions, workforce surveys, internal operational documentation	Supports analysis of how integration changes work content and cross-functional responsibilities
Skills needs related to systems integration, coordination and digital planning	Interviews, training needs assessments, competence frameworks, surveys	Helps identify emerging hybrid skill profiles and reskilling priorities
Degree of operational integration between passenger and freight functions	Service planning documents, hub management records, public authority documentation, case-study evidence	Indicates how far integration is taking place in practice and in which operational contexts
Data-sharing and interoperability practices	Platform documentation, ICT architecture documents, governance agreements, interviews	Shows whether technical and organisational conditions for integration are in place
Cross-organisational coordination capacity	Interviews, governance documents, cooperation agreements, meeting records	Assesses the institutional readiness required for integrated service models

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Analytical dimension / indicator	Indicative data sources	Relevance for case-study analysis
Training participation in cross-functional, multimodal or system-integration topics	HR/training records, training provider documentation, internal learning systems	Helps evaluate whether the workforce is being prepared for integrated operational roles
Inclusion indicators across interface and coordination roles (e.g. gender, age, digital readiness)	HR data, equality/diversity monitoring, workforce surveys, interviews	Supports assessment of whether integration-related roles are accessible across workforce groups
Quality-of-work indicators in integrated service environments (e.g. workload, role clarity, autonomy, coordination pressure)	Worker surveys, interviews, organisational assessments, labour representation inputs	Helps capture whether integration improves or complicates work organisation
Service and coordination performance indicators	Operational logs, authority data, hub performance reports, service reliability data	Links workforce and organisational change to actual system performance outcomes
Governance and institutional readiness for integrated mobility systems	Policy documents, governance frameworks, planning strategies, interviews	Supports analysis of enabling conditions and major barriers to implementation
Safety, reliability and operational performance	Safety reports, service logs, authority data	Links workforce change to operational conditions
User acceptance and service uptake indicators	User surveys, service usage data, city mobility data	Connects service model evolution to broader social acceptance and viability

These indicators and data sources can support the identification of relevant empirical settings and evidence needs for T4.4 case studies, particularly where workforce transformation, digitalisation of logistics operations, and organisational adaptation can be observed in practice.

3.4. Use Case 3: Integrated passenger–freight mobility systems

3.4.1. Context and Rationale

UC3 addresses contexts in which passenger and freight functions become increasingly coordinated, co-located or integrated, for example through multimodal hubs, shared infrastructure, combined service environments or digitally coordinated urban and peri-urban transport systems. Its purpose is to capture workforce impacts that arise specifically at the interface between passenger and freight systems, rather than within either domain in isolation. This Use Case is justified by the interview findings pointing to growing needs for system integration, service coordination and cross-functional operational management across different transport domains.

The relevance of UC3 to RESKILLING lies in its ability to reflect the project's concern with value-chain integration, changing role boundaries and emerging skill needs in increasingly interconnected transport systems. As automation and digitalisation progress, workforce transformation is not expected to occur only within separate sectors, but also across the interfaces that connect them. UC3 is therefore important for identifying if and how CCAM may generate new coordination roles, integrated planning functions and cross-sector skill requirements, while also revealing the organisational and institutional barriers that may limit such transitions. In this sense, the Use Case supports RESKILLING's objectives related to employment transformation, systems-oriented skills development and the anticipation of future professions in more integrated mobility environments.

3.4.2. Operational Scenario

UC3 addresses operational environments in which passenger and freight functions are increasingly coordinated, co-located or integrated, rather than managed as fully separate domains. The Use Case covers contexts such as multimodal hubs, shared operational environments, integrated urban or peri-urban service systems, and digitally coordinated settings in which passenger and freight flows interact through

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common infrastructure, joint planning arrangements, or service interfaces. While some of these arrangements already exist today in partial or operationally limited forms—for example in multimodal hubs, terminal areas, coordinated urban access systems, or shared planning environments—the Use Case is also forward-looking, as it captures the growing potential for closer integration as automation, connectivity and digital coordination advance. Its analytical focus is therefore not on passenger transport alone or freight transport alone, but on the operational interface where both functions become interdependent.

From an analytical perspective, UC3 captures a transition from traditionally segmented transport systems toward more networked and system-oriented mobility environments, in which automation and digitalisation support coordination across functions rather than only within them. The operational scenario is likely to remain hybrid for a prolonged period, as passenger and freight services continue to be governed by different institutional, business and operational logics even when closer integration becomes technically possible. In this sense, the Use Case combines already observable forms of operational coordination with more forward-looking integration pathways. The main workforce implications arise less from one single automated process and more from the growing need to manage interdependencies, shared assets, common digital environments and coordinated operational decisions across domains.

3.4.3. Professions, Roles and Skills across the RESKILLING Value Chain

Table 6: Professions, roles and skills across the RESKILLING value chain in UC3, linked to T3.1 job families

Job family (T3.1)	Example roles in UC3	Type of impact	Skill changes	Reskilling/upskilling needs
Mobility and services platform managers	Integrated service coordinators, multimodal operations managers	Job expansion	Greater need for cross-domain coordination, service integration and platform-supported orchestration	Training in multimodal coordination, service integration, digital platform use
Logistics managers	Passenger–freight coordination staff, hub logistics coordinators	Strong transformation	Shift from siloed planning toward integrated passenger–freight coordination	Training in multimodal planning, interface management, cross-sector coordination
Traffic control & signalling	Hub control staff, operational coordinators, interface managers	Strong transformation	Increased importance of network coordination, shared operational visibility and real-time management	Upskilling in integrated control tools, signalling interfaces, system coordination
Urban planning, including physical & digital infrastructure	Hub planners, integrated mobility planners, infrastructure coordinators	Transformation	More emphasis on shared infrastructure use, multimodal design and system integration	Training in integrated planning, interoperability, infrastructure-service coordination
Data science & analytics experts	Integration data analysts, multimodal system analysts	Job expansion	Greater use of shared data environments, demand analysis and service-flow optimisation	Skills in analytics, data-sharing, interoperability and operational modelling
Software & systems development	System integrators, multimodal service architects	Job creation / expansion	Need to support interoperability and digital coordination across passenger and freight functions	Training in system integration, interoperability, architecture design

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Job family (T3.1)	Example roles in UC3	Type of impact	Skill changes	Reskilling/upskilling needs
Policy makers / Legal & regulatory professionals	Public authorities, governance and partnership staff	Transformation	Greater importance of governance alignment, institutional coordination and shared operational frameworks	Training in governance design, partnership models, coordination frameworks
Socioeconomic & impact analysts	Analysts assessing integrated mobility impacts	Job expansion	Stronger need to assess cross-sector effects, public value and integrated service outcomes	Training in impact assessment, systems analysis and policy evaluation

The interview evidence suggests that UC3 requires cross-functional and coordination-oriented reskilling, rather than narrowly technical upskilling alone. Priority needs include training in integrated planning environments, digital coordination tools, inter-organisational collaboration, systems thinking and the management of shared operational interfaces. Because this Use Case sits across traditionally separate domains, reskilling should also support organisational bridge-building, helping workers and managers operate across passenger and freight functions that have historically had different cultures, procedures and governance structures. More broadly, the transition in UC3 depends on preparing the workforce for integrated service environments in which coordination capacity becomes as important as domain-specific expertise.

3.4.4. Actors and Stakeholders

The actors and stakeholders associated with UC3 can be distinguished according to their degree and type of involvement in integrated passenger–freight operational environments and in the broader transition toward more coordinated mobility systems. Primary actors are those directly involved in planning, managing, coordinating or operating passenger–freight interfaces and are therefore the groups most directly affected by changing responsibilities, coordination demands and skill requirements. Secondary and indirectly affected stakeholders include actors who shape, regulate, enable or influence integration through governance, infrastructure, technology provision, training, institutional coordination or public planning.

Primary actors in UC3 mainly include:

- multimodal planners and operational coordinators;
- hub managers and staff involved in shared operational environments;
- passenger and freight service managers;
- dispatch, routing and network coordination personnel;
- infrastructure-linked coordination staff;
- public and private actors directly managing integrated service environments;
- users and service beneficiaries affected by passenger–freight coordination outcomes.

Secondary and indirectly affected stakeholder groups include:

- municipalities and public authorities responsible for mobility and logistics planning;
- infrastructure managers and terminal operators;
- digital platform providers and technology suppliers;
- regulators, governance actors and standardisation bodies;
- telecom and connectivity providers;
- labour unions and worker representatives;
- training providers, education actors and skills-development organisations;

The likely workforce effects in UC3 follow the broader pattern observed across the interview material: roles that become more office-based, coordination-oriented and digitally supported may be more accessible to some worker groups, while workers with weaker digital skills or lower access to training may face greater

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barriers. As integration increases the importance of communication, coordination and system-level understanding, the key inclusion challenge is less physical capability alone and more equitable access to digital, organisational and cross-functional competences.

