

National e-Logistics Platforms and Digitalization of Transport Corridors in Selected CAREC Countries

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CONTENTS

Tables and Figures	iv
Acknowledgments	vi
Abbreviations	vii
Executive Summary	ix
I. INTRODUCTION AND REPORT STRUCTURE	1
II. ANALYSIS OF TLS DIGITALIZATION PROGRAMS IN THE SELECTED CAREC COUNTRIES	3
A. Azerbaijan	3
B. Kazakhstan	4
C. Kyrgyz Republic	6
D. Turkmenistan	7
E. Uzbekistan	8
F. Digitalization of Trade and Transport Corridors at the CAREC Regional and Sectoral Levels	9
III. REVIEW OF INTERNATIONAL PRACTICES IN TLS DIGITALIZATION	18
A. European Union	18
B. Eastern Partnership	21
C. Eurasian Economic Union	22
D. UNESCAP Region	23
E. UNECE and UN/CEFACT Activities	27
IV. DEVELOPMENT OF RESEARCH METHODOLOGY	31
V. EVALUATION OF THE LEVEL OF TLS DIGITALIZATION AND RECOMMENDATIONS FOR THE IMPLEMENTATION OF NATIONAL E-LOGISTICS PLATFORM PROJECTS	36
A. Azerbaijan	36
B. Kazakhstan	42
C. Kyrgyz Republic	49
D. Turkmenistan	55
E. Uzbekistan	60
F. PPP Options for the Implementation and Operation of NELS Platforms	66
VI. MAIN PRINCIPLES AND TECHNOLOGICAL APPROACHES FOR DIGITALIZATION OF NATIONAL SEGMENTS OF INTERNATIONAL TRANSPORT CORRIDORS	69
VII. RECOMMENDATIONS FOR THE DIGITALIZATION OF NATIONAL SEGMENTS OF THE CORE CAREC CORRIDORS	78
A. Azerbaijan	79
B. Kazakhstan	83
C. Kyrgyz Republic	88
D. Turkmenistan	93
E. Uzbekistan	98
ANNEXES	
I. List of Stakeholder Representatives Involved in the Study	107
II. Assessment of the Implementation of Standardized Electronic TLS Documents	115

TABLES AND FIGURES

TABLES

1	Digital Hub vs NELS Platform Functionality	15
2	Logistics Information Systems in the Leading Asian Countries	25
3	Alignment of Project Objectives and Methodologies	32
4	List of Basic Indicators for the Proposed Assessment Methodology	33
5	Evaluation Results for the Level of TLS Digitalization in Azerbaijan	37
6	Main Participants in the DLP Platform Project in Azerbaijan	41
7	Evaluation Results for the Level of TLS Digitalization in Kazakhstan	43
8	Main Participants in the NELS Platform Project in Kazakhstan	48
9	Evaluation Results for the Level of TLS Digitalization in the Kyrgyz Republic	50
10	Main Participants in the NELS Platform Project in the Kyrgyz Republic	54
11	Evaluation Results for the Level of TLS Digitalization in Turkmenistan	56
12	Main Participants in the NELS Platform Project in Turkmenistan	59
13	Evaluation Results for the Level of TLS Digitalization in Uzbekistan	61
14	Main Participants in the E-logistika Platform Project in Uzbekistan	65
15	Main Features of NELS Business Models	66
16	PPP Framework Analysis	67
17	Results of the OMM Model Analysis of the Main Components of NELS Projects	68
18	Digital Passport for the National Segment of the Middle Corridor in Azerbaijan	81
19	Digital Passport for the National Segment of the Middle Corridor in Kazakhstan	85
20	Digital Passport for the National Segment of CAREC Corridor 2 in the Kyrgyz Republic	90
21	Digital Passport for the National Segment of the North–South Corridor in Turkmenistan	95
22	Digital Passport for the National Segment of the Middle Corridor in Uzbekistan	100

FIGURES

1	ADB Classification of CAREC Corridors	10
2	Stages in the Development of the National Single Window in Azerbaijan	11
3	Interaction of Functional Modules in the FENIX Network	20
4	Functional Architecture of the NELS Integration Platform	22
5	Overall NELS Architecture Recommended by UNESCAP	24
6	Functional Architecture of LOGINK Platform	26
7	One-Stop Shop Service Approach by LOGINK	26
8	Information Exchange among uLogisticsHub Participants in Korea	27
9	Stages in the Evolution of the National Single Window, as Defined by UNECE	28
10	Digitalization Scheme Proposed for the Trans-Caspian (Middle) Corridor	30
11	The Study Framework	31
12	Functionality of the Digital Logistics Platform in Azerbaijan’s NSW	38
13	Governance Model for DLP Project Implementation in Azerbaijan	40

14	Governance Model for NELS Platform Project Implementation in Kazakhstan	47
15	Governance Model for NELS Platform Project Implementation in Kyrgyz Republic	53
16	Governance Model for NELS Platform Project Implementation in Turkmenistan	58
17	Governance Model for E-logistika Project Implementation in Uzbekistan	64
18	Multilayer Architecture for Information Exchange among DTC Participants	69
19	Information Exchange among TLS Participants at the National and Local Levels	71
20	Information Interaction in the Data Pipeline	73
21	Legal Scheme for E-Document Recognition Using the TTP Mechanism	74
22	Digitalization Scheme for the EU–China Transport Corridor	75
23	Common Information Exchange in the CATS/ICE Pilot	77
24	National Segment of the TITR Corridor in Azerbaijan	80
25	Integration and Data Exchange Scheme for the National DTC Segment in Azerbaijan	82
26	National Segment of the TITR Corridor in Kazakhstan	84
27	Integration and Data Exchange Scheme for the National DTC Segment in Kazakhstan	87
28	National Segment of CAREC Corridor 2 in the Kyrgyz Republic	88
29	Integration and Data Exchange Scheme for the National DTC Segment in the Kyrgyz Republic	92
30	National Segment of the INSTC Corridor in Turkmenistan	94
31	Integration and Data Exchange Scheme for the National DTC Segment in Turkmenistan	97
32	National Segment of the CASCA+ Corridor in Uzbekistan	99
33	Integration and Data Exchange Scheme for the National DTC Segment in Uzbekistan	102

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National e-Logistics Platforms and Digitalization of Transport Corridors in CAREC Countries is the consolidated report of a study commissioned by the Asian Development Bank (ADB) and the CAREC Institute. The study assesses the level of digitalization in the transport and logistics sectors (TLS) of the participating CAREC countries and develops country-specific approaches to establishing national e-logistics platforms and enabling their cross-border and cross-continental connectivity. Its ultimate objective is to support the effective digitalization of national segments of the CAREC transport corridors.

The study focuses on five CAREC countries participating in the Middle Corridor: Azerbaijan, Kazakhstan, the Kyrgyz Republic, Turkmenistan, and Uzbekistan. Particular attention is given to the building blocks of TLS digital infrastructure and to technological solutions that can be applied flexibly to the digitalization of national transport-corridor segments. To promote connectivity and interoperability among these segments, the report proposes a set of core principles to guide the digitalization of transport corridors.

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ABBREVIATIONS

ADB	Asian Development Bank
ADY	Azerbaijan Demir Yolu (Azerbaijan Railways Company)
ASCO	Azerbaijan Caspian Shipping Company
AZCON	Azerbaijan Communication Holding
BCP	Border Crossing Point
CAREC	Central Asia Regional Economic Cooperation
CBM	Coordinated Border Management
CCC	CAREC Customs Coordinating Committee
CPMM	Corridor Performance Measurement and Monitoring
CKU	China–Kyrgyzstan–Uzbekistan transport corridor
CTS	CAREC Transport Strategy
DTC	Digital Transport Corridor
EAEU	Eurasian Economic Union
EBRD	European Bank of Reconstruction and Development
EDI	Electronic Data Interchange
e–Air Waybill	International electronic consignment note for aviation
e–CMR	International electronic consignment note for road transport
e–SMGS	International electronic consignment note for railway transport
EU	European Union
eFTI	electronic freight transport information
EaP	Eastern Partnership
G2G	Government–to–Government interaction
G2B	Government–to–Business interaction
B2B	Business–to–Business interaction
INSTC	International North–South Transport Corridor
ITF	International Transport Forum
ITS	Intelligent Transport Systems
GR	Georgian Rail
KTZ	Kazakhstan Temir Zholy
KTZh	Kyrgyz Temir Zholu
MMT RDM	Multimodal Transport Reference Data Model, UN/CEFACT
NSW	National Single Window
NELS	National e–Logistics System
NCTLP	National Digital Transport and Logistics Platform in Russia
OECD	Organisation for Economic Co–operation and Development
OMM	Operations, Maintenance, and Management Model for PPPs
OSJD	Organisation for Cooperation Between Railways
OTS	Organisation of Turkic States
PKI	Public Key Infrastructure

PPP	public–private partnership
PRC	People’s Republic of China
SPECA	United Nations Special Programme for the Economies of Central Asia
SLA	Service Level Agreement
TLS	Transport and Logistics Sector
TITR	Trans-Caspian International Transport Route
TSCC	CAREC Transport Sector Coordinating Committee
UNECE	United Nations Economic Commission for Europe
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNTTC	United Nations Transport and Trade Connectivity
UTY	Uzbekistan Temir Yollari (Uzbekistan Railways Joint-Stock Company)
WB	World Bank

EXECUTIVE SUMMARY

TA6694 REG: National e-Logistics Platforms and Digitalization of Transport Corridors in CAREC Countries is a technical assistance project commissioned by ADB and the CAREC Institute. During the project, the consultant team analyzed national programs for the digitalization of the transport and logistics sector (TLS) in the selected CAREC countries—Azerbaijan, Kazakhstan, the Kyrgyz Republic, Turkmenistan, and Uzbekistan—and reviewed activities related to the digitalization of trade and transport corridors in the CAREC region. In accordance with the project’s main objectives, the level of TLS digitalization in the participating CAREC countries was evaluated, and major needs and opportunities were identified for developing a core solution for interoperable national e-logistics platforms based on modern digital technologies and international best practices. As a result, recommendations were developed for the implementation of national e-logistics platform projects in the selected countries, including governance and operational models incorporating public–private partnership options. In addition, the current state of digitalization of the main CAREC transport corridors was analyzed. Core principles and technological approaches for digitalizing the national segments of international transport corridors in the CAREC countries were developed, together with recommendations for their connectivity and integration.

The following research methodologies were used: a methodology for assessing the level of TLS digitalization; a methodology for analyzing business requirements for NELS implementation; a methodology for developing roadmaps for NELS projects; and a methodology for developing digital passports for national segments of transport corridors.

Based on consultations with national experts and key project stakeholders, the following national segments of transport corridors in the respective countries were selected for the development of recommendations on digitalization activities:

- Azerbaijan—the national segment of the Middle Corridor between Alyat Port and the Boyuk/Kesik BCP on the border with Georgia;
- Kazakhstan—the national segment of the Middle Corridor between the Dostyk BCP on the border with the PRC and Aktau Port;
- Turkmenistan—the national segment of the North–South Corridor between BCPs on the borders with Kazakhstan and Iran;
- Kyrgyz Republic—the national segment of CAREC Corridor 2 between the Irkeshtam BCP on the border with the PRC and the Kara-Suu BCP on the border with Uzbekistan;
- Uzbekistan—the national segment of the CASCA+ Corridor between BCPs on the borders with the Kyrgyz Republic, Kazakhstan, and Turkmenistan.

The following main conclusions were drawn from the project activities:

- A. The evaluation of TLS digitalization levels and the detailed analysis of corresponding programs in the CAREC countries participating in the project demonstrated that these countries have significant needs and practical opportunities to consolidate fragmented digitalization efforts through the development and implementation of national e-logistics platforms. These platforms could become the missing components of their national trade single-window systems. National TLS platforms can integrate the technological systems of different transport modes and digitalize and orchestrate multimodal business processes for transit freight transport by using standardized formats for international e-documents and enabling their cross-border exchange.

- B. The recommended building blocks for TLS digital infrastructure and technological solutions can be used flexibly to digitalize national segments of transport corridors in the CAREC countries. To ensure the connectivity and interoperability of these national segments, their development should be based on the proposed core principles for DTC formation. If CAREC countries consolidate and coordinate their efforts to develop unified core solutions for interoperable NELS platforms and data pipelines for cross-border information exchange along the main transport corridors, they can ensure the corridors' effective digitalization over the long term as the CAREC Transport and Digital Strategies are implemented.

INTRODUCTION AND REPORT STRUCTURE

In accordance with the project ToR the following topics were covered by the Project Team in this report. The analysis of current TLS digitalization programs in the selected CAREC countries was conducted with the detailed and comprehensive literature review related to the digitalization of trade and transport corridors. The research methodologies were described based on the recognized approaches tested in the previous EU, EaP and UNECE-UN/CEFACT TLS digitalization projects. The evaluation of TLS digitalization level and assessment of their readiness to the digitalization of national segments of transport corridors in CAREC countries were undertaken with recommendations for the implementation of national e-Logistics platform projects. The review of the best international practices was conducted for 10 (ten) year period of the most active TLS digitalization activities. The common approaches were identified and based on the development of building blocks of digital infrastructures for TLS and transport corridors digitalization. The multilayer architecture and main principles for digitalization of transport corridors (DTC) were developed based on analysis of the requirements for the functional and infrastructure elements of DTCs. The information interaction of TLS participants at the DTC national and local levels was considered and technological approaches were proposed for digitalization of the national segments of international transport corridors in the CAREC countries involved. And finally, the recommendations for the digitalization of these corridors national segments were made, including digital infrastructure components and activities proposed. The above scope of work was practically implemented by the Project Team starting with the state-of-art analysis of TLS and corridor digitalization policies and activities in the CAREC countries at the regional and national levels followed by the review of the best international practices and development of the research methodology.

1. In the course of implementation of the Project Work Packages the Team came to the conclusion that TLS assessment results with conclusions and recommendations could be consolidated and presented more effectively in the country-focused chapters of the current report. In this respect the rest of the report is structured as follows. Chapter 2 includes the results of detailed analysis of the current TLS digitalization programs in every CAREC country involved and the comprehensive literature review related to the digitalization of trade and transport corridors in these countries. Such combination helped us to map the specific digitalization activities in different transport modalities and analyze their alignment with the national TLS digitalization strategies and applicability for transport corridors development activities.

2. Chapter 3 contains the review of the best TLS digitalization practices in the countries of Eurasian continent, in particularly: EU region, Eastern Partnership (EaP) region, Eurasian Economic Union region, UN ESCAP region, including PRC, Japan, Korea as well as UNECE-UN/CEFACT activities. Historically, this review covered the period of the most active TLS digitalization programs and projects development since 2015 till 2025. Both national and regional digitalization activities were considered with the focus on the common digitalization approaches, interoperable solutions and international standards application.

3. Chapter 4 outlines the project methodologies proposed including: assessment of TLS digitalization level; business requirements analysis for NELS implementation; road map developments for the NELS project implementation in the particular countries; development of digital passports for transport corridors national segments.

4. Chapter 5 contains the results of TLS digitalization level evaluation and analysis in the CAREC countries involved with recommendations for the implementation of National e-Logistics platform projects developed on this basis.

5. Chapters 6 and 7 are devoted respectively to the analysis of main principles and technological approaches for digitalization of national segments of international transport corridors as well as recommendations developed for the digitalization of the core CAREC transport corridors, in particular: their national segments, digital infrastructure components and activities in the countries involved.

In the final sections of the report possible areas of technical assistance were considered with the focus on the centralized development of the core building blocks of digital infrastructure for TLS and transport corridors. The capacity building opportunities and models were proposed based on the specialized educational program developed by UNESCAP experts for digitalization of railway and multimodal transportation.

ANALYSIS OF TLS DIGITALIZATION PROGRAMS IN THE SELECTED CAREC COUNTRIES



6. In the original project concept developed by the CAREC institute the following six countries were considered to take part in the TLS digitalization study – Azerbaijan, Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan. But later it was revealed that Tajikistan is more focused on Intellectual Transport Systems for public transport in its digitalization activities. So finally, just five countries were selected for the study.

In 2022–2023 UNESCAP undertook the study on the digitalization of multimodal cargo transportation in the North and Central Asia with the following countries involved: Azerbaijan, Kazakhstan, Kyrgyz Republic, Russian Federation, Tajikistan, Turkmenistan and Uzbekistan. The initial stage of this study focused on reviewing relevant national policies, digitalization strategies and programs in the above region which includes the target countries of our project. This inventory was compiled of national programs and strategic concepts used for digital transformation of the national TLS and multimodal cargo transportation in the region.

In this respect the project team decided to use results of UNESCAP inventory as the basis for our analysis and updated its results with the programs recently adopted in our target countries in 2024–2025 with the additional information on the institutional structures which are entitled to govern these programs.

A. Azerbaijan

The following strategies and programs related to the TLS Digitalization were adopted and implemented in Azerbaijan in 2014–2024:

7. **National Strategy for the Development of the Information Society in the Republic of Azerbaijan for 2014–2020:** Digital transformation was considered to be a priority and should become an important component of the national policy to diversify the economy. This strategy envisaged the growth of digitalization level of the national economy and planned to strengthen cybersecurity. Although this strategy did not define the approaches to TLS digitalization, many aspects of ICT development were contributing to the digital transformation of transport and logistics in the country.

8. **Strategic Roadmap for Development of Telecommunications and Information Technologies in the Azerbaijan Republic,** it was adopted in 2016 to increase the productivity and efficiency of public and private sector by the deployment of modern digital tools, and provision of electronic services. In particular, the improvement of information systems of state organizations, should indirectly support the TLS digitalization as well as enable the digitalization of government processes.

9. **Strategic Roadmap for the Development of Logistics and Trade in the Republic of Azerbaijan:** This Roadmap defined the Azerbaijan policy directions for economic development in logistics and trade for the periods of 2020, 2025, and post 2025. It specified the corresponding action plan, strategic priorities and objectives to be achieved in the period by 2020. To achieve these objectives, Azerbaijan should develop and deploy advanced TLS digital infrastructures in order to collect and integrate data from various transport modalities and transport corridors and store it in a central database. Through a national information logistics system built upon this database, Azerbaijan planned to process and analyze this data in order to manage TLS operations effectively.

10. **Alat Free Economic Zone:** it was established by the decree signed by the President of the Republic of Azerbaijan on May 22, 2020 as the new trade and logistics hub on the Caspian Sea coast. The Baku International

Sea Trade Port was included in the territory of this Zone with the favorable tax and customs regimes to the resident companies. As for the digitalization of the Alat Free Economic Zone, it should be focused in the first instance on the digital transformation of Baku International Sea Trade Port operations to provide the modern container management facilities connecting Asia and Europe;

11. **National Strategy of Socio-Economic Development of Azerbaijan by 2026:** The main tasks on TLS digitalization of the country were laid down in these documents adopted in 2022 and envisaged the development of a national strategy, taking into account the Azerbaijan important role in the regional transport corridors, as well as the extensive use of digital technologies to improve transit transportation and logistics, in particular:

- creation of a system ensuring integration of international transportation and logistics participants on a national digital platform;
- joining provisions and pilot's implementation on e-CMR and e-SMGS protocols;
- Cargo tracking and tracing along the national segments of transport corridors;
- Integration of transportation operations into a national digital platform for 24/7 prompt implementation;

12. **Presidential Decree on international transport passing through the territory of the country and increasing the transit potential of corridors and transportation of transit cargoes for 2024–2026:** This decree was adopted in November 2023 and endorsed the plan of practical actions for the development and digitalization of international transport corridors crossing the country, as well as the creation of an electronic portal and a national digital TLS platform.

13. **Concept of Digital Development in the Republic of Azerbaijan** has been approved by the Presidential Decree in January 2025. The Concept is aimed at improving public administration, accelerating economic development by the intensive usage of digital technologies. It is envisaged to develop business processes using digital technologies, improve ICT infrastructure, strengthen business and startup ecosystems in the country.

14. To govern all the above programs the Ministry of Digital Development and Transport was created in Azerbaijan in 2022. This Ministry is acting as the main governmental body to implement state policy and regulations in the field of TLS development and digitalization with the number of subordinate agencies: Azerbaijan Railways, Azerbaijan Land Transport Agency, State Civil Aviation Agency, State Maritime and Port Agency. To improve operations, enhance competitiveness, and strengthen financial sustainability of all these agencies plus Azerbaijan Airlines and Azerpost are managed by AZCON (Azerbaijan Transport and Communications) Holding which was created in 2024. The Ministry is also a responsible party for digitalization of freight information exchange in multimodal transportation via national segments of transport corridors and operates the Coordinating Council of the Republic of Azerbaijan on Transit Freight. This body is to facilitate multimodal transportation by establishing common principles, optimizing tariffs, simplifying transit procedures, ensuring transparency and promoting efficient transit systems in cooperation with relevant governmental agencies and neighboring countries.

B. Kazakhstan

The following strategies and programs on the TLS Digitalization were adopted and implemented in Kazakhstan in 2012–2024:

15. **The Strategy Kazakhstan-2050:** Adopted in 2012 and had got dedicated chapters focused on the development of the transport and communication infrastructure to be created in Kazakhstan in order to position the country as the core transit hub between Asia, Europe and the Middle East. This strategy also called for the development of joint digitalization projects with neighboring countries.

16. **State program “Digital Kazakhstan” for 2018–2022:** it aimed to transform Kazakhstan's economy through digital tech, focusing on building a digital ecosystem, boosting economic growth, and enhancing public services, with key areas including e-government, digital skills, smart infrastructure, and innovations

in transport and logistics. The main effect should be obtained by the transition to electronic document management, and through the deployment of intelligent transport systems, which would facilitate the transit cargo transportation in the country by providing high-quality management of the national and international traffic in Kazakhstan.

17. Concept of the Digital Transport Corridors (DTC) Ecosystem in the EAEU: In 2019–2020 Kazakhstan Ministry of Industry and Infrastructural Development participated in the strategic initiative for the development of DTC ecosystem in the EAEU countries based on the creation of interoperable National e-Logistics platforms.

18. State program of infrastructural development “Nurly Zhol” for 2020–2025: The program main objective was to stimulate economic growth of the country through the development of the modern TLS infrastructure for the provision of transit cargo transportation services. One of the principal areas of this initiative practical implementation should be the development of modern digital solutions in the field of TLS infrastructures. That will help deploy intelligent transport systems and create a unified information space for effective data exchange between different transport modalities as well as customs and supervisory state bodies in order to increase the national TLS efficiency.

19. National Development Plan of the Republic of Kazakhstan until 2025: The government unveiled this plan in 2021 which complements the previous strategic documents and programs. The core nationwide priorities were considered to become “Building a Diversified and Innovative Economy,” which related to the deployment of digital technologies and solutions to the public and private sector, including transport and logistics.

20. Plan of the Nation – 100 Steps to Implement Five Institutional Reforms – included the third principal reform titled “Industrialization and Economic Growth” with the following steps for TLS modernization and digitalization: 65: Integration of Kazakhstan into international transport connectivity actions and the project to create a multimodal transport corridor – “Eurasian Transcontinental Route”. 66: Creation of an international aviation hub and improvements of the state regulations on air transportation to facilitate air cargo transit through Kazakhstan.

21. Concept for the development of Kazakhstan Transport and Logistics Potential by 2030: The most comprehensive and ambitious document adopted by the Kazakhstan Government in December 2022 with the specialized chapters dedicated to digitalization and about 12 project actions planned for the deployment of specialized digital platforms for transport modalities as well as at the national level, in particular:

- creation of a digital multimodal corridor;
- development and implementation of the information and analytical system “Digital Corridors”;
- development and implementation of information systems to improve the connectivity between different transport modes in multimodal transportation;
- creation and development of a “green corridor” for transit goods based on a single digital platform.

Based on all the above events, it was planned to develop a national legal framework with the special role of the Ministry of Digital Development, Innovation and Aerospace Industry of the Republic of Kazakhstan in cooperation with other interested organizations.

22. Roadmap for Digital Transformation of the TLS industry in the Republic of Kazakhstan was adopted in July 2023 by the Ministry of Transport, which covers more than 60 activities with a planned implementation period of 3 years. This map is a strategic document aimed at improving the TLS digitalization with the following main goals:

- Increasing the efficiency and transparency of processes in the transport industry.
- Improving the level of service for freight and passenger transportation.
- Reducing risks and improving transport safety.

This Digital Transformation Roadmap is a strategic plan aimed at achieving modern standards in the field of multimodal transport in the Republic of Kazakhstan. Its implementation involves cooperation between government agencies, the business sector and the public bodies to successfully adapt to digitalization

challenges. The initiatives outlined in the roadmap are monitored by the responsible Committees and departments of the Ministry of Transport, within the framework of their functionality.

C. Kyrgyz Republic

The following policies, strategies and programs on the TLS Digitalization were adopted and implemented in Kyrgyz Republic in 2018–2023:

23. **National Development Strategy of the Kyrgyz Republic until 2018–2040:** approved in 2018 and included the National Program for Digital Transformation “Taza Koom”. Under this strategy, Kyrgyz Republic should become a transit country with multiple transport corridors, including transit railway branch line connecting the North and South of the country. The digitalization and the integrated development of all economy sectors were envisaged with the special attention to TLS of Kyrgyz Republic, which should lead the advanced development of the country’s digital infrastructure within the CAREC regional trends.

24. **National Development Program of the Kyrgyz Republic until 2026:** the program stated the important priorities and aimed at resolving the transport isolation of the country by the smart TLS integration. The government was supposed to create modern multimodal cargo hubs, combining air, rail and road transportation. The modern digital technologies should be deployed in the course of TLS infrastructure developments to provide the effective transit corridors operation. The following practical points were included in this Program for TLS modernization:

- Development of TLS hard and soft infrastructures and implementation of modern digital technologies, providing seamless connectivity of transport corridors;
- Implementation of the construction of the railway “China–Kyrgyzstan–Uzbekistan” within the framework of the project “One Belt, One Road” for the development of the country’s transit potential.

25. **Road transport development concept of the Kyrgyz Republic for 2020–2024:** In view of the mountainous landscape the road transport is considered to be the dominant mode of transport. As a result, the major part of freight transportation is carried out by road. In this respect the concept addressed country prime needs for digitalization of the road and urban transport.

26. **The Ministry of Digital Development was established by Presidential Decree in 2021** as a result of the merger of the State Service for Digital Development and the State Registration Service of the Kyrgyz Republic. The Ministry got authorized to develop and implement digitalization and e-government policies, including special technological solutions for TLS modernization.

27. **Digital Kyrgyzstan 2019–2023:** complemented and expanded the National Development Strategy of the Kyrgyz Republic for 2018–2040 as well as specified programs of digital transformation, of the particular economic sectors. It was noted, that digitalization of industrial sectors will be incomplete without TLS digital transformation which should solve many optimization tasks to increase the efficiency and volumes of freight transportation.

28. **National Trade Facilitation Roadmap (2021–2025)** was adopted in December 2020 by the National Trade Facilitation Council and got focused on transition to digital trade facilitation, elimination of paper-based documents during import/export, in line with EAEU agreements and global standards. This roadmap supported the transition to paperless logistics, enabled real-time cargo tracking, and foster public–private data exchange in the TLS sector. In its framework the Tulpar Single Window was created in Kyrgyz Republic in accordance with UN/CEFACT recommendations and standards, enabling seamless electronic data submission across trade documents.