3.4.5. Employment and Socio-economic Impacts

In UC3, the employment effects of automation and digitalisation are expected to arise primarily through the reorganisation of responsibilities and coordination functions across passenger and freight domains, rather than through direct substitution of one single occupational group. In the short term (up to 2030), the main effects are likely to concern improved information exchange, more coordinated planning and the emergence of interface tasks linking previously separated operational areas. In the medium term (up to 2040), increasing integration may strengthen demand for workers able to manage cross-functional service environments, shared hubs and multimodal coordination functions. In the longer term (up to 2050), if integrated mobility systems become more mature, some fragmented or duplicated coordination functions may lose importance, while new roles centred on network-level planning, operational integration and shared governance may expand. This suggests that the main employment effect in UC3 is a shift toward interface and coordination-intensive roles, rather than direct workforce reduction.

From a socio-economic perspective, UC3 may create positive effects where integration improves operational efficiency, service continuity and cross-sector collaboration, while also creating more knowledge-intensive and coordination-based work. At the same time, integration may also generate complexity, ambiguity in responsibilities and increased coordination pressure if governance and organisational arrangements remain unclear. Quality-of-work outcomes will therefore depend on whether integrated environments are supported by clear role definitions, effective inter-organisational cooperation and training for workers expected to operate across traditional boundaries. More broadly, UC3 shows that service integration can improve system performance, but only if the associated workforce transition is actively managed and does not simply transfer complexity onto workers without adequate support.

3.4.6. Enabling Conditions, Constraints and Influencing Factors

The development of integrated passenger–freight mobility systems depends on a complex combination of regulatory, technical, organisational and social conditions, because this Use Case sits at the intersection of transport functions that have traditionally been planned and governed separately. In UC3, the main constraint is often not one specific technology, but the difficulty of aligning operational, organisational and institutional systems across domains. For this reason, enabling conditions in this Use Case depend heavily on the capacity of mobility systems to move beyond fragmented sectoral approaches and support shared planning, common operational interfaces and coordinated governance.

From a regulatory and policy perspective, UC3 requires frameworks that support cross-domain coordination, shared infrastructure use, data exchange, interoperability and aligned service governance. Where passenger and freight activities remain governed by separate rules, institutions and decision-making structures, integration may remain administratively difficult even when technically feasible. At the technical and operational level, enabling conditions include interoperable digital systems, shared or compatible information environments, and operational arrangements that allow different transport functions to interact efficiently. Organisational and institutional conditions are especially important, since fragmented responsibilities, institutional silos and weak coordination can be as limiting as technical barriers.

Finally, social acceptance and user-related factors concern trust in more integrated service models, perceived reliability and clarity of service, and acceptance of changing responsibilities among workers and organisations. Overall, UC3 demonstrates that integration depends on the combined capacity of governance systems, organisations and operational actors to work across established boundaries.

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3.4.7. Data Needs and Indicators

To support a structured analysis of workforce and system transformation in UC3, a set of indicative indicators and pertinent data sources is proposed below. Given the integrative nature of this Use Case, the evidence base should capture not only employment and skill changes, but also coordination capacity, interoperability, service integration and institutional readiness across passenger and freight domains.

Table 7: Suggested indicators and pertinent data sources for the analysis of UC3

Analytical dimension / indicator	Indicative data sources	Relevance for case-study analysis
Employment structure across passenger–freight interface roles	Operator HR records, organisational charts, labour statistics, public authority data	Helps identify which occupational groups are directly affected by integrated service environments
Role and task transformation in multimodal coordination, hub management and service integration functions	Interviews, job descriptions, workforce surveys, internal operational documentation	Supports analysis of how integration changes work content and cross-functional responsibilities
Skills needs related to systems integration, coordination and digital planning	Interviews, training needs assessments, competence frameworks, surveys	Helps identify emerging hybrid skill profiles and reskilling priorities
Degree of operational integration between passenger and freight functions	Service planning documents, hub management records, public authority documentation, case-study evidence	Indicates how far integration is taking place in practice and in which operational contexts
Data-sharing and interoperability practices	Platform documentation, ICT architecture documents, governance agreements, interviews	Shows whether technical and organisational conditions for integration are in place
Cross-organisational coordination capacity	Interviews, governance documents, cooperation agreements, meeting records	Assesses the institutional readiness required for integrated service models
Training participation in cross-functional, multimodal or system-integration topics	HR/training records, training provider documentation, internal learning systems	Helps evaluate whether the workforce is being prepared for integrated operational roles
Inclusion indicators across interface and coordination roles	HR data, equality/diversity monitoring, workforce surveys, interviews	Supports assessment of whether integration-related roles are accessible across workforce groups
Quality-of-work indicators in integrated service environments	Worker surveys, interviews, organisational assessments, labour representation inputs	Helps capture whether integration improves or complicates work organisation
Service and coordination performance indicators	Operational logs, authority data, hub performance reports, service reliability data	Links workforce and organisational change to system performance outcomes
Governance and institutional readiness for integrated mobility systems	Policy documents, governance frameworks, planning strategies, interviews	Supports analysis of enabling conditions and barriers to implementation
Safety, reliability and operational performance	Safety reports, service logs, authority data	Links workforce change to operational conditions

These indicators and data sources can support the identification of relevant empirical settings and evidence needs for T4.4 case studies**,** particularly where passenger–freight coordination, multimodal integration and cross-organisational workforce adaptation can be observed in practice.

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3.5. Use Case 4: Shared, on-demand and micromobility services

3.5.1. Context and Rationale

UC4 focuses on workforce transformation in shared, flexible and demand-responsive mobility services, including bike sharing, e-scooters, demand-responsive transport and other platform-mediated urban mobility models. This Use Case is justified by the increasing importance of service models that rely on distributed fleets, digitally supported coordination and flexible, user-responsive operations, and which therefore generate workforce profiles distinct from those found in mainstream public transport or conventional operations.

The relevance of UC4 to RESKILLING lies in the fact that these services represent a growing part of the mobility ecosystem in which automation and digitalisation affect not only vehicles, but also service organisation, local operations, hybrid roles and customer-facing functions. UC4 is particularly useful for the project because it highlights forms of work that combine operational, technical and service skills, and because it allows the analysis of new business and service models that are likely to require continuous reskilling, adaptability and digitally mediated coordination.

In this respect, the Use Case contributes to RESKILLING by broadening the project's analytical scope beyond conventional transport occupations and by addressing emerging mobility services where employment conditions, role development and skill needs may evolve rapidly.

3.5.2. Operational Scenario

UC4 addresses operational environments built around shared, flexible and demand-responsive mobility services, including bike sharing, e-scooters, demand-responsive transport and other platform-mediated urban mobility models. The Use Case focuses on service systems characterised by distributed fleets, dynamic demand, local redistribution activities, charging and light maintenance tasks, and digitally supported customer and service coordination. Its defining characteristic is therefore not one specific automated technology, but a service model organised around shared use, flexible deployment and platform-enabled operations.

Analytically, UC4 captures a transition from more fixed and standardised transport provision toward decentralised and dynamically managed service environments, in which operational work is increasingly mediated by digital tools, real-time information and flexible service logics. Automation may enter this environment through optimisation tools, connected assets, digital control systems or future automated vehicles, but the main workforce implications arise from the changing organisation of work around distributed service delivery, local operations and platform-mediated coordination. The scenario is especially relevant in urban and peri-urban contexts where service responsiveness, local fleet management and user interaction are central.

3.5.3. Professions, Roles and Skills across the RESKILLING Value Chain

Table 8: Professions, roles and skills across the RESKILLING value chain in UC4, linked to T3.1 job families

Job family (T3.1)	Example roles in UC4	Type of impact	Skill changes	Reskilling/upskilling needs
On-site mobility assistance roles	Customer support staff, field operators, user assistance staff	Strong transformation	Greater role of customer interaction, digital interfaces and support in flexible/shared environments	Training in customer experience, accessibility, digital tools, support in automated/shared services
Mobility and services	Shared-mobility coordinators,	Job expansion	Shift toward platform-based coordination,	Training in platform management, analytics,

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Job family (T3.1)	Example roles in UC4	Type of impact	Skill changes	Reskilling/upskilling needs
platform managers	fleet managers, service operators		demand-responsive service management and distributed fleet oversight	demand-responsive coordination
Maintenance & repair operators	Charging and light-maintenance staff, fleet maintenance operators	Strong transformation	Greater use of digital diagnostics, asset status monitoring and hybrid maintenance tasks	Training in diagnostics, charging systems, service maintenance tools
Drivers / Remote mobility support roles	DRT operators, remote assistance staff	Transformation	Less direct control, more coordination, support and exception handling in responsive service environments	Training in remote support, service supervision, human–machine interaction
Data science & analytics experts	Shared-mobility data analysts	Job creation	Increased need for service optimisation, demand analysis and fleet rebalancing	Skills in data analytics, operational optimisation, platform data use
Software & systems development	Shared-mobility app developers, service integration staff	Job creation	Greater importance of platform functionality, service integration and user-oriented digital design	Training in software/service integration, app development, user-centred design
Sales & marketing specialists / Service & business design	Shared-mobility service designers, user-growth staff	Expansion	Stronger focus on uptake, user engagement and service innovation	Training in service design, communication, user behaviour and business-model innovation

UC4 suggests the need for practice-based and flexible reskilling approaches that combine operational, digital and customer-oriented capabilities. Priority training areas include platform-supported service coordination, digital fleet tools, local operational decision-making, customer interaction in technology-mediated environments, and hybrid technical-service tasks such as charging and light maintenance. Because these services often evolve quickly, reskilling should support not only specific technical competences but also adaptability, responsiveness and continuous learning in dynamic urban service environments.