29. **Presidential decree on creation of digital green transit corridors through Kyrgyz Republic** to third countries was adopted in July 2022) and launched a coordinated, multi-agency initiative to modernize border crossings, digitize transit processes, and establish eco efficient digital corridors through Kyrgyz Republic on the way to third countries. However, challenges remain in harmonizing data systems, improving inter-agency coordination, and ensuring alignment with international standards.

30. **The new National Program for Kyrgyz Republic Development till 2030** has been recently adopted¹ which underlined the country strategic location in the region creating potential for integration into global supply chains and transport corridors. As such one of the core vectors for the country development was considered to become the promotion the Kyrgyz Republic as a regional hub and center of logistics and trade flows. And modern technologies (AI, IoT, Big Data) and TLS digitalization were recognized as the main implementation tools for the supply chain modernization and creation of integration platforms for regional cooperation.

31. As for TLS governance structure the Ministry of Transport and Communications oversees policy and regulation for road, rail, air transport and communication systems. Since 2021 the specialized Division of Digital Development was formed in the Ministry and the dedicated Vice-Minister assigned for digitalization affairs. State Customs Service manages customs IT systems, cross-border trade facilitation, and international transit compliance. Digital Development Ministry drives digital transformation, coordinates IT infrastructure and e-government platforms. In 2017 the National Trade Facilitation Council was established to serve as the official national body for coordination and implementation of trade facilitation reforms. This Council comprises high-level representatives from government ministries (Economy, Transport, Customs, Border Services, Digital Development) and representatives from the private sector.

D. Turkmenistan

The following policies, strategies and programs on the TLS Digitalization were adopted and implemented in Turkmenistan in 2018–2024:

32. **State Program for the Development of Digital Economy in Turkmenistan for 2019–2025:** included a Digital Economy Development Concept to support the digital transformation of all industries and public administration. The concept was complemented by a technological roadmap, which specified actions to create a knowledge economy and increase the industrial productivity. TLS development was identified as a core factor of economic development and its digitalization was considered to become the major trend in the CAREC region to build the attractive and competitive transport and logistic network.

33. **“Single Window for Export and Import Transactions” Project:** In 2020, UNDP, UNCTAD and the State Customs Service of Turkmenistan launched the project “Single Window for Export and Import Transactions” to be implemented in 2021–2023. The “Single Window” system should provide for the transition to the paperless export, import, and transit procedures to get customs procedures accelerated with time and costs of import-export and transit procedures reduced.

34. **National Program of Socio-Economic Development of Turkmenistan 2030:** was adopted in 2022 with the main objectives of state transport policy focused on the formation of a highly effective national transport system to increase the competitiveness of transport operators in the domestic and foreign freight transportation. Thus, TLS development should serve the growing trade flows between Turkmenistan and foreign countries and ensure the creation of reliable and accessible transit routes.

35. **UNESCAP Assessment for Cross-Border Paperless Trade in Turkmenistan:** project was implemented in 2022 with practical findings and recommendations for technical and legal aspects related to cross-border paperless trade and freight transportation procedures in the country. Besides, Turkmenistan was advised to get engaged in CAREC regional initiatives on cross-border paperless trade and transport corridors development with the following main actions:

- To establish a national trade facilitation committee with the participation of private sector representatives.
- Develop a strategy for the integration of sectorial IT systems and data harmonization according to international standards based on national platforms.
- Introduce modern authentication methods and electronic signatures in the country.
- Implement regular capacity building and training programs for all market participants.

¹ <https://www.specialeurasia.com/2025/06/12/kyrgyzstan-economy-strategy-2030/>.

36. **Agency for Transport and Communications under the Cabinet of Ministers of Turkmenistan:** “Turkmenaragatnashyk” agency, was founded in 2022 as the state organization responsible for the implementation of governmental policy in the field of transport, communications, space, cyber security, and the digital economy. This agency is coordinating the proactive development of national segments of international transport corridors crossing Turkmenistan in the East-West and North-South directions as well as the operational activities of the following transport modal agencies – “Turkmenavtoulaglary” (road transport), “Turkmendemiryollary” (railway transport), “Turkmendenizderyayollary” (maritime and river transport), “Turkmenhowayollary” (aviation transport). In July 2025 the Turkmen Cabinet of Ministers decided to reorganize the national TLS governance structure and disbanded Turkmenaragatnashyk agency creating instead of it a number of separate Ministries – Ministry of Communications, Ministry of Railway Transport, Ministry of Motor Transport of Turkmenistan.

37. A key element of the institutional structure dealing with digitalization affairs is considered to be the Interdepartmental Commission for the Development of the Digital Economy, established on 2020 to oversee the implementation of the Concept for the Development of the Digital Economy of Turkmenistan for 2019–2025. The Commission is headed by the authorized Vice-Prime Minister and its work is predominantly carried out by representatives of state bodies, but the participation of private sector bodies remains limited.

38. To coordinate the implementation of the “Single Window for Export–Import Operations” project, a separate Interdepartmental Commission was formed under the chairmanship of the State Customs Service of Turkmenistan. All relevant state bodies and agencies responsible for issuing permits and licenses participate in the work of this Commission, which facilitates the creation of the unified platform for all export–import operations.

E. Uzbekistan

The following policies, strategies and programs on the TLS Digitalization were adopted and implemented in Uzbekistan in 2016–2025:

39. **Strategy of Actions on Five Priority Areas of Development of the Republic of Uzbekistan for 2017–2021:** This Strategy was adopted back to 2016 to accelerate the development of TLS infrastructures, stimulate their modernization, technical and technological upgrades, implement priority projects, as well as to ensure the development of the railway industry and growth of the country transit potential.

40. **Strategy for the Development of the Transport System of the Republic of Uzbekistan until 2035:** The Strategy was prepared in 2019 in accordance with the Presidential Decree. The goals and objectives of this strategy were to form an integrated and unified transport system of Uzbekistan, to provide conditions for sustainable economic growth and meet the country demand for high quality transport services. The tasks of TLS digitalization and the deployment of modern ICT occupied a central place in the implementation of this Strategy.

41. **The “Digital Uzbekistan-2030” Strategy:** Within the framework of this strategy, it was expected to implement more than 280 information systems and software products for automation of industrial, transport and logistics processes at enterprises of the real sector of the economy;

42. **Decree of the President of Uzbekistan on measures for the effective organization of public administration in the field of transport:** Adopted in June 2023 with the program for reorganization of the divisions and organizations subordinate to the Ministry of Transport as well as the priority areas of TLS digitalization in the country with the Road Map for the practical reforms. In particular, the specialized Centre of Digital Transport and Interdepartmental Council for the Development of Transit Potential in Uzbekistan were formed with the program of project actions for the extensive deployment of information technologies and increasing the TLS digitalization level;

43. **Resolution of the President of Uzbekistan Republic on Measures for further Development of the Transport and Logistics System** in the country: Signed in January 2025 together with the Concept for the country TLS Development until 2030. This comprehensive document specified the five priority areas of transport and logistics system development:

- diversification of foreign trade routes through further development of international and regional cooperation;
- development of the logistics services market, facilitating the maximum implementation of the multimodality principle;
- full realization of the country's transit potential, including the attraction of additional transit cargo flows by applying a flexible tariff policy and simplifying customs procedures;
- comprehensive and advanced development of transport infrastructure based on expanding the scope of external and internal sources of financing and application of innovative technologies;
- formation of platforms for the country's logistics system with integration into international information systems, widespread introduction of digital and innovative technologies in international freight transport.

The Concept has got the dedicated paragraph for the widespread introduction of digital and innovative technologies in the international freight transport, in particular, by the conclusion of bilateral and multilateral agreements on cross-border mutual recognition of documents in electronic form. The following practical steps and developments were envisaged as well:

- creation of an integrated system for planning, coordination and operational management of cargo train traffic by integrating individual elements of the transportation process into a single logistics chain to ensure optimal interaction with other modes of transport;
- formation of an electronic document management system in TLS through the creation of a digital platform for registration of accompanying cargo documents and its integration with the digital systems of foreign countries involved;
- Full implementation of the e-Logistika information system for shippers, consignees and carriers through digitalization of technological processes in freight transport.

44. The Ministry of Transport has got the powers of central governmental body to implement the state policy and regulations for TLS management, development and digitalization in Uzbekistan with the number of the core subordinate agencies: Automobile Road Committee, Inspectorate for Supervision of Railway Transport Safety, Civil Aviation Agency, Center for the Study of Problems of Transport and Logistics Development and Digital Transport Center. In accordance with the 2024 Presidential Decree Uzbekistan Railways (UTY – Uzbekistan Temir Yollari) was reorganized into the Joint-Stock company with the specialized division UTY Cargo responsible for the freight transportation services, maintenance and development of freight wagon and container facilities as well as organization of multimodal transportation.

F. Digitalization of Trade and Transport Corridors at the CAREC Regional and Sectoral Levels

Following the project ToR requirements this sub-chapter includes results of the retrospective analysis and literature review of trade and transport digitalization policies and activities in the CAREC region since the time of adoption of the coordinated Strategy for Transport and Trade Facilitation. The resulting conclusions of such analysis are aligned with the outcome of the latest OECD² and ITF³ projects dedicated to enhancing the connectivity, sustainability, and resilience of regional freight transport in Central Asia. As for the common TLS digitalization policies and cooperation in CAREC region the analysis of annual reports and plans endorsed by the Transport Sector Coordination Committee (TSCC) as well as the CAREC Mid-Term Review of the Transport-Strategy demonstrate the growing importance of the coordinated development of digital and

² <https://www.oecd.org/en/about/programmes/oecd-eurasia-competitiveness-programme.html>.

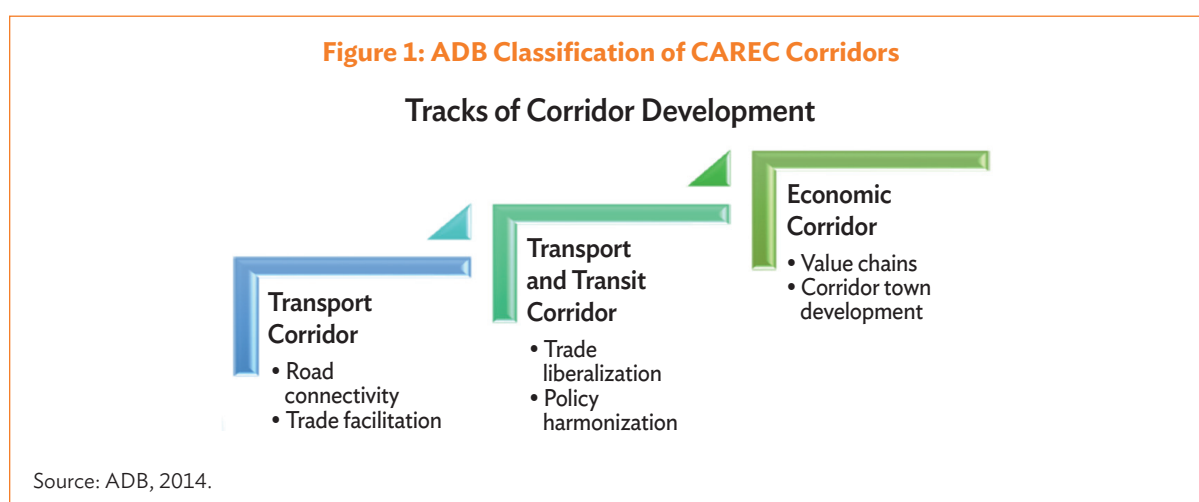
³ <https://www.itf-oecd.org/enhancing-connectivity-sustainability-and-resilience-regional-freight-transport-central-asia>.

transport infrastructure in the region. In particular, it was revealed that investments in physical infrastructure might improve regional transport connectivity, but significant soft-infrastructure barriers remained, including still outdated customs procedures and inefficiencies at border crossing points. As such beyond physical infrastructure developments digitalization should be definitely considered as the strategically important soft component of trade and transport facilitation and become the effective tool for the CAREC corridors development cycle: Transport Corridor > Trade Corridor > Economic Corridor.

45. The coordinated Strategy of Transport and Trade Facilitation 2020 (TTFS) in CAREC region was endorsed back to 2013⁴. This strategy envisaged a more integrated approach to improving TLS infrastructure, and promoted trade and transport facilitation. To increase trade with countries outside the region, CAREC countries planned to extend its corridors and enhance corridor management. It's worth noting that TTFS 2020 emphasized the importance to balance the usage of the “software” that supports the infrastructure “hardware” in order to maximize the impact of both past and future investments into the transport network. The coordinated development of hard (physical infrastructure) and soft (trade and transport facilitation) aspects should be strengthened, with greater focus on multimodal transport and logistics development. This should include the harmonization of regulations, procedures, and standards for cross-border cargo transportation as well as the implementation of enhanced approaches to the efficient border management. The TTFS provided for continuity in the development of transport corridor infrastructure and increasing the level of connectivity between the main CAREC corridors and major seaports.

The proposed integrated transport and trade facilitation approach was focused on increasing the volume of international trade in CAREC countries. At that period achievements in integrated trade facilitation were related to the progress toward the development of national single windows (NSW) and establishment of a system for collection and analysis of CAREC corridor performance measurement and monitoring (CPMM)⁵ with published annual reports since 2009. Besides the importance of the coordinated border management (CBM) solutions was emphasized.

46. In 2014 ADB announced its approach to three tracks of CAREC corridors⁶. In its study it was proposed that the CAREC corridors should be developed in correspondence with the following functions: transport corridors (T1) – ensure transportation connectivity (within the country, within the region, and with outside the region); transit corridors (T2) – enable smooth transit through countries; economic corridors (T3) – promote organization of economic activities to create jobs, increase productivity, strengthen economic clusters, and contribute to economic development of the country. In later developments and publications⁷ transit corridors were renamed into trade ones according to the classification illustrated in Figure 1.



⁴ <https://www.carecprogram.org/uploads/CAREC-Transport-TradeFacilitation-Strategy.pdf>.

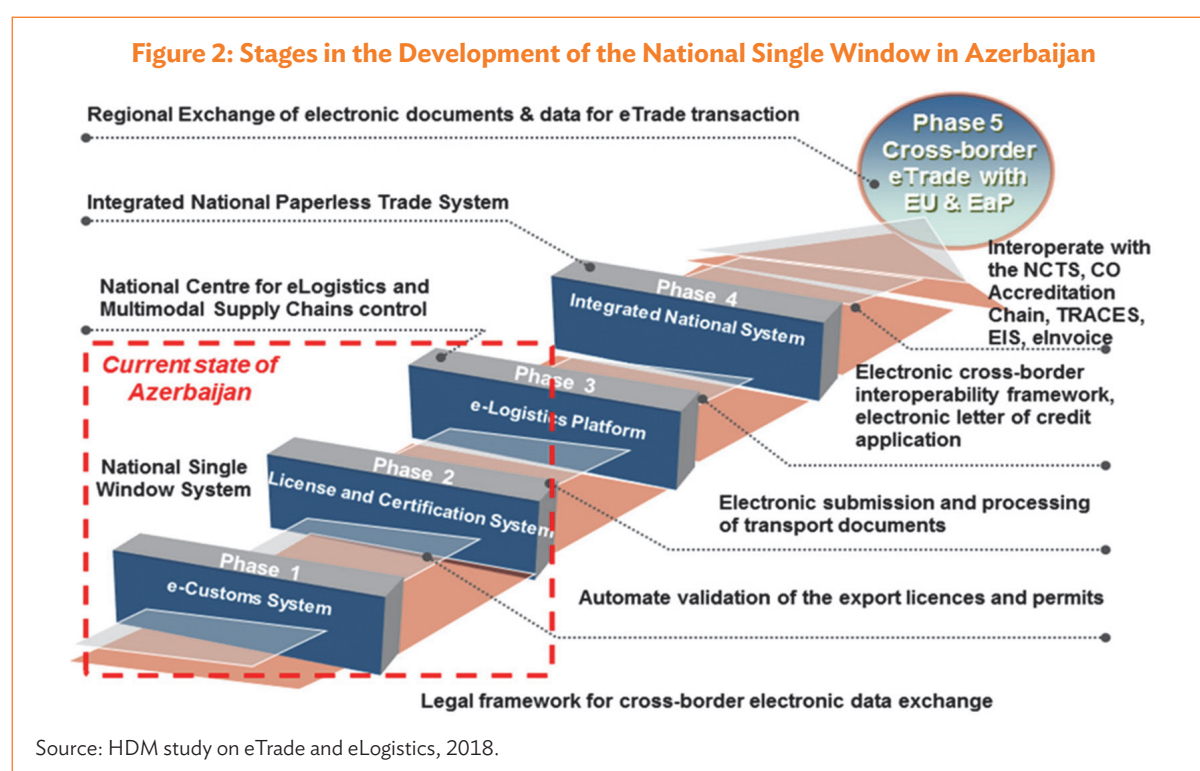
⁵ <https://cpmm.carecprogram.org/>.

⁶ <https://www.adb.org/sites/default/files/publication/153330/economic-corridors-central-asia.pdf>.

⁷ https://www.un.org/ohrlls/sites/www.un.org.ohrlls/files/dorothea_lazaro_-adb_carec.pdf.

The transit function of CAREC corridors is important because a majority of the member countries are landlocked and dependent on smooth, efficient, and low-cost movement of goods through neighboring countries, particularly in acquiring consumer goods and machinery for investment.

47. In 2017–2018 two CAREC countries – Azerbaijan and Georgia pioneered R&D activities for trade and transport corridors digitalization in the course of Harmonizing Digital Markets (HDM) initiative in the Eastern Partnership⁸. In the framework of HDM study (more details in section 58 of this report) the evaluation of these countries readiness for NSW implementation was undertaken with preliminary analysis of TLS digitalization activities. Figure 2 demonstrates the sample diagram with NSW implementation stages in Azerbaijan as of 2018.



By the time of assessment Azerbaijan completed two stages of e-Customs and e-Licensing systems implementation and was expected to start the development of the national e-Logistics platform for TLS and transport corridors digitalization. The similar level of NSW maturity was proved by Georgia where e-Customs and transport modalities IT systems were deployed by 2018.

48. In February 2017 the regional Railway Strategy 2017–2030⁹ was endorsed in the framework of the CAREC Program with the main objectives to transform the region's rail transport into a quick, efficient, and accessible system that can capture evolving trade flows and contribute to economic development. The strategy's core priorities include improving rail and multimodal infrastructure, commercializing railway operations, and reforming legal and regulatory frameworks. The overall vision was to make rail the preferred mode for trade throughout the CAREC region with one of the main priorities focused on investing in information technology for better user orientation and efficient railway operation/maintenance. The strategy designated six main rail corridors which were defined in TTFS 2020 as multimodal corridors. The special attention in this strategy implementation chapters was paid to technology transfer, including development of paperless borders based on modern transit regimes and electronic documents transmission and exchange.

⁸ <https://eufordigital.eu/library/study-on-the-harmonisation-of-the-digital-markets-in-the-eastern-partnership-etrad-e-logistics-digital-transport-corridors/>.

⁹ <https://www.adb.org/sites/default/files/institutional-document/227176/carec-railway-strategy-2017-2030.pdf>.

49. In 2018–2019 two other CAREC countries – Kazakhstan and Kyrgyz Republic were participating in the R&D project for the development of Digital Transport Corridors (DTC) ecosystem concept in the Eurasian Economic Union¹⁰. As a result of the detailed analysis of TLS digitalization level and processes on multimodal cargo transit transportation via EAEU countries it was decided to build the DTC ecosystem based on National eLogistics systems integrated by the federative supranational platform (more details in section 78).

50. In 2020 the Transport Working Group of GUAM countries¹¹ discussed and endorsed the GUAM-NET concept for creation of the data pipeline for digitalization of the GUAM transport corridor connecting Azerbaijan, Georgia, Moldova and Ukraine. The main objective of the proposed solution was to unite disparate segments of transportation information systems in the GUAM countries on the basis of a single digital platform that ensure cross-border information interaction and the creation of a trust environment based on modern blockchain technologies¹². Finally, the GUAM-NET concept got support at the GUAM Ministerial level and was included as priority project in the protocol of GUAM Transport Ministers meeting¹³.

51. In 2019–2020 the CAREC Integrated Trade Agenda (CITA) 2030 was refined¹⁴ to facilitate the integration of member-countries into the global economy. That should involve making border-crossing procedures more efficient by improving logistics services and enhancing transit systems of transport corridors. CITA 2030 also envisaged focus on the following five operational clusters: trade, tourism, and economic corridors; infrastructure and economic connectivity. For these clusters the use of ICT was considered to become a cross-cutting priority across the CAREC program main pillars. Besides, CITA 2030 includes trade facilitation priorities such as modernization of regulatory frameworks, promotion of effective cross-border management and deployment of public–private partnership arrangements to facilitate the regional trade and transport services.

52. In 2020 and 2022 the following interlinked strategies were adopted – CAREC Transport Strategy (CTS) 2030¹⁵ and CAREC Digital Strategy 2030¹⁶. The Transport Strategy included the five strategic pillars of cross-border transport and logistics, roads and road asset management, railways and aviation. The cross-border transport and logistics problems were identified as the main issues to be addressed. Therefore, the strategy was focused on cooperation among the CAREC countries to reduce soft trade and logistics barriers. The special attention was paid in the strategy to the interoperability between different modes of transport in order to create seamless multimodal corridors within the CAREC region and other countries involved. For the main strategic Pillar – Cross-Border Transport and Logistics Facilitation the following objectives were envisaged in relation with digitalization actions:

- improvement of BCP facilities and procedures;
- development of ports centers and logistics hubs to support seamless interoperability of all modes of transport;
- railways digitalization to improve their operations;
- deployment of common data interchange standards and advanced information systems to enable smooth information exchange among TLS participants of CAREC member countries.

Under the CTS 2030, modern digital technologies shall facilitate seamless transport operations along the CAREC transport corridors. The following relevant soft infrastructure components should be developed and integrated in CAREC TLS projects – Intelligent Transport Systems and digital platforms to enable efficient management of trade and logistics procedures as well as general governance information systems, such as NSWs.

¹⁰ Concept Development of Digital Transport Corridors Ecosystem in the Eurasian Economic Union countries, R7D report, 2019.

¹¹ <https://guam-organization.org/category/struktura-guam/rabochie-gruppy-i-podgruppy/rabochaya-gruppa-po-transportu/>.

¹² <https://plmo.cyber.az/2021/papers/139-141.pdf>.

¹³ <https://guam-organization.org/en/1st-meeting-of-the-working-subgroup-on-the-implementation-of-the-guam-net-platform/>.

¹⁴ <https://www.indrastra.com/2018/11/17th-Ministerial-Conference-CAREC-004-11-2018-0030.html>.

¹⁵ <https://www.carecprogram.org/uploads/CAREC-Transport-Strategy-2030-1.pdf>.

¹⁶ <https://www.adb.org/sites/default/files/institutional-document/777876/carec-digital-strategy-2030.pdf>.

53. CAREC Digital Strategy 2030's envisaged the creation of a common CAREC Digital Space, which should stimulate economic growth and strong regional competitiveness. To achieve these goals, the Strategy stands for creating a digital regional economy with trusted, real-time digital services for public and private sectors. This mission is to be completed by the following main undertakings:

- Stimulate investment in the digital infrastructure to close connectivity gaps.
- Reduce regional cross-border barrier to increase trade and expand business opportunities for companies, in particular, in e-Commerce and e-Logistics.
- Strengthen digital foundations and create interoperable digital platforms to enable the development of CAREC's operational clusters.

For CAREC, TLS digitalization platforms offer practical opportunities for regional connectivity and integration. Today, the development of national and subregional platforms is required to facilitate cross-border trade. To grow and succeed the CAREC regional platform economy requires the development of interoperable digital infrastructures across the region as well as adoption of common regional data standards and policies.

54. The chapter “e-Logistics, Cross-Border Services, and e-Customs” of the CAREC Digital Strategy highlights the importance of implementing e-logistics services and complementing them by the latest developments in supply chain and logistics digitalization technologies. These complementary activities should ensure interoperability at all levels: common legal framework, digitalized business processes, standardized electronic documents and data formats as well as technically interoperable digital infrastructures. For cross-border e-Logistics and e-Customs services, it's important to base business process reengineering on the digitalization principles to provide paperless trade transactions within the region and at the international level. In this regard, CAREC member countries should develop interoperable e-Logistics platforms to support the effective information exchange in the transnational supply chains.

55. At the end of 2022 the review of CPMM results were published with analysis of 10-year results and progress in trade facilitation in CAREC countries¹⁷. It was mentioned that the CAREC transport sector received during the past period more than \$30.0 billion of investments with small part of projects dedicated to corridors digitalization. Transport sector investments accounted for 75% of the total and were largely dedicated to hard infrastructure operations with the rhetoric question raised – *did the transport road and rail infrastructure completed under the CAREC projects actually improve regional connectivity and integration?*

As for digitalization and process optimization projects they involved reviews of existing workflows and the re-engineering of operational steps to increase productivity and transparency. In the digitalization chapter of the CPMM review, it was stated that innovative solutions such as artificial intelligence, blockchain, and data analytics should be deployed in transport and supply chain management.

56. In the CAREC latest CPMM report¹⁸ the special attention was paid to digitalization and NSW activities with digital trade platforms as striking theme. In 2023 Azerbaijan, Turkmenistan, Kazakhstan, Tajikistan, and Uzbekistan activated the development and expansion of their NSWs as well as port community systems and eCustoms platforms. In addition, the policy landscape across CAREC countries demonstrated the positive move to trade facilitation and corridor efficiency based on digitalization, regulatory coordination and infrastructure modernization. In later presentations of CPMM consultants more attention was paid to practical aspects of BCP digitalization and importance of adequate investments in the digital infrastructures of CAREC transport corridors.

57. Similar concerns about prevailing investments mainly in transport physical infrastructures were articulated at the CAREC 20th TSCC meeting¹⁹ held in 2023 when the Transport Sector Progress Report and Work Plan were discussed. Regarding corridor efficiency, meeting participants noted the lack of improvement in CAREC corridor productivity. CPMM indicators demonstrated that border-crossing costs and times, as well as cross-border transport speeds along CAREC corridors, had not been improved. In this regard, meeting

¹⁷ <https://www.adb.org/sites/default/files/publication/844686/progress-trade-facilitation-carec-countries.pdf>.

¹⁸ <https://cpmm.carecprogram.org/2023-report/introduction/>.

¹⁹ <https://www.carecprogram.org/uploads/20th-TSCC-Transport-Sector-Progress-Report-ENG.pdf>.

participants emphasized the need to simplify border control procedures, implement harmonized approaches and standards, and improve coordination along road and rail corridors to eliminate bottlenecks. This also places digitalization at the forefront of accelerating transport processes and transforming CAREC transport and logistics into a more competitive sector. In the Summary of CAREC 21st TSCC meeting²⁰ held in 2024, the emergence of new tools such as digitalization and Artificial Intelligence were considered to become the future CAREC focus areas.