3.5.4. Actors and Stakeholders

The actors and stakeholders associated with UC4 can be distinguished according to their degree and type of involvement in shared, on-demand and micromobility service delivery and in the wider transition toward more platform-mediated urban mobility systems**.** Primary actors are those directly involved in operating, coordinating, maintaining or using these services and are therefore the groups most directly affected by changing service models, tasks and skill requirements. Secondary and indirectly affected stakeholders include actors who shape, regulate, enable or influence these services through governance, urban planning, infrastructure provision, technology supply, training or user representation.

Primary actors in UC4 mainly include:

- field operators and fleet redistribution staff;
- charging and light maintenance workers;
- local service coordinators and operations managers;
- customer support and user-facing service staff;
- shared mobility operators and service providers;
- users of shared, on-demand and micromobility services;
- municipalities

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Secondary and indirectly affected stakeholder groups mainly include:

- municipalities and public authorities responsible for urban mobility regulation and space allocation;
- infrastructure managers and local urban-service actors;
- technology and platform providers;
- regulators and governance bodies;
- labour unions and worker representatives;
- training providers and skills-development organisations;
- civil society and user-representation groups, particularly in relation to accessibility and public acceptance;
- funders, investors

As with other digitally supported service environments, UC4 may create more accessible roles for some groups where work becomes less physically demanding and more flexible. At the same time, access to emerging roles may depend increasingly on digital familiarity, service responsiveness and adaptability. Inclusion outcomes will therefore depend on whether service models are designed in ways that support both worker accessibility and sustainable role development.

3.5.5. Employment and Socio-economic Impacts

In UC4, employment change is expected to take the form of service-model-driven role transformation, rather than abrupt workforce reduction. In the short term (up to 2030), the main impacts are likely to concern the digitalisation of local operations, stronger reliance on platform-mediated coordination and the reorganisation of field tasks such as redistribution, charging and customer support. In the medium term (up to 2040), growing service flexibility and operational optimisation may increase demand for workers able to combine local operational knowledge with digital and service-oriented competences. In the longer term (up to 2050), if shared and demand-responsive services continue to expand and become more technologically sophisticated, some highly manual field tasks may decline in relative importance, while hybrid operational-service roles and digitally supported local management functions grow. This suggests that the main employment effect in UC4 is a shift toward more hybrid, flexible and service-integrated occupational profiles.

Socio-economically, UC4 may create positive effects by expanding urban mobility services, enabling more responsive local operations and creating new types of hybrid work. However, these gains may be offset where business models generate role instability, weak progression opportunities or dependence on fragmented platform-mediated work. Quality-of-work outcomes will depend strongly on organisational choices, employment conditions, workload distribution and the extent to which workers receive structured training and support. In this sense, UC4 highlights that flexible mobility services can generate innovation and new roles, but also require careful attention to job quality, accessibility and sustainability of employment conditions.

3.5.6. Enabling Conditions, Constraints and Influencing Factors

The development of shared, on-demand and micromobility services is shaped by a combination of regulatory, technical, organisational and social conditions, reflecting the fact that these service models operate at the intersection of digital platforms, urban governance and local service delivery. In UC4, enabling conditions are closely linked to how urban authorities, municipalities, service providers and technology actors manage flexibility, scale and public-space impacts. Unlike more infrastructure-intensive Use Cases, the main challenges here concern the coordination of distributed assets, local operations and user-facing service quality.

From a regulatory and policy perspective, local licensing frameworks, urban space rules, parking and curb management, service obligations and safety requirements are especially important. At the technical and operational level, enabling factors include digital platform maturity, real-time data use, digital fleet coordination, charging arrangements and operational responsiveness. Organisational and institutional conditions concern the ability of operators to manage decentralised services, train staff in hybrid roles and coordinate with local authorities. Finally, social acceptance and user perceptions are especially important,

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as shared mobility services depend on whether people see them as safe, secure convenient, fair in their use of urban space, and useful in everyday life.

Overall, UC4 shows that flexible service models succeed not only through technology, but through the alignment of service design, local governance and workforce capability.

3.5.7. Data Needs and Indicators

To support a structured analysis of workforce and system transformation in UC4, a set of indicative indicators and pertinent data sources is proposed in Table 9 below. Given the service-oriented and distributed nature of this Use Case, the evidence base should capture workforce change alongside service flexibility, local operations and user-facing outcomes.

Table 9: Suggested indicators and pertinent data sources for the analysis of UC4

Analytical dimension / indicator	Indicative data sources	Relevance for case-study analysis
Employment structure across shared-mobility service roles	Operator HR records, organisational records, labour statistics	Helps identify which occupational groups are involved in shared and on-demand mobility models
Role and task transformation in redistribution, charging, customer support and local coordination	Interviews, job descriptions, workforce surveys, operational documentation	Captures how service flexibility changes daily work and task distribution
Skills needs related to digital service coordination, platform use and hybrid field roles	Interviews, training-needs assessments, competence frameworks, surveys	Identifies emerging skill profiles and reskilling priorities
Fleet operations and local service activity indicators	Operator platform data, service logs, local operational records	Links workforce roles to the intensity and organisation of distributed service operations
Training participation in digital tools, customer-service and hybrid operational tasks	HR/training records, provider documentation, internal learning systems	Shows whether workers are being prepared for emerging service demands
Inclusion indicators across shared-mobility roles	HR data, equality/diversity monitoring, interviews, surveys	Assesses accessibility of emerging roles across workforce groups
Quality-of-work indicators in flexible service environments	Worker surveys, interviews, organisational assessments	Helps capture whether service flexibility improves or worsens work conditions
User acceptance and service uptake indicators	User surveys, service usage data, city mobility data	Connects service model evolution to broader social acceptance and viability
Governance and urban-management conditions	Policy documents, local regulations, city planning records, interviews	Supports analysis of enabling conditions and barriers linked to local governance
Worker contractual fragmentation / platform-mediated employment patterns	Worker surveys, operator data, interviews, labour inspection data	Better captures the specific nature of work in shared/on-demand services.

3.6. Use Case 5: Smart transport infrastructure and connectivity systems

3.6.1. Context and Rationale

UC5 addresses workforce transformation related to the transport infrastructure and connectivity systems that enable connected and automated mobility. This includes roadside digital infrastructure, V2I/V2X systems, communication networks, traffic signals, smart stops and sensor-based monitoring systems. The Use Case considers vehicle interaction where relevant, but its primary focus is the infrastructure and connectivity environment that supports increasingly automated and connected mobility systems. This Use Case is justified by the strong evidence from the stakeholders' consultation that infrastructure digitalisation

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is a major but often underestimated source of workforce change and reskilling demand within the broader CCAM ecosystem.

The relevance of UC5 to RESKILLING lies in its contribution to a more complete understanding of transport automation as a system-level transformation, rather than a vehicle-centred one. It brings into the analysis a category of professions and roles that are essential to the deployment and long-term functioning of CCAM, but which are often underrepresented in automation debates. UC5 is therefore important for identifying new competence needs related to infrastructure digitalisation, interoperability, telecom resilience and public-sector capability, while also supporting RESKILLING's objectives on anticipating future skills, mapping workforce implications across the value chain, and linking technology deployment with organisational and institutional readiness.

3.6.2. Operational Scenario

UC5 addresses operational environments centred on transport infrastructure and connectivity systems that enable connected and automated mobility, including roadside digital infrastructure, traffic signals, priority systems, communication networks, smart stops, V2I/V2X functions and sensor-based monitoring systems. The Use Case focuses on the infrastructure layer as an operational enabler of CCAM rather than on direct service delivery. Its analytical centre of gravity lies in the planning, operation, monitoring and adaptation of infrastructure systems that increasingly combine physical and digital components.

From an analytical perspective, UC5 captures a transition from conventional infrastructure management toward more integrated, software-enabled and connectivity-dependent infrastructure environments. A defining feature of this scenario is the coexistence of old and new systems over long periods, since infrastructure lifecycles are typically much longer than vehicle or platform lifecycles. As a result, the main workforce implications arise not only from new technologies, but also from the challenge of managing long hybrid periods in which legacy infrastructure, newer connected systems and evolving operational requirements must function together.