58. In September 2023 CAREC Institute organized the international workshop “Transport Corridors in the CAREC Region: Supply Chain Resilience and Trade Facilitation”²¹ with the wide representation of international institutions and experts. In their key-note presentations the core experts underlined that digital infrastructure elements and trade facilitation measures are as important as hard infrastructure for effective transport connectivity in CAREC region. As a result, the event organizers agreed to stimulate research and policy dialogue on transport corridors modernization and digitalization in the CAREC region.

59. All the above strategic documents and developments boosted in 2023 the TLS and transport corridors digitalization activities in the CAREC countries, in particular:

- Azerbaijan activated the development and digitalization of international transport corridors crossing its territory by creation of the NSW electronic portal and national digital TLS platform.
- Kazakhstan launched the project for development of the Global Digital Trade Corridor (GlobalDTC) in cooperation PSA Group from Singapore²².
- Uzbekistan started the development of e-Logistics system and created the dedicated Digital Transport Center²³ under the Ministry of Transport;
- TRACECA Secretariat developed its Digital Concept²⁴ based on the review of international experience in TLS digitalization and created a vision of the TRACECA digital ecosystem.

60. It should be mentioned that all CAREC countries involved in the current project at the same time are the members of the Organization of Turkic States²⁵ (OTS). And OTS has got the comprehensive regional program for TLS development, including transport corridors digitalization actions. The legal foundation for transport cooperation within the OTS is built on several key documents:

- “Agreement on International Combined Freight Transport among the Governments of the Member States of the Organization of Turkic States” – 2022;
- “Transport Connectivity Program of the Organization of Turkic States” – 2022;
- “Joint Action Plan (“Roadmap”) on the Implementation of the Transport Connectivity Program of the Organization of Turkic States for 2023–2027” – 2023;
- “Memorandum of Understanding among the Member States of the Organization of Turkic States Regarding Cooperation and Use of Electronic Permit (e-Permit) in International Road Transport Operations” – 2024.

Besides, OTS is currently advancing with IRU and UNECE experts the implementation of “e-CMR in the countries involved. At the OTS Coordination Committee Meeting in 2024 the implementation of multilateral e-CMR project was supported and Member States decided to form the corresponding Sub-Working Group on Digitalization. This group activities are focused on the legal aspects and e-CMR operationalization in the Turkic region.

61. In April 2024 the 11th Asia-Pacific Trade Facilitation Forum²⁶ was held in Samarkand with the first Digital Transport Corridors event organized by UNESCAP. This Forum was focused on digitalization and sustainability of supply chains in the Asia-Pacific region with broad discussions of international experience in

²⁰ <https://www.carecprogram.org/uploads/21st-TSCC-Summary-of-Proceedings-fin-EN-clean.pdf>.

²¹ <https://www.carecinstitute.org/publications/workshop-report-trans-caspian-transport-corridor-infrastructure-and-trade/>.

²² <https://globaldtt.com/en>.

²³ <https://dtransport.uz/en>.

²⁴ https://traceca-org.org/fileadmin/fm-dam/pdfs/tit-igcmeets/15th/eng/Appendix_21_Digital_Concept_eng.pdf.

²⁵ <https://turkicstates.org/en>.

²⁶ <https://www.unescap.org/events/2024/asia-pacific-trade-facilitation-forum-2024>.

trade facilitation and digitalization, including cross-border paperless trade and transport corridors. Ministerial delegates participating in the DTC event started discussions on the digitalization of national segments in CAREC transport corridors. The specialized UNECE capacity building workshop was held in the Forum and dedicated to the SPECA Road Map for Digitalization of Multimodal Data and Document Exchange along the TITR Corridor, using United Nations standards

62. In the course of CAREC 20th and 21st TSCC meetings there were an obvious growth of attention to the TLS and transport corridors digitalization matters. Representatives from PRC, Azerbaijan, Georgia, Kazakhstan, Kyrgyz Republic and Uzbekistan presented the national digitalization initiatives and proposed to promote technological innovation and activate TLS digital transformation in the region. The special attention was paid to the development of Middle Corridor (MC) Development Strategy and its digitalization prospects in relation to the World Bank (WB) study project “Improving Freight Transit and Logistics Performance of the Trans-Caucasus Transit Corridor”²⁷ implemented in 2022–2024. The WB team proposed the Platform-of-Platform’s concept based upon the federated technology solutions for digital infrastructure with the governance model which supported the creation of national Digital Hubs in the MC participating countries. A Digital Hub was considered to become a localized data and service convergence point that acts as the nexus of digital services, data management, and interconnectivity within a particular country. It should aggregate and manage a country’s digital services and data, serving a diverse spectrum of stakeholders, from government bodies, private enterprises, to individual users.

The thorough discussions of the Digital Hub functionalities at the WB Workshop in Georgia proved that it would play the role similar to the NELS platform (as shown in Table 1). As such the joint efforts were discussed between the WB expert team and MC countries to develop a detailed plan for establishing Digital Hubs in each country, including technical requirements, operational processes, and governance mechanisms. As a result in November 2024 the joint Working Group was formed for MC digitalization under the auspices of the Coordination Committee for the Development of the Trans-Caspian International Transport Route (TITR)²⁸ and the corresponding plan was developed for digitalized business processes re-engineering and standardization.

Table 1: Digital Hub vs NELS Platform Functionality

National Digital Hub in the WB Project	NELS Functionality in SPECA Countries
Digital Hub (DH) is a localized data and service convergence point that act as the nexus of digital services, data management, and interconnectivity within a country.	• Provided by Clients Block of modules, Data Management module and Data Pipeline connectivity module
DH aggregates and manages a country’s digital services and data, serving a diverse spectrum of stakeholders, from governmental bodies, private enterprises, to individual users.	• Provided by the integration with main corporate DTC participants and their IT systems, as well as Governmental agencies, transport and logistics operators etc.
DH functions as a critical interconnect and other countries’ DHs across the transport corridor. Through this framework, DHs cooperate, share data, collaborate on standards, while each maintains control over its local digital services and data.	• Provided by the interoperable NELS integration platform with dedicated connectivity modules and special block-chain based solutions for data pipeline
Digital Hubs, aligns perfectly with the infrastructure needed to handle digital identities, electronic signatures, and cross-border transactions.	• Provided by the specialized PKI module and innovative solution for authorization and authentication of NELS/ DTC participants using their eSignatures for secure cross-border transactions
Digital Hub facilitates various facets of digital governance. These include the standardization of digital policies and practices, certifying new members, monitoring compliance with agreed standards, and overseeing the creation and use of digital data and services.	• Provided by the dedicated regulatory and monitoring modules as well as usage of electronic documents based on UNECE–UN/CEFACT standards and MMT RDM formats

Source: Digital Strategy Harmonization Workshop for the Middle Corridor: Executive Summary and Meeting Minutes, June 20th 2023.

²⁷ <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/701831585898113781>.

²⁸ <https://middlecorridor.com/en/>.

63. The comprehensive methodological approaches to CAREC transport corridors development and digitalization were analyzed in the latest ADB publication “Unlocking Transport Connectivity in the Caucasus and Central Asia”. This book expands on the general understanding of CAREC transport corridor development through various studies developed by international experts and sector specialists. CAREC transport corridors can further prosper through greater regional cooperation, boosted cross-border trade flows, enhanced infrastructural and digital connectivity across countries and multimodal transport networks. For sustainable and resilient physical and digital infrastructures along the CAREC corridors, stakeholders are recommended to collectively standardize logistics procedures, streamline the regulatory and trade facilitation architecture, and deepen cooperation at various levels of governance.

64. But the most important conclusions in the field of trade and transport corridors digitalization were made in the course of the ongoing Mid-Term Review (MTR) of the CAREC Transport Strategy 2030 with the preliminary MTR report discussed recently at the 22nd TSCC meeting²⁹. In the MTR draft report³⁰ it was mentioned that digitalization activities in CAREC countries are expected to make a profound impact on increasing the efficiency of intraregional and external trade as well as raise the importance of the multimodal transport corridors in the region. In particular, the MTR report proved that the effectiveness of the CAREC corridors could be enhanced by scaling up digitalization, strengthening cross-border transportation and promotion of multimodality together with integration of national logistics systems.

In the MTR recommendations it was also underlined that the regional trade and transport connectivity across the CAREC region can be enhanced by:

- BCPs digitalization covering infrastructure components as well as processes and procedures;
- strengthening intermodal connectivity;
- assisting with harmonization of logistics processes and proposing regional standards for multimodal documentation that also link to international documentation standards and systems;
- Developing CAREC Corridor Digital Trade and Transit Platforms to integrate BCPs, logistics, and customs processes and integrating trade-related digital platforms as part of transport projects.

As result in the Transport Sector Progress Report and Work Plan for 2024–2025 the following recommendations were made for enhancing CAREC Transport Strategy 2030:

- Strengthening cross-border and corridor efficiency particularly the need for improving the hard and soft infrastructure of border crossing points;
- Promoting modal diversification, Integrated Logistics Systems and promoting intelligent transport systems, use of digitalization;
- Scaling up digitalization and utilizing digital solutions across all transport operations;
- Deepening institutional collaboration and forward-looking planning through developing a region-focused transport model to evaluate and measure impacts of CAREC corridors.

And it was rather indicative that in the Middle Corridor Development strategy³¹ presented at 22nd TSCC meeting the proposed short-term interventions were focused on digital solutions, including BCP upgrade with digitalization and coordinated operations as well as digitalization of business processes and adoption of common forms and standardized electronic documents.

65. The undertaken analysis of the regional trade and transport digitalization policies and activities in CAREC countries allowed us to make the following conclusions:

- a. The latest reviews of regional and sectoral strategies have got strong focus on the coordinated development of transport and digital infrastructures in CAREC countries as well as encourage investments in their TLS digitalization across the region to close connectivity gaps.

²⁹ <https://www.carecprogram.org/?event=22nd-carec-transport-sector-coordinating-committee-meeting>.

³⁰ <https://www.carecprogram.org/uploads/4-250609-CTS-MTR-v4-EN.pdf>.

³¹ <https://www.carecprogram.org/uploads/1-LS-CAREC-2030-Strategy-Midterm-Review-22nd-TSCC-EN.pdf>.

- b. National TLS digitalization platforms offer wide opportunities for regional connectivity and integration of transport modality systems in the particular country thus strengthening intermodal connectivity.
- c. Interoperable e-Logistics platforms can provide for seamless cross-border information exchanges in the digitalized CAREC transport corridors and transnational supply chains.
- d. To improve the cross-border procedures in the main CAREC transport corridors the corresponding BCP processes re-engineering and digitalization are required based on the CBM approach and standardized electronic documents.
- e. Regional standards for exchange of electronic documents in transport modalities shall be adopted and correlated to the international standards and best practices.

66. The above conclusions are very much in line with the results of the OECD/ITF comprehensive study titled “Enhancing the connectivity, sustainability, and resilience of regional freight transport in Central Asia”. In this study connectivity in freight transport was referred to the efficiency and integration of infrastructure, services, and institutional frameworks that enable the seamless movement of goods across transport networks and borders. The special attention was paid to the soft measures driving Central Asia’ freight connectivity including harmonization and digitalization of border-crossing procedures and integration of digital platforms to connect regional supply chains and logistics systems. Based on the stakeholder survey the following feedback and opinions were received from the field experts involved:

- Connectivity challenges remain the region’s primary bottleneck, with border crossings at the core of the issue. Lengthy delays and complex customs procedures significantly hinder seamless movement. To address this, targeted measures such as unified digital customs systems, regulatory harmonization, and one-stop border solutions are essential.
- Reducing border delays through digitalization and process optimization is considered to be a top priority. Without effective soft measures, such as digitalization and asset management, infrastructure investments will fall short of delivering the desired outcomes.
- Both public and private sectors place greater emphasis on digitalization and optimization in future policies compared to current ones. Public authorities are shifting focus away from extensive road and railway expansion, prioritizing better asset utilization to improve efficiency and connectivity. Digital infrastructure and freight management are prioritized in most countries of the region.

As for policy-related improvements at the regional level the following recommendations were made:

- Harmonize regulations and technical standards to cut inefficiencies and transport costs, which are currently up to 2.1 times higher than global benchmarks.
- Promote intermodality and network redundancy by strengthening both rail and road links through integrated, multimodal systems.
- Foster mature logistics markets by reducing state monopolies, encouraging private sector participation and improving service quality.
- Mobilize TLS digitalization investments through PPPs and blended finance.

All the above professional opinions and recommendations were taken into account in the course of our project activities.



REVIEW OF INTERNATIONAL PRACTICES IN TLS DIGITALIZATION

A. European Union

67. The EU Digital Single Market (DSM) strategy³² does not explicitly include initiatives for digitalization of transport and logistics, but the European Commission has targeted programs to develop this sector and, in particular, a large scale and long-term program to create transport, digital and energy infrastructure – Connecting Europe Facility (CEF). The CEF program for the creation of transport, digital and energy infrastructure of the EU countries was planned for the period 2014–2020 and its regulatory documents were updated in April 2018. The transport component of the CEF program provides serious support for the goals and principles of the development of TEN-T European Transport Corridor Network as well as addresses the digitalization issues.

68. The TLS development of the EU countries is determined by the corresponding strategy adopted in 2011 in the form of a road map for creating a single European transport space³³. In this working document, the European Commission formulated the tasks for multimodal transportation of goods and the implementation of the e-Freight project, the wider use of information technologies in the transport sector, as well as the development of an integrated system of European transport corridors TEN-T. In 2017–2018, the European Commission decided to expand the TEN-T corridor network and join the Eastern Partnership (EaP) transport trunk lines with it, as a result of which the corresponding roadmaps were developed. During the implementation of these strategic plans, the relevant directorates of the EC and the UN Economic Commission for Europe (UNECE) proposed an innovative approach to stimulate information interaction among participants in international supply chains, based on the concept of a “data pipeline”³⁴. It is based on the integration of all data elements generated in supply chains and aimed at ensuring visibility and tracking cargo vehicles and goods in international transport corridors.