3.6.3. Professions, Roles and Skills across the RESKILLING Value Chain

Table 10: Professions, roles and skills across the RESKILLING value chain in UC5, linked to T3.1 job families

Job family (T3.1)	Example roles in UC5	Type of impact	Skill changes	Reskilling/upskilling needs
Urban planning, including physical & digital infrastructure	Infrastructure planners, civil engineers, infrastructure coordinators	Strong transformation	Increasing integration of digital and physical infrastructure, interoperability and CCAM-readiness	Training in smart infrastructure planning, interoperability, digital infrastructure integration
Telecommunications & connectivity engineers	Connectivity engineers, V2X specialists, network planners	Job expansion / creation	Greater demand for connectivity, roadside communications and resilient network support	Advanced training in V2X, telecom systems, connectivity resilience
Maintenance & repair operators	Roadside equipment technicians, signalling and communication maintenance staff	Strong transformation	Shift from conventional maintenance toward digital diagnostics, connected-system support and predictive maintenance	Training in diagnostics, communication systems, digital maintenance, sensor calibration

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Job family (T3.1)	Example roles in UC5	Type of impact	Skill changes	Reskilling/upskilling needs
Construction workers	Infrastructure deployment workers, installation crews	Transformation	Greater interaction with digital assets, sensor-equipped environments and semi-automated infrastructure tools	Training in basic digital literacy, safe interaction with smart infrastructure systems
Engineers	Public-sector engineers, system-integration engineers	Job expansion	More systems-level thinking linking infrastructure, vehicles and data environments	Training in systems engineering, interoperability, technical integration
Data science & analytics experts	Infrastructure data modellers, asset-monitoring analysts	Job creation / expansion	Greater use of monitoring data, asset intelligence and performance analysis	Skills in data modelling, infrastructure analytics, digital monitoring
Emergency & incident management	Emergency coordination staff linked to smart infrastructure systems	Transformation	Greater interaction with connected signalling, priority systems and digital incident interfaces	Training in incident-response coordination, infrastructure emergency interoperability
Policy makers / Legal & regulatory professionals	Public authorities, regulatory and procurement staff	Transformation	Greater importance of public-sector capability, standards, procurement and governance of enabling infrastructure	Training in procurement, standards, governance and regulatory frameworks

UC5 points to the need for multi-layered technical reskilling, combining traditional infrastructure knowledge with digital systems, communications, data use and interoperability competences. Priority needs include telecom and connectivity expertise, infrastructure data modelling, monitoring and diagnostics, software-enabled asset management and the ability to operate across infrastructure and mobility interfaces. Because infrastructure transition is slow and hybrid by nature, reskilling should also support workers in managing coexistence between legacy and newer systems over long periods.

3.6.4. Actors and Stakeholders

The actors and stakeholders associated with UC5 can be distinguished according to their degree and type of involvement in the planning, operation, maintenance and governance of smart transport infrastructure and connectivity systems**.** Primary actors are those directly involved in infrastructure operation, technical support, connectivity deployment and public-sector infrastructure planning, and are therefore the groups most directly affected by changing technical and organisational requirements. Secondary and indirectly affected stakeholders include actors who shape, regulate, supply, coordinate or depend on the infrastructure environment through governance, telecom provision, service operation, training or standards development.

Primary actors in UC5 mainly include:

- infrastructure technicians and signalling/communications staff;
- public-authority engineers and planners;
- asset managers and infrastructure operations personnel;
- technical support staff linked to connectivity and monitoring systems;
- organisations directly responsible for transport infrastructure and digital network operation.

Secondary and indirectly affected stakeholder groups include:

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- transport operators depending on infrastructure adaptation;
- telecom and connectivity providers;
- technology suppliers and system integrators;
- regulators, governance actors and standardisation bodies;
- training providers and skills-development organisations;
- labour unions and worker representatives;
- public administrations involved in planning, budgeting and inter-agency coordination.

Inclusion effects in UC5 are likely to depend on how infrastructure work is re-organised as digitalisation and automation progress. In some cases, emerging roles may become less physically demanding and more digitally supported, particularly where monitoring, diagnostics, control or planning functions can be performed in office-based or remote environments. However, this should not be assumed uniformly across all infrastructure roles, since many field-based tasks may remain physically demanding unless supported by broader automation, robotics or safer inspection and maintenance technologies. For this reason, the main inclusion challenge in UC5 concerns not only physical job demands, but also access to technical qualifications, digital capability and continuous training, which will increasingly shape entry and progression in infrastructure-related roles.

3.6.5. Employment and Socio-economic Impacts

In UC5, automation and digitalisation are expected to produce employment effects mainly through role upgrading and functional broadening in infrastructure-related occupations, rather than through large-scale workforce contraction. In the short term (up to 2030), the main changes are likely to concern the gradual incorporation of digital monitoring, connectivity functions and interoperability requirements into existing infrastructure roles. In the medium term (up to 2040), stronger demand is expected for workers able to manage physical and digital systems together, especially where infrastructure increasingly supports connected public transport, priority systems and real-time traffic interaction. In the longer term (up to 2050), as infrastructure adaptation deepens, some conventional roles may lose relative importance while more hybrid technical roles expand. The main employment effect is therefore a shift toward digitalised infrastructure competence, not the disappearance of infrastructure work itself.

Socio-economically, UC5 may strengthen the importance of public authorities and infrastructure managers as key actors in enabling CCAM. Positive effects may include more knowledge-intensive work, greater strategic importance of infrastructure roles and stronger demand for resilient communication and systems expertise. Risks include exclusion of workers who cannot make the transition to digitally intensive roles and institutional bottlenecks where infrastructure adaptation lags behind mobility-system evolution. Overall, UC5 demonstrates that workforce transition in infrastructure is central to CCAM deployment and that socio-economic outcomes depend on whether public and technical institutions can build the necessary capability base.

3.6.6. Enabling Conditions, Constraints and Influencing Factors

The development of smart transport infrastructure and connectivity systems is shaped by a combination of regulatory, technical, organisational and social conditions, with particularly strong dependence on public governance capacity and long-term investment frameworks. In UC5, one of the defining characteristics is the mismatch in speed between infrastructure evolution and the faster pace of change in vehicles, software and service models. This means that enabling conditions concern not only technology deployment, but also the management of long coexistence periods between legacy and newer systems.

From a regulatory and policy perspective, standards, public procurement, infrastructure funding, interoperability frameworks, telecom governance and public-service priorities are central. At the technical and operational level, key factors include network resilience, communication coverage, compatibility between infrastructure and vehicle systems, data quality and reliable operation under real traffic conditions. Organisational and institutional conditions are equally important, since fragmented responsibilities, siloed public institutions and reluctance to share resources can constrain infrastructure adaptation even where the technology is available.

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Finally, social acceptance and user-related factors concern public confidence in infrastructure-enabled automation, especially where critical services such as public transport and emergency mobility depend on reliable communication and priority systems.

Overall, UC5 shows that infrastructure digitalisation is enabled or constrained by the combined capacity of public institutions, technical systems and inter-agency coordination arrangements.

3.6.7. Data Needs and Indicators

To support a structured analysis of workforce and system transformation in UC5, a set of indicative indicators and pertinent data sources is proposed in Table 11 below. Given the enabling nature of this Use Case, the evidence base should capture workforce change alongside infrastructure readiness, connectivity resilience, interoperability and governance capacity.

Table 11: Suggested indicators and pertinent data sources for the analysis of UC5

Analytical dimension / indicator	Indicative data sources	Relevance for case-study analysis
Employment structure across infrastructure and connectivity roles	Public authority records, infrastructure manager HR data, labour statistics	Helps identify which occupational groups are directly affected by infrastructure digitalisation
Role and task transformation in signalling, connectivity, monitoring and asset management functions	Interviews, job descriptions, organisational records, operational documentation	Captures how infrastructure work changes under digitalisation and CCAM-enabling requirements
Skills needs related to connectivity, interoperability, diagnostics and infrastructure data	Interviews, competence frameworks, training-needs assessments, surveys	Supports identification of reskilling priorities for infrastructure-related roles
Infrastructure digitalisation and interoperability readiness	Asset databases, planning documents, deployment records, technical system documentation	Indicates whether enabling infrastructure conditions are present in practice
Telecom resilience and communication coverage indicators	Network reports, telecom operator documentation, infrastructure monitoring systems	Helps assess whether connectivity conditions support CCAM-related services
Training participation in digital infrastructure and connectivity topics	HR/training records, provider documentation, internal learning systems	Shows whether workforce capability is keeping pace with infrastructure transformation
Inclusion indicators across infrastructure-related roles	HR data, diversity monitoring, interviews, surveys	Assesses accessibility of emerging infrastructure roles across workforce groups
Quality-of-work indicators in digital infrastructure settings	Worker surveys, interviews, organisational assessments	Helps capture whether work becomes more knowledge-intensive, complex or exclusionary
Governance and inter-agency coordination capacity	Policy documents, cooperation agreements, planning strategies, interviews	Supports analysis of institutional readiness and barriers to implementation

These indicators and data sources can support the identification of relevant empirical settings and evidence needs for T4.4 case studies, particularly where infrastructure adaptation, connectivity and workforce capability development can be observed together.