69. In 2015, an analysis was made of the interim results of the implementation of the above strategy, and to accelerate the work on digitalization of the transport and logistics sector, the European Commission decided to form a Digital Transport and Logistics Forum³⁵ (DTLF). DTLF was set up on the public–private partnership base as a powerful expert platform that brought together experts to stimulate cooperation in the field of digitalization of freight transport and logistics processes. Within the framework of the DTLF, expert subgroups were formed to develop the main project activities for two topics: Facilitation of the use of electronic transport documents and data exchange (SG1); Development of interoperable information systems for TEN-T transport corridors (SG2).

As a result of DTLF analysis, the SG1 expert group came to the following conclusions. The freight documents other documents relating to goods transportation are stored in the internal IT systems of the shipper, carrier, or a combination of these systems. Such IT systems of supply chain participants contain the necessary information for the generation of the required types of electronic freight documents. For the effective exchange of this information and data in order to generate electronic transport documents, an open IT architecture of digital platforms is required, which guarantees compatibility between different systems and solutions based on agreed international standards.

³² <https://www.consilium.europa.eu/en/policies/digital-single-market/>.

³³ https://transport.ec.europa.eu/white-paper-2011_en.

³⁴ https://unece.org/fileadmin/DAM/trade/Trade_Facilitation_Forum/BkgrdDocs/UNPaper_DataPipeline.pdf.

³⁵ <http://www.dtlf.eu/>.

The second DTLF expert group – SG2 developed appropriate approaches for the conceptual interoperability of information systems for transport corridors and for data exchange between participants in transport and logistics processes, including state control and supervision bodies. As a result, it was concluded that the proper solution for the required digital infrastructures in the EU could be a federated network of national and regional platforms in which interoperability and data exchange should be provided by standardized protocols and dedicated network services. The DTLF recommendations and conclusions were used as the basis for the implementation of the following EU digitalization projects in 2015–2020.

70. **e-Freight project** was implemented in the course of the 7th EU Framework Program from 2010 to 2013³⁶ with the main objective to facilitate the use of various modes of transport and their multimodal combination to optimize the usage of European freight transport resources. Electronic freight was designed to ensure the interoperability of business processes and overcome organizational boundaries between different modes of transport, which allows TLS participants to plan, implement and control the movement of vehicles in multimodal mode. During the implementation of the e-Freight project, its expert team provided IT solutions and demonstrated that the paperless exchange of information between the participants of the EU multimodal freight transport processes for all internal and some part of external freight transport can be carried out in practice.

71. **CASSANDRA project**³⁷ was implemented in 2011–2014 with the main objective to enhance supply chain visibility to improve business operations and government's cross-border security inspections as well as to develop the common solution for supply chain visibility, where data can be shared between business and government. To provide supply chain actors and government authorities with the required accurate data, the project developed a data-sharing concept called the Data Pipeline. As a result of CASSANDRA project provided a new approach to the exchange of information between the stakeholders involved in supply chain involving digital data exchange (the Data Pipeline) and improved risk assessment.

72. **CORE project**³⁸ was implemented by the European Commission in 2014–2018 with the main objective to consolidate, extend and demonstrate capabilities of the international co-operation for securing supply chains whilst improving business performance of the key supply chain corridors. CORE demonstrated how innovative and optimized ecosystem implementation, integrating interoperability, security, resilience and real-time optimization can produce cost effective, fast and robust solutions that guarantee the efficient and secure transit of goods through the worldwide global supply chain corridor. The principal results of the CORE project are considered to be:

- provision of tools and maps for building data pipelines and results from reference projects to satisfy the Customs and business requirements for reliable and complete data exchange;
- proof of concept that data pipeline solutions based on blockchain can provide exchange of all transport electronic documents and data via the digital platform.

73. **SELIS project**³⁹ was implemented in 2016–2019 and focused on the development of solutions for the creation of Shared European Logistics Intelligent Information Space as the network of logistic communities' information spaces termed SELIS Community Nodes (SCN). The general scheme of interaction of SCN nodes in regional and global supply chains should work like that – each regional SCN node integrates the technological systems of participants of transport and logistics processes in the region, supports their communication and interaction, confidentiality and data protection, as well as analytics and visualization tools, thus providing end-to-end visibility of their region in the international supply chain.

74. **FENIX project (Federated Network of Information eXchange in LogistiX Study)**⁴⁰ was launched in 2019 which ran until 2022 as part of the CEF Transport program to synergize combination of technological solutions for the regional and federal levels. This project, implemented by a consortium led by ERTICO, aimed to support the development, validation, and pilot deployment of digital information systems along

³⁶ <https://cordis.europa.eu/project/rcn/94475/factsheet/en>.

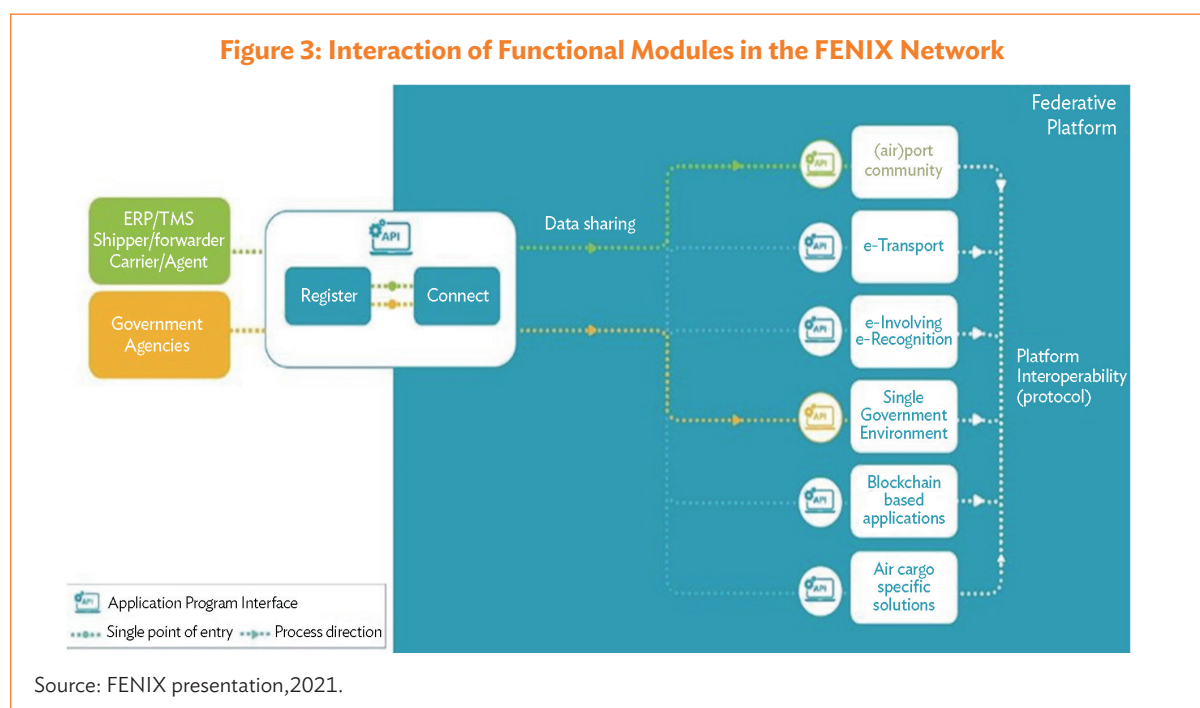
³⁷ <https://cordis.europa.eu/project/rcn/100060/factsheet/en>.

³⁸ <https://cordis.europa.eu/project/rcn/188515/factsheet/en>.

³⁹ <https://cordis.europa.eu/project/rcn/204146/factsheet/en>.

⁴⁰ <https://fenix-network.eu/>.

the European TEN-T transport corridor core network. The project developed a federated data exchange architecture that will serve the European logistics community, including shippers, logistics service providers, mobility infrastructure providers, and public institutions, to ensure interoperability between existing and future e-Logistics platforms. A general diagram of the interaction between the elements of this platform is presented in Figure 3. The main practical results of this project were the development and testing of technological solutions for data exchange between digital information systems along the EU core transport network of the main TEN-T corridors.



75. **EU regulations on electronic Freight Transport Information (eFTI)**⁴¹ were adopted in the EU in 2020 and would make it obligatory for freight transport companies to provide information to authorities in digital format by 2027. The eFTI policy is applicable to intra-EU international transport and international transport having its origin, destination or transit in the EU. All relevant public authorities are required to accept information provided electronically on certified platforms whenever companies choose to use such a format to provide information as proof of compliance with legislative requirements. It was planned to release eFTI common data set specifications and requirements for the national eFTI platform and rules for the certification of service providers in 2024 and 2025 correspondingly. In 2024 the European Commission announced that UN/CEFACT Multimodal Transport Reference Data Model (MMT RDM – more details in section 89) and international standards will be used by the EU countries for the eFTI common data sets and subsets.

As for eFTI platforms to be used for processing regulatory information the following functional requirements were envisaged to ensure:

- a unique electronic identifying link can be established between the data processed and the physical shipment of goods to which that data is related, from origin to destination, under the terms of a single transport contract;
- data can be processed solely on the basis of authorized and authenticated access;
- all processing operations are duly recorded in order to allow, at a minimum, the identification of each distinct operation, the natural or legal person having made the operation and the sequencing of the operations on each individual data element;

⁴¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020R1056>.

- data can be archived and remain accessible for an appropriate period of time, in accordance with the relevant regulatory information requirements;
- data are to be protected against corruption and theft.

The eFTI regulation will make an important impact to the Digital Transport Corridors (DTC) between EU and CAREC partner countries as authorities of the EU Member States shall be obligated to process and confirm data provided by the transport operators electronically. CAREC countries involved in the digitalization of international transport corridors shall be aware of eFTI regulation and specifications when developing national platform solutions for cross-border multimodal information exchange in order to ensure possible future interoperability of TLS systems.

B. Eastern Partnership

76. The conceptual development of projects for the TLS digitalization in the Eastern Partner countries (EaP – Azerbaijan, Armenia, Belarus, Georgia, Moldova and Ukraine) was started in 2015. The topic of electronic logistics and digital transport corridors (DTC) was included as one of priorities in the Ministerial Declaration of the EU and EaP on the digital economy⁴². This declaration noted the importance of cross-border connections between transport and digital infrastructures of transport corridors between the EU and partner countries, as well as the interoperability of multimodal electronic logistics platforms.

77. **The multilateral Study project for eTrade, eLogistics and DTC in the EaP** was implemented in 2017–2018 with the overall objective to assess the readiness of digital markets in the partner countries for harmonization with the EU's Digital Single Market. The study report evaluates the level of digital market infrastructures, regulation and electronic services development in the field of paperless trade (eTrade), electronic logistics operations and transport corridors digitalization. The principal goal of harmonization in electronic logistics between the EU Member States and EaP Countries was to provide exact information about transported goods and cargos at any moment during the way from the point of departure to the point of destination through transit countries. The Study helped to evaluate the degree of the usage of electronic documents and paperless procedures by involved TLS participants from the EaP Countries.

78. **The EU4Digital Facility project**⁴³ on electronic trade and logistics was implemented in the EaP countries in 2019–2020. In the course of research, the readiness of digital market infrastructures, regulation and development of electronic services in the EaP were evaluated for the implementation of paperless trade and electronic logistics processes. Besides, the feasibility analysis was undertaken and the original DTC concept was developed with preparatory actions planned to create a digitalized transport corridor between the Black and Baltic Sea. The developed DTC concept was based on set of principles for building a federated information service platform that forms a data pipeline and acts as a corridor as a service (CaaS) along the transport corridor and is capable of serving multimodal transportation. To implement these principles, it was proposed to build the DTC national segments using a core digital integration platform as the main functional block of the National eLogistics System (NELS) which serves multi-modal supply chain stakeholders in the country with functionalities similar to SELIS solution. Such concept was endorsed by the DG MOVE of the European Commission and the corresponding pilot project was included in the EaP planning document “20 Deliverables for 2020”.

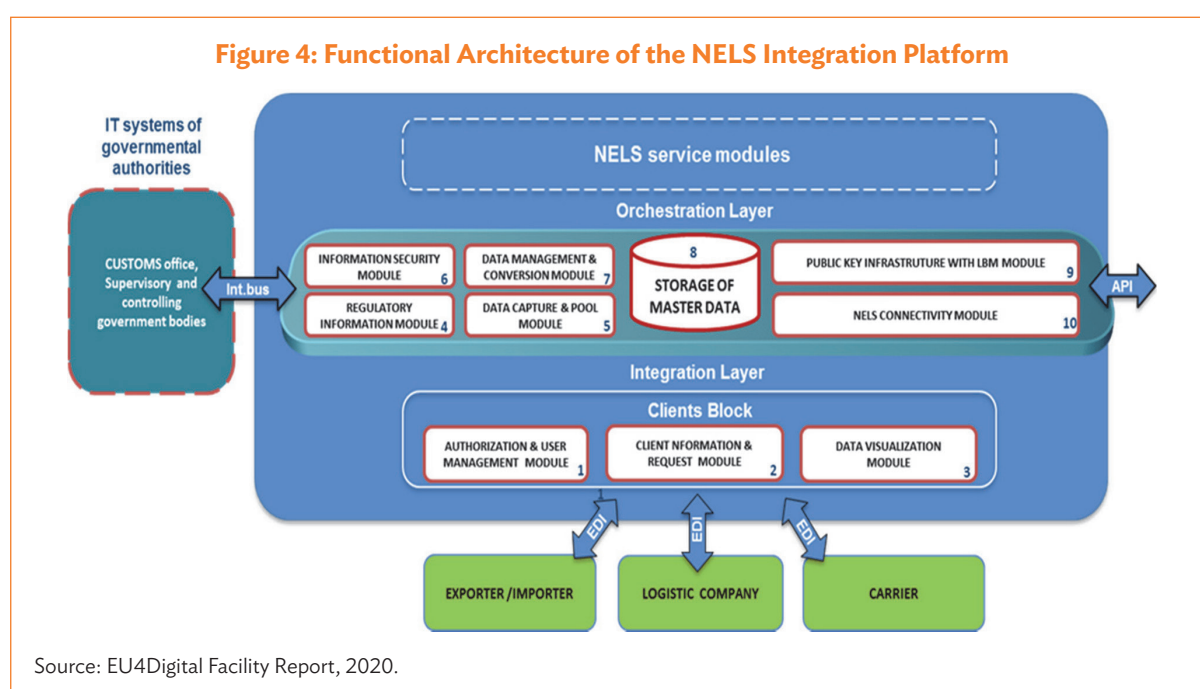
79. In the EaP countries NELS was considered to be based on integration platform serving multimodal information flows and processing data from the main TLS participants and their technological systems as well as converts these data into standardized formats of international electronic documents used to accompany transit cargo. In the process of creating the national DTC segments the following main tasks shall be addressed:

⁴² <https://digital-strategy.ec.europa.eu/en/news/first-eastern-partnership-ministerial-meeting-digital-economy>.