3.7. Use Case 6: Traffic management, remote operations and mobility system supervision

3.7.1. Context and Rationale

UC6 focuses on workforce transformation in traffic management, remote operations and system supervision, reflecting interview evidence that many transport functions may progressively shift from direct physical control toward office-based monitoring, coordination and remote assistance roles. This Use Case

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is justified by the strong emergence, across the interviews, of operational scenarios involving traffic management centres, control rooms, remote supervision functions and increasingly connected mobility operations requiring continuous oversight.

The relevance of UC6 to RESKILLING lies in its clear connection to one of the most significant labour transitions associated with CCAM: the movement from direct operation to supervisory and control-intensive work. This Use Case is especially important for the project because it highlights emerging roles such as remote operators, system supervisors and digitally enabled control functions, while also drawing attention to the associated need for digital, analytical, regulatory and soft skills. In this sense, UC6 contributes directly to RESKILLING's objectives on anticipating transformed professions, analysing changing job content, and identifying reskilling pathways for workers who will increasingly operate within hybrid human–machine environments rather than through routine operational tasks alone.

3.7.2. Operational Scenario

UC6 addresses operational environments centred **on** real-time control, oversight and supervision of increasingly automated and connected mobility systems. This includes traffic management centres, remote operations environments, fleet control settings, incident management functions and digitally supported operational supervision. The analytical focus is not on direct service delivery or platform governance as such, but on the control and oversight layer through which mobility systems are monitored, coordinated and intervened in when required.

More specifically, UC6 captures a transition from direct physical control of vehicles and operations toward supervisory, exception-handling and network-level coordination functions. The interview evidence suggests that many tasks currently performed by drivers or local operational staff may progressively be transferred to office-based control roles, especially in structured and safety-critical environments. However, this transition is expected to remain gradual, with human oversight continuing to play a central role during long hybrid phases. The main workforce implications therefore arise from the re-organisation of work around monitoring, decision support, remote assistance and real-time system supervision.

3.7.3. Professions, Roles and Skills across the RESKILLING Value Chain

Table 12: Professions, roles and skills across the RESKILLING value chain in UC6, linked to T3.1 job families

Job family (T3.1)	Example roles in UC6	Type of impact	Skill changes	Reskilling/upskilling needs
Traffic control & signalling	Traffic controllers, route coordinators, system supervisors	Strong transformation	Increasing reliance on real-time data, digital control systems and supervisory decision-making	Training in digital control tools, real-time coordination, signalling systems
Remote operations	Remote operators, fleet-control staff, control-room personnel	Job expansion / creation	Shift from physical control to remote supervision, exception handling and oversight	Training in remote operations, situational awareness, supervision of automated systems
Emergency & incident management	Incident coordinators, public-safety interface staff	Strong transformation	Greater need to coordinate emergencies in digitally managed and partly automated environments	Training in incident management, inter-agency coordination, emergency interfaces
Surveillance operators	Monitoring staff, compliance and safety surveillance personnel	Strong transformation	More use of automated detection, digital surveillance and system oversight tools	Training in digital monitoring, safety oversight, compliance tools

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Job family (T3.1)	Example roles in UC6	Type of impact	Skill changes	Reskilling/upskilling needs
Drivers	Safety drivers, fallback operators, supervised vehicle staff	Transformation / partial decline	Reduced direct vehicle control; stronger need for supervision and intervention capability	Training in handover management, automation oversight, safety procedures
Data science & analytics experts	Traffic data analysts, system performance analysts	Job expansion	Increased use of predictive monitoring, optimisation and operational analytics	Skills in AI/data analytics, traffic-system analysis, data interpretation
Software & systems development	Control-system developers, supervision-platform integrators	Job creation	Development of digital control and supervision environments	Training in software integration, supervision systems, control architectures
Legal & regulatory professionals / Policy makers	Regulatory oversight and safety governance staff	Transformation	More attention to accountability, safety, liability and operational governance in remote-supervision contexts	Training in liability, operational rules, safety and compliance

UC6 points to the need for supervision-oriented reskilling, especially for workers moving from direct operational roles into remote, monitoring and decision-support environments. Priority areas include digital control tools, incident-response procedures, human–machine interaction, compliance and safety literacy, and the soft skills required in time-sensitive and safety-critical control contexts. Because the transition is expected to remain hybrid, reskilling should also support workers in managing coexistence between manual and increasingly automated operations.

3.7.4. Actors and Stakeholders

The actors and stakeholders associated with UC6 can be distinguished according to their degree and type of involvement in real-time traffic management, remote operations and system supervision, and in the broader transition toward more digitally controlled mobility systems. Primary actors are those directly involved in monitoring, supervising, coordinating or intervening in mobility operations and are therefore the groups most directly affected by changing control functions and skill requirements. Secondary and indirectly affected stakeholders include actors who shape, regulate, enable or influence these environments through governance, infrastructure, technology provision, connectivity, training or labour representation.

Primary actors in UC6 mainly include:

- traffic controllers and dispatchers;
- control-room and remote-operations personnel;
- fleet-control and route-supervision staff;
- incident-management and operational coordination personnel;
- organisations directly managing mobility control and supervision environments.

Secondary and indirectly affected stakeholder groups mainly include:

- infrastructure managers and connectivity providers;
- technology suppliers and system developers;
- regulators and governance actors shaping safety and liability conditions;
- labour unions and worker representatives;
- training providers and skills-development organisations;
- transport operators and service managers' dependent on control environments.

UC6 may create more accessible roles for some groups by shifting work away from physically demanding operation toward office-based supervision and coordination. At the same time, these roles may create barriers for workers with lower digital confidence or less familiarity with monitoring environments. Inclusion

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outcomes will therefore depend on whether access to these emerging supervisory roles is supported through targeted training and transition pathways.

3.7.5. Employment and Socio-economic Impacts

In UC6, the employment effects of CCAM are expected to arise mainly through the transfer of functions from direct operation to remote supervision and coordination, rather than through immediate elimination of work. In the short term (up to 2030), the main changes are likely to concern increasing use of digital monitoring, route control and control-room support tools. In the medium term (up to 2040), stronger demand is expected for staff able to supervise multiple operations, manage exceptions and coordinate increasingly connected transport systems. In the longer term (up to 2050), as remote assistance and system-level supervision become more established, some traditional operational roles may decline in relative importance, while cognitively demanding supervisory roles expand. The main employment effect is therefore a shift toward control-intensive and oversight-based occupational profiles.

Socio-economically, UC6 may reduce physical strain and open access to roles that were previously tied to direct vehicle operation. However, it may also increase cognitive pressure, monitoring intensity and responsibility concentration in control-room environments.

Quality-of-work outcomes will depend on workload design, clarity of responsibility, training provision and trust in automated systems. More broadly, UC6 highlights that remote operations may preserve employment in changing forms, but only if workers are supported in the transition from physical control to digital supervision and decision support.

3.7.6. Enabling Conditions, Constraints and Influencing Factors

The transition toward traffic management, remote operations and system supervision is shaped by a combination of regulatory, technical, organisational and social conditions, with particularly strong dependence on safety assurance, reliable communication and institutional clarity of responsibility. In UC6, the key question is not whether automation can exist in isolation, but whether mobility systems can be supervised effectively in real time through hybrid human–machine arrangements. This makes enabling conditions especially dependent on trustworthy control environments, resilient connectivity and clear operational accountability.

From a regulatory and policy perspective, enabling conditions include legal acceptance of remote functions, safety requirements, liability rules and operational standards for supervised automated systems. At the technical and operational level, reliable connectivity, real-time data flows, system interoperability, monitoring tools and fall-back procedures are essential. Organisational and institutional conditions concern the redesign of control functions, training for supervisory roles, cooperation across control environments and the integration of new monitoring tasks into existing structures.

Finally, social acceptance and user-related factors include worker and decision maker trust in automated systems, confidence in accountability arrangements and broader acceptance of remote oversight as a legitimate form of operation.

Overall, UC6 shows that the success of remote operations depends not only on technology but on whether supervisory systems are viewed as safe, reliable and organisationally workable.

3.7.7. Data Needs and Indicators

To support a structured analysis of workforce and system transformation in UC6, a set of indicative indicators and pertinent data sources is proposed below. Given the real-time supervisory nature of this Use Case, the evidence base should capture workforce change alongside monitoring intensity, control performance, system reliability and operator readiness.