⁴³ <https://eufordigital.eu/>.

- Development and implementation of the NELS integration platform;
- Integration with technological systems of various TLS participants;
- Standardization of electronic documents and data formats for all segments of cargo transportation;
- Selection of technological solution for monitoring and controlling the cargo and goods transportation (track and trace);
- Provision of information security.

The recommended architecture of the core solution for NELS integration platform adopted by the Eastern Partner countries is shown in Figure 4.



The main practical results of the EU4Digital project were the detailed road map for the DTC pilot project between the Baltic and the Black Sea with the creation of the DTC national segments in participating countries – Lithuania, Belarus, Ukraine and data pipeline development for their seamless connectivity and interoperability.

80. Since 2022 EaP countries were mainly involved in the UNECE projects for reconciling a standardized railways dataset with UN/CEFACT international standards and data models as well as gap analysis of their readiness for application of UN/CEFACT standards for digitalization of multimodal data and documents exchange in the region. Azerbaijan and Georgia were actively participating in the TITR digitalization project activities which have been reviewed in detail in the previous chapter.

C. Eurasian Economic Union

81. In 2017–2019 the Eurasian Economic Union (EAEU) countries decided to include DTC topic in the list of its strategic priorities of the EAEU Digital Agenda with the corresponding R&D project implemented for the development of DTC ecosystem⁴⁴. The main project objective was to develop a concept for the formation of an open ecosystem of TLS information platforms and services based on the latest digital technologies, ensuring

⁴⁴ <https://www.akm.ru/eng/press/the-creation-of-an-ecosystem-of-digital-transport-corridors-continues-in-the-eaeu/>.

effective connections between TLS participants in all EAEU member states, as well as their integration with third countries. The concept was based on the creation DTC ecosystem national segments which should be built on the interoperable national digital transport and logistics platforms integrated by the federated EAEU platform operated as the Single Window. Such concept was endorsed by the Eurasian Economic Commission and in 2022 the project for the development of DTC ecosystem core infrastructure elements and priority services was initiated.

82. The practical implementation of the nationwide project for Digital Transport and Logistics Platform⁴⁵ (NDTLP) was announced in Russian Federation in December 2023. NDTLP was designed to provide digital logistics services to all TLS participants and to become a “Single Window” service platform for interaction between the state, transport carriers and their customers. NDTLP, also known as GosLog, is integrating all transport modes to streamline cargo transportation by replacing paper documents with electronic management and enabling end-to-end tracking. Its architecture relies on creating a unified, secure digital environment with interconnected intelligent systems from carriers and logistics companies, digital seals, distributed ledger systems (like blockchain), and artificial intelligence. Key goals include improving multimodal logistics, reducing administrative barriers at borders, and creating a seamless, transparent, and efficient transport ecosystem for both domestic and international trade with the following core components and technologies:

- Unified Digital Environment:
- A secure, digital “space” where various services can be established to connect different stakeholders in the logistics chain.
- End-to-End Cargo Real-time tracking of cargo, including containers, vehicles, and vessels, using technologies like digital seals for identification.
- Electronic Document Management:
- A system for the complete digitalization of transportation documents, moving away from paper-based processes.
- Interoperability – the integration of various “smart” solutions from carriers, logistics firms, and government systems into a cohesive ecosystem.
- Distributed Ledger Technology – blockchain to provide secure, shared, and transparent information for all parties involved in container shipments.
- Artificial Intelligence (AI) and Wireless Communication utilized to optimize processes and provide seamless communication throughout the transport network.

The platform deployment is to increase the operational efficiency of the Russian TLS by deploying digital solutions for integrating state and corporate platforms as well as for interaction with foreign logistics platforms. In July 2025 the plan was announced to connect NDTLP with similar national TLS platforms in PRC and India. It is assumed that integration with these national platforms will help solve the problems of the electronic transport and shipping documents exchange between the BRICS, Shanghai Cooperation Organization (SCO) and Association of Southeast Asian Nations states. As such the NDTLP is expected to provide seamless multimodal transportation via transport corridors between the countries involved.

D. UNESCAP Region

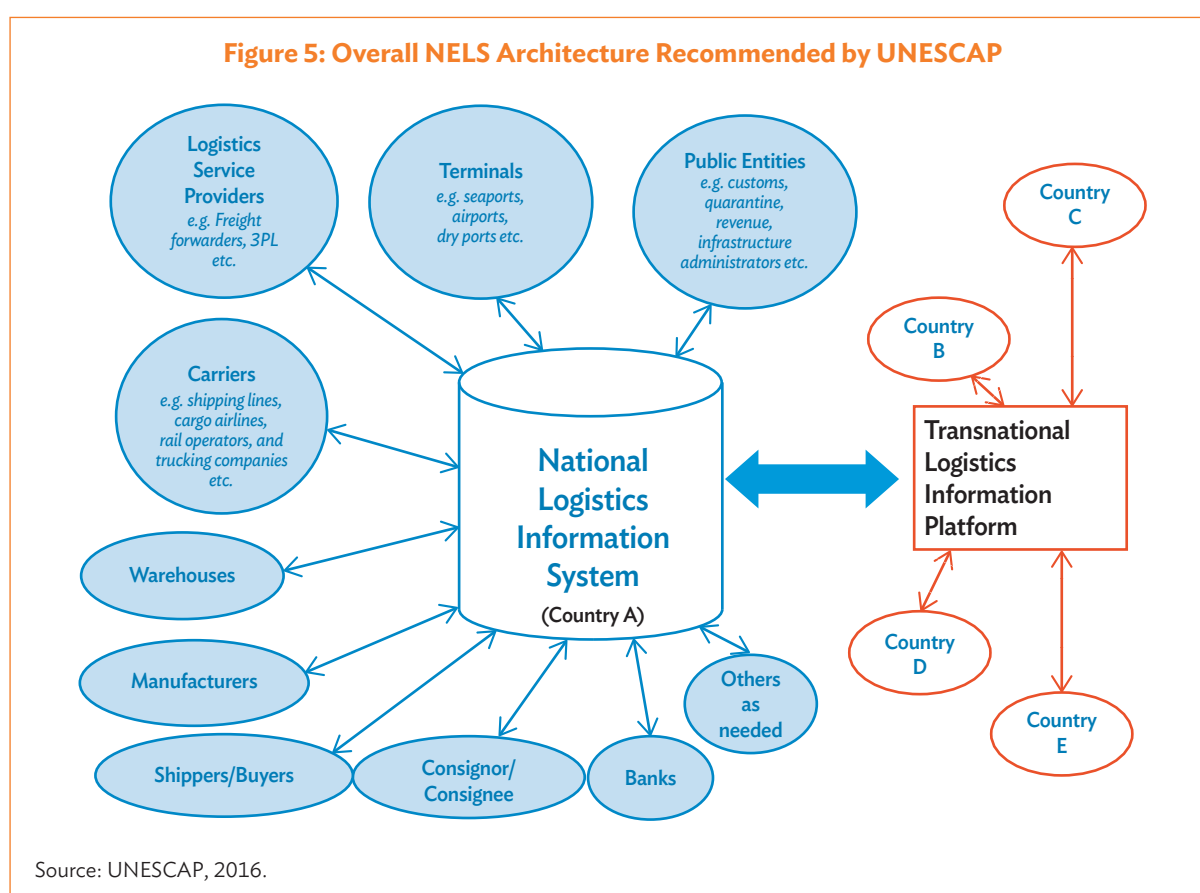
In 2016 the UN Economic Commission for Asia and Pacific (UNESCAP) published the results of its study project “The use of Logistics Information Systems for increased efficiency and effectiveness”⁴⁶. UNESCAP study provided the review of the technical solutions of existing national and transnational logistics information systems, helped to identify best practices and provided recommendations on the core functional architecture and requirements for the establishment and utilization of such systems. In accordance with UNESCAP recommendations the national information logistics systems shall be implemented to digitalize business processes in all modes of transport and provide the extensive portfolio of digital services to TLS participants with the capability to be interconnected via transnational platforms in the region. The core architecture of the

⁴⁵ https://tadviser.com/index.php/Product:GosLog_National_Digital_Transport_and_Logistics_Platform_%28NDTLP%29?ysclid=mcukk8m8gs918878602.

⁴⁶ <https://www.unescap.org/resources/regional-study-use-logistics-information-systems-increased-efficiency-and-effectiveness>.

national logistics information systems recommended in this study is shown in Figure 5. In accordance with UNESCAP recommendations the national eLogistics systems shall provide information exchange to all TLS participants (B2B, B2G, and G2G), cover multimodal transport, i.e., provide multi-modal services to their users and perform the following core functions:

- User management;
- Import/export clearance;
- Payment services;
- Data sharing and electronic documents interchange;
- Data exchange and standardization;
- Data integrity, security and confidentiality
- Information queries and services throughout the logistics operation.



83. In the digitalization policy recommendations developed As a result of UNESCAP 2023–2024 project for the North and Central Asian countries⁴⁷ the separate chapter was dedicated to advantages of the national e-Logistics systems. In particular, it was emphasized that such approach ensured the integration of key stakeholders into a single national e-Logistics system (NELS) for smooth and efficient multimodal data processing and exchange in the course of TLS digitalization in the country. The core NELS element is considered to become comprehensive digital platforms acting as national multimodal digital hubs. These dynamic hubs serve as the integration and multimodal processes orchestration platforms, enabling the effective data exchange and facilitating seamless collaboration among key TLS stakeholders and government agencies. Leveraging integration capabilities, these platforms facilitate the digitalization of multimodal business processes and cargo transportation across the supply chain.

⁴⁷ <https://repository.unescap.org/items/7d4ba9a2-3222-4779-a47e-dd3f0ca09fd9>.

To ensure regulatory compliance, effective border control, and security monitoring, it is important to ensure that relevant government agencies can be easily integrated with the national digital platform. By integrating Customs, port and regulatory authorities into the digital logistics environment, TLS participants can more effectively manage document flow processes, speed up BCP inspections and ensure compliance with national regulations.

84. TLS digitalization activities and logistics information systems have been actively implemented by the leading Asian countries such as PRC, South Korea, Japan and Singapore. Based on the data from the above-mentioned 2016 UNESCAP Study, the national systems implemented in these countries are listed in Table 2.

Table 2: Logistics Information Systems in the Leading Asian Countries

Countries	Logistics Information Systems	Managing Authority
People's Republic of China	LOGINK	Ministry of Transportation, CTTIC
	E-port	Customs
South Korea	Port-MIS	Marine and Fisheries Ministry
	SP-IDC	
	uLogisHub	KTNET
	uTradeHub	Ministry of Economy, KTNET
Japan	Colins	Ministry of Land, Infrastructure, Transportation and Tourism
	NACCS	State owned enterprise
Singapore	PortNet	Port Authority of Singapore
	TradeNet	Cooperation between governmental agencies
	TradeXChange	

Source: UNESCAP, 2016.

As some of these system and platforms are serving just maritime cargo transportation in this review we paid main attention to the multimodal platforms – LOGINK in PRC and uLogisHub in South Korea.

85. **China National Information Logistics platform LOGINK⁴⁸** is considered to be one of the most advanced solutions in the UNESCAP region. LOGINK was developed by the Ministry of Transportation based on the regional project originally implemented by the Zhejiang Province Government to facilitate information-sharing between TLS participants as well as between the existing information systems in PRC. LOGINK platform is managed by the China Transport Telecommunications Information Center (CTTIC) under Ministry of Transport and is currently upgraded into the integrated information service platform for multimodal transport based on logistics information interchanging network in Asian countries NEAL-NET⁴⁹. LOGINK got connected to all main logistics nodes in PRC and 11 ports outside China, this platform functional architecture is shown in Figure 6.