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Table 13: Suggested indicators and pertinent data sources for the analysis of UC6

Analytical dimension / indicator	Indicative data sources	Relevance for case-study analysis
Employment structure across control, dispatch, intervention and supervision roles	Operator HR records, organisational charts, labour statistics	Helps identify which occupational groups are directly affected by remote and supervisory transition
Role and task transformation in traffic management and remote operations	Interviews, job descriptions, workforce surveys, control-room documentation	Captures how work shifts from direct operation to monitoring and oversight
Skills needs related to supervision, digital control, incident response and human–machine interaction	Interviews, competence frameworks, training-needs assessments, surveys	Supports identification of reskilling priorities for supervisory roles
Extent of remote-control or monitoring functions	Operational logs, system records, control-centre documentation	Indicates how far supervision-based operations are deployed in practice
Training participation in control-room, monitoring and incident-response functions	HR/training records, provider documentation, internal learning systems	Shows whether workers are being prepared for new supervisory environments
Safety and incident-management performance	Safety reports, incident logs, operational monitoring systems	Links workforce change to the reliability and quality of supervised operations
Quality-of-work indicators in control environments	Worker surveys, interviews, organisational assessments	Helps assess cognitive load, autonomy, monitoring intensity and stress
Inclusion indicators across supervisory and remote-operation roles	HR data, diversity monitoring, interviews, surveys	Supports assessment of whether new control roles are accessible across workforce groups
Organisational readiness for remote supervision	Planning documents, governance frameworks, interviews, operational procedures	Helps analyse whether supervisory transition is institutionally and operationally supported
Incident-response coordination capacity	Control-centre procedures, incident logs, interviews, inter-agency protocols	Connects the supervisory layer **with** public safety and emergency interfaces**.**

These indicators and data sources can support the identification of relevant empirical settings and evidence needs for T4.4 case studies, particularly where remote supervision, control-room functions and workforce adaptation can be observed in real operational contexts.

3.8. Use Case 7: Automated Transport Systems Maintenance and Lifecycle Management

3.8.1. Context and Rationale

UC7 addresses workforce transformation in maintenance, diagnostics and lifecycle support for increasingly automated, connected and digitally enabled transport systems. It includes automated and connected vehicles as part of the broader system landscape, while placing the analytical emphasis on maintenance, diagnostics, servicing and lifecycle management rather than on vehicle operation alone. This Use Case is justified by repeated interview evidence indicating that automation and electrification substantially increase the technological complexity of maintenance work. These changes generate new competence needs related to diagnostics, electronics, sensors, software, data-driven monitoring and predictive maintenance environments.

The relevance of UC7 to RESKILLING lies in the fact that maintenance and lifecycle support represent a major part of the transport value chain, yet are often less visible in discussions on automation-related labour change. By bringing these functions into focus, the Use Case helps the project identify how technical

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occupations evolve when transport systems become more software-enabled, data-rich and interconnected. UC7 is therefore important for RESKILLING because it supports the mapping of hybrid technical roles, the anticipation of reskilling needs in maintenance-intensive contexts, and the analysis of how organisations can support workers in transitioning from conventional mechanical practices toward more integrated and digitally supported technical functions.

3.8.2. Operational Scenario

UC7 addresses operational environments related to the maintenance, diagnostics, testing and lifecycle support of increasingly automated, connected and digitally enabled transport systems. This includes depots, workshops, service facilities, diagnostics environments, connected infrastructure support contexts and asset-management settings where vehicles and transport systems are inspected, serviced, repaired, updated and monitored over time. The analytical focus is therefore not on infrastructure operation in general or on real-time supervision, but on the technical support and lifecycle layer of the mobility ecosystem.

UC7 captures a transition from predominantly mechanical and routine maintenance practices toward more predictive, software-enabled and data-supported maintenance environments. The interviews evidence suggests that electrification, automation and connectivity increase the technological complexity of maintenance work, requiring stronger IT, electronics, sensor and diagnostic capabilities. At the same time, the transition is expected to be gradual, with conventional and more advanced systems coexisting, making hybrid technical competence especially important. The main workforce implications therefore arise from the growing need to combine mechanical knowledge with digital diagnostics, software awareness and integrated troubleshooting.

3.8.3. Professions, Roles and Skills across the RESKILLING Value Chain

Table 14: Professions, roles and skills across the RESKILLING value chain in UC7, linked to T3.1 job families

Job family (T3.1)	Example roles in UC7	Type of impact	Skill changes	Reskilling/upskilling needs
Maintenance & repair operators	Mechanics, depot technicians, connected-system maintenance staff	Strong transformation	Shift from mechanical routines toward diagnostics, predictive maintenance and integrated servicing	Training in diagnostics, predictive tools, electronics, sensor systems
Engineers	Maintenance engineers, lifecycle specialists, systems engineers	Job expansion	Stronger systems understanding across mechanical, electrical and digital layers	Advanced training in integrated systems, troubleshooting, lifecycle support
Software & systems development	Software support and update integration staff	Job creation / expansion	Greater importance of software-enabled maintenance, OTA updates and system compatibility	Training in software integration, update management, system interfaces
Data science & analytics experts	Predictive maintenance analysts, asset intelligence staff	Job creation	Increased reliance on monitoring data, failure prediction and lifecycle optimisation	Skills in analytics, predictive maintenance, asset data management

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Job family (T3.1)	Example roles in UC7	Type of impact	Skill changes	Reskilling/upskilling needs
Telecommunications & connectivity engineers	Connectivity diagnostics staff, communication-system support roles	Transformation	Greater relevance of networked system support and communication troubleshooting	Training in connectivity diagnostics, telecom resilience, communication systems
Manufacturing & assembly technicians	OEM-linked technical support, systems integration technicians	Transformation	Stronger links between manufacturing knowledge, servicing and update ecosystems	Training in component integration, digital servicing, automated-system configuration
Health, safety & ergonomics	Safety assurance and maintenance-risk staff	Transformation	Greater importance of safe maintenance in sensor-rich and high-voltage automated environments	Training in safety standards, maintenance risk, safe intervention procedures
Legal & regulatory professionals	Compliance and certification support roles	Transformation	More relevance of standards, maintenance traceability and regulatory compliance	Training in certification, documentation, compliance procedures

UC7 points to the need for deep technical reskilling that combines traditional maintenance expertise with electronics, software, diagnostics and predictive maintenance capabilities. Priority areas include sensor systems, digital diagnostics, remote-support tools, troubleshooting across integrated systems and the ability to interpret software-enabled maintenance environments. Because maintenance transition is often gradual and linked to asset turnover, reskilling should also support workers in managing mixed fleets and mixed systems over time, rather than assuming a sudden move to entirely new technical environments.

3.8.4. Actors and Stakeholders

The actors and stakeholders associated with UC7 can be distinguished according to their degree and type of involvement in maintenance, diagnostics and lifecycle support activities**,** and in the wider transition toward more automated and digitally enabled technical systems. Primary actors are those directly involved in servicing, diagnosing, repairing, testing or managing transport assets and systems, and are therefore the groups most directly affected by changing technical requirements. Secondary and indirectly affected stakeholders include actors who shape, regulate, supply or support lifecycle and maintenance environments through manufacturing, software provision, training, standards, labour representation or organisational planning.

Primary actors in UC7 mainly include:

- mechanics and depot maintenance staff;
- technical diagnostics and electronics personnel;
- asset managers and service-facility staff;
- infrastructure-related maintenance workers;
- organisations directly responsible for lifecycle support and maintenance operations.

Secondary and indirectly affected stakeholder groups mainly include:

- vehicle and system manufacturers;
- software providers and technology suppliers;
- infrastructure managers;
- regulators, standardisation bodies and governance actors;
- training providers and skills-development organisations;

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- labour unions and worker representatives;
- HR and organisational planning functions responsible for role redesign and redeployment.

As maintenance becomes less physically centred and more diagnostic and digitally supported, some roles may become more accessible to a wider range of workers. At the same time, access will increasingly depend on technical training and digital confidence. The key inclusion issue in UC7 is therefore how workers from conventional maintenance backgrounds can be supported in making the transition to more hybrid and technologically complex roles.

3.8.5. Employment and Socio-economic Impacts

In UC7, the employment effects of CCAM are expected to take the form of strong role upgrading and technical specialisation, rather than simple job reduction. In the short term (up to 2030), the main changes are likely to concern the increasing complexity of maintenance tasks, especially where electrification, sensors and digital systems are introduced into existing fleets and facilities. In the medium term (up to 2040), stronger demand is expected for workers able to combine mechanical knowledge with digital diagnostics, electronics and system troubleshooting. In the longer term (up to 2050), as more automated systems become common, some conventional maintenance routines may lose relative importance while specialised lifecycle-support functions expand. The main employment effect is therefore a shift toward higher-skill hybrid technical roles, rather than a shrinking of maintenance as a domain.

Socio-economically, UC7 may generate positive effects through improved technical capability, better safety and the creation of more advanced technical roles. At the same time, workers unable to access the necessary reskilling pathways may face obsolescence risks. Quality-of-work outcomes will depend on whether organisations treat automation as a complement to maintenance expertise or as a replacement logic that leaves conventional staff behind.

UC7 therefore highlights that lifecycle and diagnostics functions are a major site of workforce transformation and that their socio-economic outcomes depend on the availability of structured transition and upskilling pathways**.**

3.8.6. Enabling Conditions, Constraints and Influencing Factors

The evolution of automated transport systems maintenance is shaped by a combination of regulatory, technical, organisational and social conditions, with particularly strong dependence on standards, access to diagnostic tools and the integration of software and hardware support environments. In UC7, the key enabling question is whether maintenance systems can evolve quickly enough to support new transport technologies without excluding existing workers or creating technical bottlenecks. This makes lifecycle capability a core enabling condition for wider CCAM deployment.

From a regulatory and policy perspective, standards, certification requirements, liability conditions and maintenance protocols are central. At the technical and operational level, enabling factors include access to diagnostics, software interfaces, sensor data, predictive-maintenance tools and interoperability across systems and fleets. Organisational and institutional conditions concern training investment, role redesign, redeployment pathways, manufacturer–operator coordination and support for hybrid technical profiles.

Finally, social acceptance and user-related factors mainly concern the workforce itself: trust in new technologies, willingness to enter the profession in the first place, to retrain and acceptance of changing professional identities in maintenance settings. Overall, UC7 shows that lifecycle support is not a secondary issue but a core determinant of whether automated systems can be operated sustainably over time.

3.8.7. Data Needs and Indicators

To support a structured analysis of workforce and system transformation in UC7, a set of indicative indicators and pertinent data sources is proposed in Table 15 below. Given the technical and lifecycle-

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oriented nature of this Use Case, the evidence base should capture workforce change alongside diagnostics capability, maintenance complexity and organisational readiness.

Table 15: Suggested indicators and pertinent data sources for the analysis of UC7

Analytical dimension / indicator	Indicative data sources	Relevance for case-study analysis
Employment structure across maintenance and diagnostics roles	Depot HR records, organisational records, labour statistics	Helps identify which technical occupational groups are directly affected by automation-related maintenance change
Role and task transformation in maintenance, diagnostics and asset support functions	Interviews, job descriptions, maintenance logs, organisational documentation	Captures how maintenance work changes as systems become more digital and integrated
Skills needs related to electronics, software, diagnostics and predictive maintenance	Interviews, training-needs assessments, competence frameworks, surveys	Supports identification of key reskilling priorities for maintenance roles
Extent of digital diagnostics and predictive-maintenance use	Maintenance system records, asset-management systems, technical documentation	Indicates how far lifecycle digitalisation is taking place in practice
Training participation in hybrid technical skills	HR/training records, provider documentation, internal learning systems	Shows whether workers are being prepared for new maintenance environments
Redeployment and reassignment patterns in maintenance functions	HR records, organisational planning documents, interviews	Helps assess whether transition is being managed through internal mobility
Quality-of-work indicators in maintenance settings	Worker surveys, interviews, organisational assessments	Captures whether work becomes more skilled, more stressful or more exclusionary
Inclusion indicators across maintenance-related roles	HR data, diversity monitoring, interviews, surveys	Assesses accessibility of emerging technical roles across workforce groups
Operational reliability and downtime indicators	Maintenance logs, fleet records, asset-performance data	Links workforce capability to lifecycle performance outcomes
Organisational readiness for hybrid maintenance systems	Planning documents, governance records, interviews	Supports analysis of institutional and organisational transition capacity
Dependence on OEM / vendor support / software update ecosystems	Technical documentation, procurement records, maintenance contracts, interviews	As maintenance transition also depends on external technology providers, not only on internal capabilities.

These indicators and data sources can support the identification of relevant empirical settings and evidence needs for T4.4 case studies, particularly where maintenance complexity, diagnostics capability and workforce adaptation can be observed together.

3.9. Use Case 8: Mobility Data, Digital Platforms and Mobility Services

3.9.1. Context and Rationale

UC8 is conceived as a horizontal Use Case focusing on the data, platform and digital coordination layer that cuts across the wider mobility ecosystem. Unlike the other Use Cases, which are linked more directly to specific operational domains, UC8 captures the transversal digital environments through which operators, infrastructure, users and service providers are increasingly connected. This includes mobility data platforms, decision-support systems, service integration environments, analytics tools and software-mediated coordination systems. The Use Case is justified by the interview findings, which repeatedly emphasise the growing role of data-driven mobility services and suggest that some of the most significant employment shifts may occur in digital coordination functions rather than in direct vehicle operation.

The relevance of UC8 to RESKILLING lies in its ability to capture the cross-cutting digital transformation affecting several other parts of the transport value chain. It supports the project's objectives by making visible the emerging roles, skills and reskilling needs associated with data governance, analytics, interoperability, digital service management and platform-based coordination. UC8 is particularly important because it helps explain how automation-related workforce change is increasingly mediated through digital ecosystems that connect services, infrastructure and operations. In this sense, it complements the other Use Cases by providing a horizontal analytical lens through which RESKILLING can better understand the systemic, software-mediated dimensions of future employment and skills transformation in transport and mobility.

3.9.2. Operational Scenario

UC8, conceived as a horizontal Use Case, focusing on the data, platform and digital coordination layer that cuts across the wider mobility ecosystem. Unlike the other Use Cases, which are primarily linked to specific operational domains, UC8 captures the transversal digital environments through which mobility services, infrastructure, operators and users are increasingly connected. This includes mobility data platforms, integration environments, decision-support systems, analytics tools, digital service coordination systems and other software-mediated environments that support optimisation, interoperability and system-level coordination.

In more detail, UC8 captures a transition from fragmented and often manual information handling toward data-intensive, platform-mediated and interoperable mobility ecosystems. The main workforce implications do not arise from direct operation of vehicles or services, but from the increasing importance of data governance, digital orchestration, analytics, interoperability and coordination across multiple actors and functions. For this reason, UC8 should be understood as a cross-cutting layer that supports and connects several of the other Use Cases, rather than as a single operational domain in its own right.

3.9.3. Professions, Roles and Skills across the RESKILLING Value Chain

Table 16: Professions, roles and skills across the RESKILLING value chain in UC8, linked to T3.1 job families

Job family (T3.1)	Example roles in UC8	Type of impact	Skill changes	Reskilling/upskilling needs
Data science & analytics experts	Mobility data analysts, optimisation analysts, forecasting staff	Job expansion / creation	Increased demand for analytics, predictive modelling and data interpretation across services	Advanced skills in AI/data analytics, modelling, data governance
Mobility and services platform managers	Platform administrators, MaaS/service integration managers	Strong transformation / expansion	Shift toward real-time coordination, service orchestration and digital governance	Training in platform management, interoperability, analytics, digital coordination
Software & systems development	Platform developers, interoperability architects, system integrators	Job creation	Development and maintenance of digital mobility backbones, APIs and service-integration environments	Training in software development, interoperability, system integration
Cybersecurity & IT protection	Cybersecurity specialists, IT protection staff	Job expansion	Greater need to secure digital mobility platforms, data flows and connected service environments	Training in cybersecurity, privacy, digital risk management

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Job family (T3.1)	Example roles in UC8	Type of impact	Skill changes	Reskilling/upskilling needs
Legal & regulatory professionals	Data governance, compliance and digital-regulation staff	Transformation	Stronger importance of privacy, governance, accountability and legal compliance in platform ecosystems	Training in data regulation, compliance, digital governance
Policy makers	Public-sector digital mobility governance staff	Transformation	Increased need to manage data-sharing, interoperability and platform regulation	Training in governance, digital policy, interoperability frameworks
HMI, UX & Human Factors experts	User-interface specialists, accessibility and service-design staff	Job expansion	Greater need for usable and inclusive digital service environments	Training in UX, accessibility, human-centred design
Trainers / Educational programme developers	Digital mobility trainers, curriculum developers	Expansion	Need to support capability-building for data, platform and AI-enabled roles	Training-of-trainers, curriculum development, modular digital-skills design

UC8 points to the need for horizontal digital reskilling that cuts across several parts of the transport value chain. Priority areas include data literacy, analytics, platform use, interoperability, cybersecurity awareness, digital service management and cross-sector collaboration. Because this Use Case is transversal, reskilling should not be limited to specialist data roles alone, but should also support workers in operational, organisational and service functions who increasingly interact with data-intensive systems as part of their daily work.

3.9.4. Actors and Stakeholders

The actors and stakeholders associated with UC8 can be distinguished according to their degree and type of involvement in data management, digital platforms and service-integration environments, and in the broader transition toward more software-mediated mobility systems. Primary actors are those directly involved in the collection, processing, coordination, governance or operational use of mobility data and digital platforms, and are therefore the groups most directly affected by changing digital work requirements. Secondary and indirectly affected stakeholders include actors who shape, regulate, supply, rely on or interact with these digital systems through governance, service provision, infrastructure, telecom, training or standards development.

Primary actors in UC8 mainly include:

- data analysts and digital coordination staff;
- platform administrators and platform managers;
- service-integration personnel;
- IT and digital support staff directly operating mobility data environments;
- organisations responsible for digital mobility platforms and data-driven service coordination.

Secondary and indirectly affected stakeholder groups mainly include:

- transport operators and service providers using digital coordination systems;
- infrastructure managers and telecom/connectivity providers;
- public authorities and governance bodies responsible for data-sharing and digital standards;
- technology suppliers and software developers;
- training providers and skills-development organisations;
- labour unions and worker representatives;
- user-facing and civil-society actors concerned with data governance, transparency and accessibility.

UC8 may create opportunities in knowledge-intensive and less physically demanding work environments, but it may also reinforce inequalities if access depends heavily on prior education, digital confidence or specialist skills. Inclusion outcomes will therefore depend on whether digital training and progression pathways are made accessible across a wider range of occupational backgrounds, rather than concentrated only among already highly qualified workers.

3.9.5. Employment and Socio-economic Impacts

In UC8, the employment effects of automation and digitalisation are expected to arise through the expansion and strategic upgrading of digital, analytical and coordination roles across the mobility ecosystem. In the short term (up to 2030), the main impacts are likely to concern the growing use of digital tools, data platforms and AI-supported coordination functions within existing organisations. In the medium term (up to 2040), stronger demand is expected for staff able to manage data governance, analytics, interoperability and digital service integration. In the longer term (up to 2050), as digital coordination becomes more central to mobility-system organisation, some routine administrative and low-analytical functions may lose relative importance while more specialised data and platform roles expand. The main employment effect is therefore a shift toward higher-value digital and analytical work, rather than a reduction in work volume per se.

Socio-economically, UC8 may create positive effects through higher-value employment, better system coordination and improved capacity for evidence-based mobility management. At the same time, it may also increase skill polarisation if opportunities concentrate around already well-qualified workers or specialised professions. Quality-of-work outcomes will depend on whether digital transition is accompanied by inclusive skill development and whether platform-mediated coordination supports rather than fragments organisational work.

UC8 therefore highlights that some of the most significant labour-market effects of CCAM may occur in the digital coordination layer, not only in direct operational roles.

3.9.6. Enabling Conditions, Constraints and Influencing Factors

The development of mobility data platforms and digital coordination environments is shaped by a combination of regulatory, technical, organisational and social conditions, with especially strong dependence on data governance, interoperability and organisational willingness to share information across boundaries. In UC8, the key enabling issue is not simply whether digital tools exist, but whether mobility systems can develop trusted, interoperable and governable digital environments that support coordination across multiple actors. This makes UC8 strongly dependent on institutional cooperation and standards, as well as on technical capability.

From a regulatory and policy perspective, data-sharing rules, privacy requirements, interoperability standards, cybersecurity frameworks and digital governance arrangements are central. At the technical and operational level, enabling factors include platform compatibility, data quality, system integration, analytics capability and reliable digital infrastructure. Organisational and institutional conditions concern the ability of actors to coordinate across departments and sectors, share resources and integrate digital functions into wider mobility operations.

Finally, social acceptance and user-related factors include trust in data handling, transparency of digital systems and confidence that platform-mediated coordination improves rather than obscures service accountability.

Overall, UC8 demonstrates that digital mobility systems are enabled or constrained by the combined maturity of governance, technology and organisational cooperation.

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3.9.7. Data Needs and Indicators

To support a structured analysis of workforce and system transformation in UC8, a set of indicative indicators and pertinent data sources is proposed in Table 17 below. Because this is a horizontal Use Case, the evidence base should capture workforce change alongside digital governance, interoperability, platform coordination and data-intensive service integration.

Table 17: Suggested indicators and pertinent data sources for the analysis of UC8

Analytical dimension / indicator	Indicative data sources	Relevance for case-study analysis
Employment structure across data, platform and digital coordination roles	Organisational HR records, labour statistics, digital service-provider records	Helps identify which workforce groups are directly affected by platform and data expansion
Role and task transformation in data handling, digital coordination and service-integration functions	Interviews, job descriptions, workforce surveys, organisational documentation	Captures how routine digital work shifts toward analytical and governance-oriented roles
Skills needs related to analytics, interoperability, governance and digital service management	Interviews, competence frameworks, training-needs assessments, surveys	Supports identification of key digital reskilling priorities
Extent of platform use and digital service integration	Platform documentation, organisational system records, ICT architecture documents	Indicates how central digital coordination has become in practice
Data-sharing and governance maturity	Policy documents, governance frameworks, data-sharing agreements, interviews	Helps assess whether enabling digital governance conditions are in place
Training participation in digital and data-related topics	HR/training records, provider documentation, internal learning systems	Shows whether workforce capability is developing in parallel with platform deployment
Inclusion indicators across digital roles	HR data, diversity monitoring, surveys, interviews	Supports assessment of accessibility of emerging digital roles
Quality-of-work indicators in data-intensive environments	Worker surveys, interviews, organisational assessments	Helps capture whether digital transition improves or polarises work conditions
Interoperability and coordination performance indicators	Platform performance data, integration reports, operational records	Links workforce capability to digital coordination outcomes
Organisational readiness for data-driven service management	Planning documents, digital strategies, governance records, interviews	Supports analysis of institutional maturity and barriers to horizontal digital transition

These indicators and data sources can support the identification of relevant empirical settings and evidence needs for T4.4 case studies, particularly where digital coordination environments, data governance and workforce transition can be analysed as cross-cutting dimensions of CCAM deployment.

4. Conclusions

This deliverable has defined the RESKILLING Use Cases as an analytical framework through which the project examines the employment, skills and socio-economic implications of CCAM across the transport and mobility ecosystem. Building on the initial Use Cases identified during the proposal phase, the final set of Use Cases was revised and expanded on the basis of evidence generated within the project so far, including literature and desk research, the mapping of professions across the CCAM value chain, and stakeholder consultation activities.

The final Use Case structure provides a more robust and comprehensive representation of the different service, operational, infrastructure, maintenance and digital dimensions through which CCAM-related workforce transformation is expected to unfold. In this respect, the Use Cases function as structured analytical contexts that allow the project to examine common patterns, identify differentiated impacts across workforce groups, and better understand the changing requirements for reskilling, upskilling and inclusive workforce transition.

At the same time, the deliverable indicates that, while the Use Cases are distinguished by their main analytical focus, they are not fully isolated from one another. A certain degree of overlap is both expected and methodologically justified, reflecting the interconnected nature CCAM across multiple system layers. Taken together, the Use Cases therefore provide a coherent but flexible framework that captures both the diversity and the interdependence of change across the CCAM ecosystem.

The RESKILLING Use Cases will serve as a common reference point for the next phases of the project, supporting the implementation of the Case Studies under Task 4.4, the development of training-related outputs in WP4, and the impact assessment, policy recommendations and roadmap activities to be carried out in WP5. As such, they form a key building block of the overall RESKILLING methodology and of the project’s contribution to supporting a fair and forward-looking socio-economic transition to CCAM.

At the same time, the present Use Case framework may be further strengthened through subsequent project activities. In particular, future work could more explicitly integrate broader industrial transformation perspectives and related transition challenges across the CCAM ecosystem. This could include further elaboration of the technological transformation pathways associated with workforce change and geographical contexts within the Case Studies, supporting a more operational understanding of how specific technological configurations, enabling systems and deployment conditions may generate differentiated skill needs and labour-market effects over time.

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ANNEX I: RESKILLING Use Cases description - Proposed Template

Annex I provides the common analytical template used to structure the full description of the RESKILLING Use Cases presented in Section 3. Beyond its role in this deliverable, the template is also intended to serve as a practical reference for T4.4 case-study leads, supporting a more consistent and comparable approach to data collection, analysis and validation across case-study settings.

Use Case ID and Title: UC-X: Short descriptive title

1. **Context and Rationale**
   - CCAM domain (e.g. urban passenger transport, logistics)
   - Relevance to RESKILLING objectives (e.g. reference to RESKILLING Key Objectives and/or KIPs)
2. **Operational Scenario**
   - Description of the CCAM service/system
   - Level of automation
   - Spatial context (urban, peri-urban, corridor, etc.)
3. **Professions, Roles and Skills across the RESKILLING Value Chain**
   - Existing professions and roles involved
   - Professions and skills at risk of transformation or displacement
   - Emerging and skill requirements
   - Reskilling, upskilling and transition needs
4. **Actors and Stakeholders**
   - Primary actors (operators, workers, users)
   - Secondary / indirectly involved or affected groups (e.g., institutional actors and governance bodies shaping the transition)
   - Gender and age considerations
5. **Employment and Socio-economic Impacts**
   - Expected short-, medium-, long-term effects of CCAM
   - Job creation opportunities, transformation, displacement or job loss risks
   - Quality of work considerations
6. **Enabling Conditions, Constraints and Influencing Factors**

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- Regulatory and policy conditions (e.g., legal compliance, policy direction, standards, labour-related rules, and sectoral governance.
- Technical and operational conditions (e.g., technology readiness, deployment, interoperability, and operational feasibility)
- Organisational and institutional conditions (e.g., company structures, internal processes, cooperation between actors)
- Social acceptance and user-related factors (e.g., worker acceptance, trust, perceptions, and user readiness)

7. Data Needs and Indicators

- Key indicators (employment, skills, safety, costs, etc.)
- Sources of pertinent data
- Relevance for T4.4 Case Studies