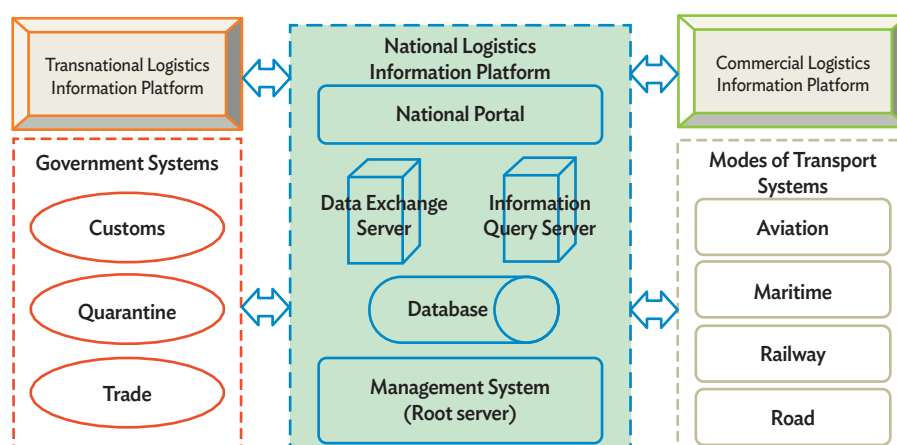
LOGINK platform has got two main components called the National Portal including basic information exchange components and Management and Monitoring system. Governmental bodies and private sector companies are connected to the LOGINK portal to fulfill B2G, G2B, and B2B data exchange to meet regulatory and business requirements. Such functionality enables users to exchange electronic documents with their partners or submit declarations to government agencies. The information request function allows users to get an access to information services, such as transportation status, based on catalogs and information resources supported by LOGINK.

⁴⁸ <https://www.unescap.org/sites/default/files/01%20-%20LOGINK.pdf>.

⁴⁹ <https://www.unescap.org/sites/default/files/11%20-%20NEAL%20NET.pdf>.

In its operation LOGINK can be connected with commercial logistics information platforms for the different modes of transport – maritime, railway, road and aviation as well as with the national TLS platforms in other countries. As such LOGINK played the principal role in the formation of the NEAL-NET connectivity with the transport and logistics platforms of Japan and Korea.

Figure 6: Functional Architecture of LOGINK Platform

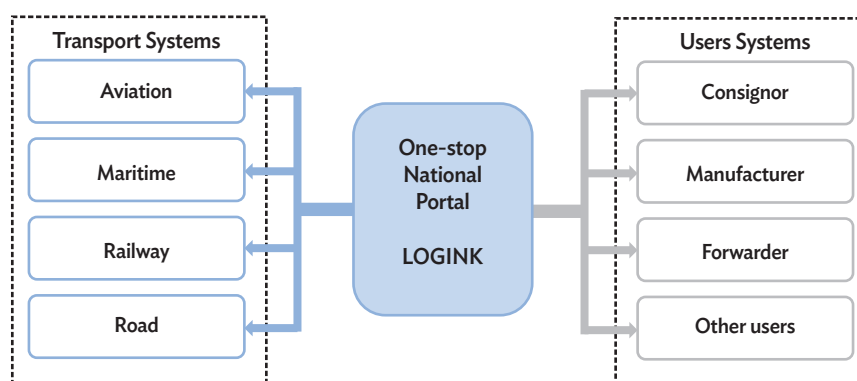


Source: LOGINK.

LOGINK services are provided through a one-stop-shop approach illustrated in Figure 7 and include:

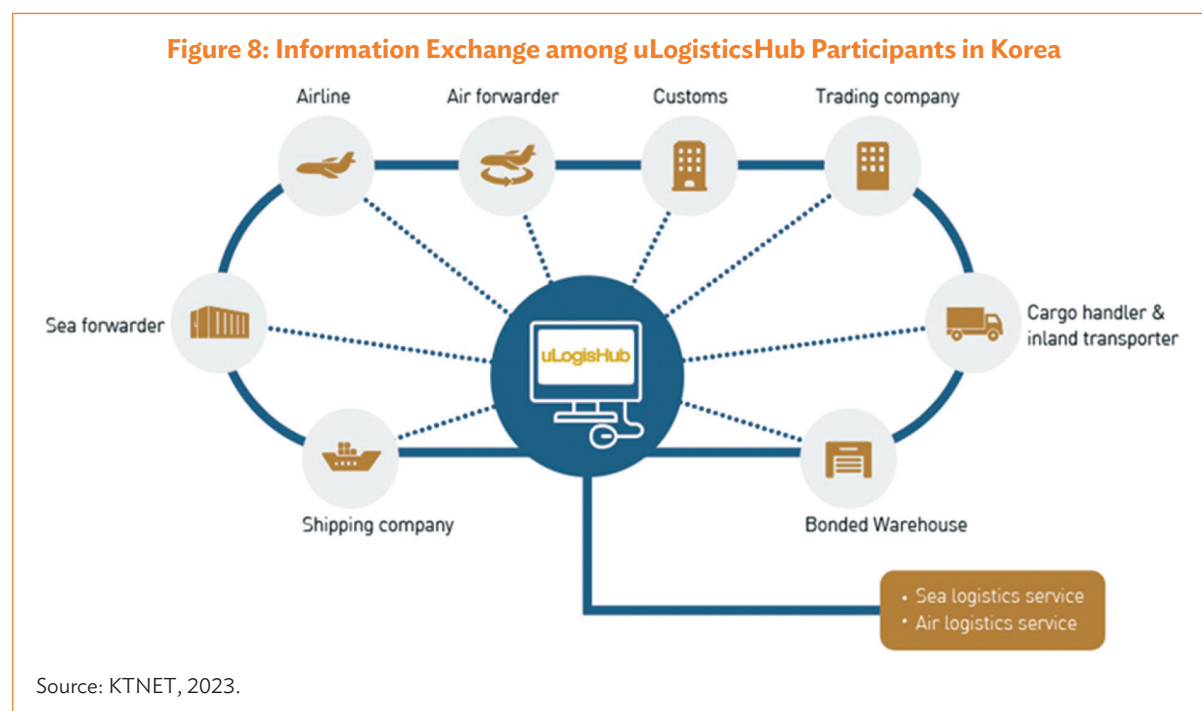
- carrier registration;
- regulation compliance and violation information;
- truck tracking information through connection to road transport departments;
- shipping tracking information;
- e-booking, electronic waybill through connection to port authorities;
- information services such as e-booking, freight rates inquiry, etc.
- Customs clearance through link or interface with Customs departments.

Figure 7: One-Stop Shop Service Approach by LOGINK



Source: LOGINK, 2023.

86. **Korea Trade Network (KTNET-Single Window)⁵⁰ and its logistics multimodal platform uLogisHub** are connected to the information systems of transport carriers of all major modalities – sea, air and road, as well as customs, bonded warehouses, logistics centers and trading companies. On this basis, a wide range of electronic logistics services are provided, such as sea logistics, road logistics and aviation logistics. The information interaction of the uLogisticsHub participants and clients is shown in Figure 8.



The uLogisHub was implemented on the same technological platform with KTNET and that makes Korean Single Window solution very effective and capable of providing an extensive portfolio of services to clients with the following benefits:

- use of a comprehensive package of paperless trade, eLicensing and eLogistics services by authorizing KTNET clients without installing additional programs;
- services for exchanging, storing and monitoring data in a stable paperless trading, transportation and logistics environment;
- improved service efficiency by enabling logistics companies to process their B2G and B2B information transactions quickly and accurately;
- competitively priced EDI rates as well as customized and flexible services portfolio to the clients.

E. UNECE and UN/CEFACT Activities

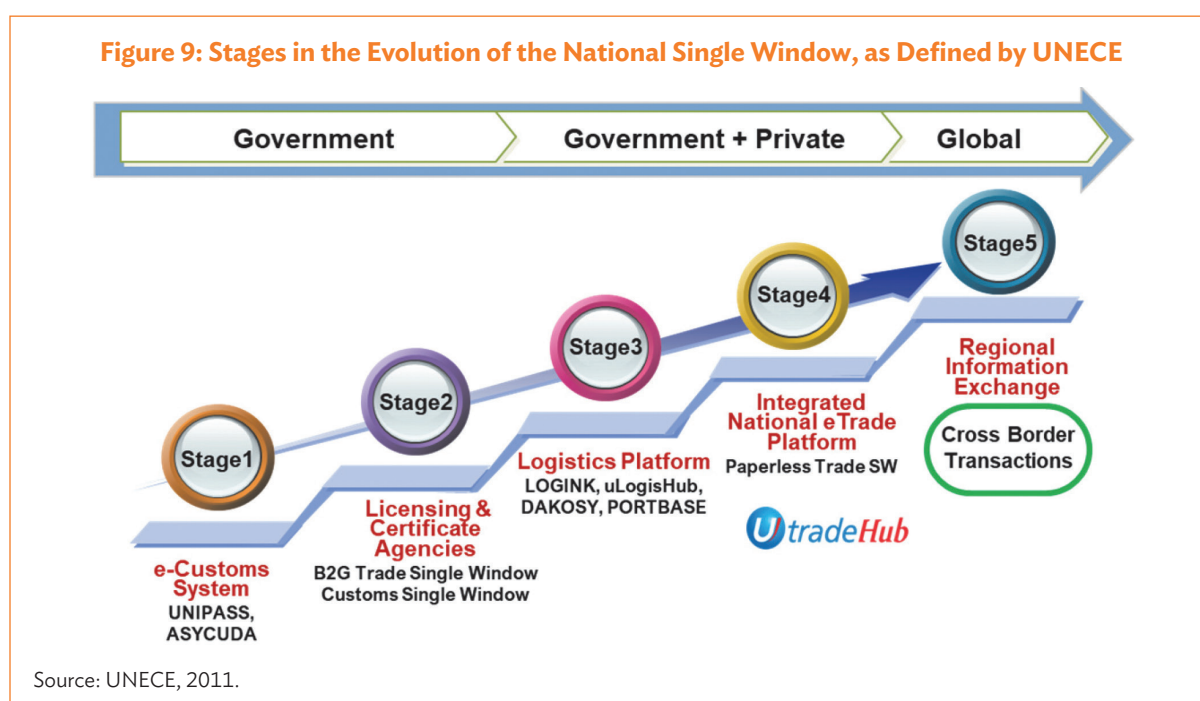
87. The best international practices prove that coordinated digitalization of trade, transport and logistics processes based on the national Single Window is considered to be the important success factor for the CAREC corridors development cycle: Transport corridor > Trade Corridor > Economic corridor. In this respect it's worthwhile considering the basic recommendations of the UNECE-UN/CEFACT expert community which were originally discussed and formulated at the international forum "Paperless Trade in

⁵⁰ https://www.ktnet.com/board/viewStaticHtmlPage.do?viewName=ktnet_re/comp_prof_en.

International Supply Chains: Enhancing Efficiency and Security”⁵¹. The main objective of this event was to develop the joint vision of the parties involved on the common approaches to the paperless trade, transport and logistics. As a result, the “Roadmap towards paperless trade” was agreed, clarifying the main issues and made general recommendations and policy-oriented suggestions to governments and businesses in order to build paper-free trade environment. The main stages for this Roadmap implementation are considered to be as follows:

- i. Development of a paperless e-Customs system.
- ii. Integration of administrative and regulatory bodies engaged in export/import procedures, to enable e-Licensing and certification procedures.
- iii. Creation of the national logistic platforms, connecting administrations, TLS companies and the service providers.
- iv. Creation of integrated national eTrade platform uniting all the systems into the national paperless trade Single Window (NSW).
- v. Integration of NSW platforms into regional and international information-exchange networks and alliances.

The evolution diagram of these stages is illustrated in Figure 9 with some references to the famous systems and platforms implemented at the market.



88. In 2020–2022 UNECE developed a set of projects dedicated to the harmonization of standards for the digitalization of data and document exchange in multimodal transport and trade⁵². The objective was to use the UN/CEFACT standards and the UN/CEFACT Multimodal Transport Reference Data Model (MMT RDM), to provide for interoperability and data exchange between documents and TLS modes. This should enable the seamless information exchange in digital corridors of the international supply chains. The use of UN standards and modern digitalization tools, provided as core solutions in the form of available public products, helps to improve the efficiency and interoperability of international transport and trade corridors.

⁵¹ https://unece.org/sites/default/files/datastore/fileadmin/DAM/trade/forums/forum05/roadmap/roadmap_oct05.pdf.

⁵² <https://unttc.org/stream/electronic-trade-and-transport-documents-and-data>.

89. As a result of the UNECE projects described above, a package of standards was developed for the digitalization of key documents accompanying goods transported by various modes. Making data sets in these documents interoperable with the UN standards, TLS participants will ensure the interoperability along transport corridors and supply chains. The UNECE project objectives were not to impose ready-made formats of electronic documents to the various stakeholders, but to provide solutions for interoperability based on the usage of modern technologies such as XML and JSON API. Practical cases were piloted, such as the digitalization of the multimodal Bill of Lading and pilot tests of the semantic interoperability concept focusing on multimodal cargo transportation.

90. UN/CEFACT Multimodal Transport Reference Data Model (MMT RDM)⁵³ is a common semantic framework and a set of standards for the digital exchange of product and logistics information in supply chains, ensuring interoperability across different systems and modes of transport, from air freight to maritime, railway and road transport. It enables the unification of data (on cargo, documents, and transactions) for automated processing and increased efficiency, without replacing legal norms, but creating a common language for their digitalization. The MMT RDM provides the effective standardization tools which can be used for TLS data description, categorization and sharing. As such MMT RDM users can achieve interoperability in their business information exchanges.

91. The above concept was effectively used by UN/CEFACT experts in the development of the roadmap for digitalization of multimodal data documents exchange along the TITR corridor using relevant UN standards which was requested in 2023 at the SPECA Ministerial Meeting⁵⁴. In the course of this project initiative a working definition of digital corridor for trade and multimodal transport was proposed and included the following main components:

- a. an electronic platform (or combination of platforms) connecting TLS participants to share information on the status of cargo transportation;
- b. it's used as the basis for accepting digital data by regulatory agencies and economic operators;
- c. enables regional data exchange and requires regional integration;
- d. facilitates the free information flow and ensures data protection and cybersecurity;
- e. involves several layers of information to be provided by TLS participants in the course of cargo transportation and data submission to authorities.

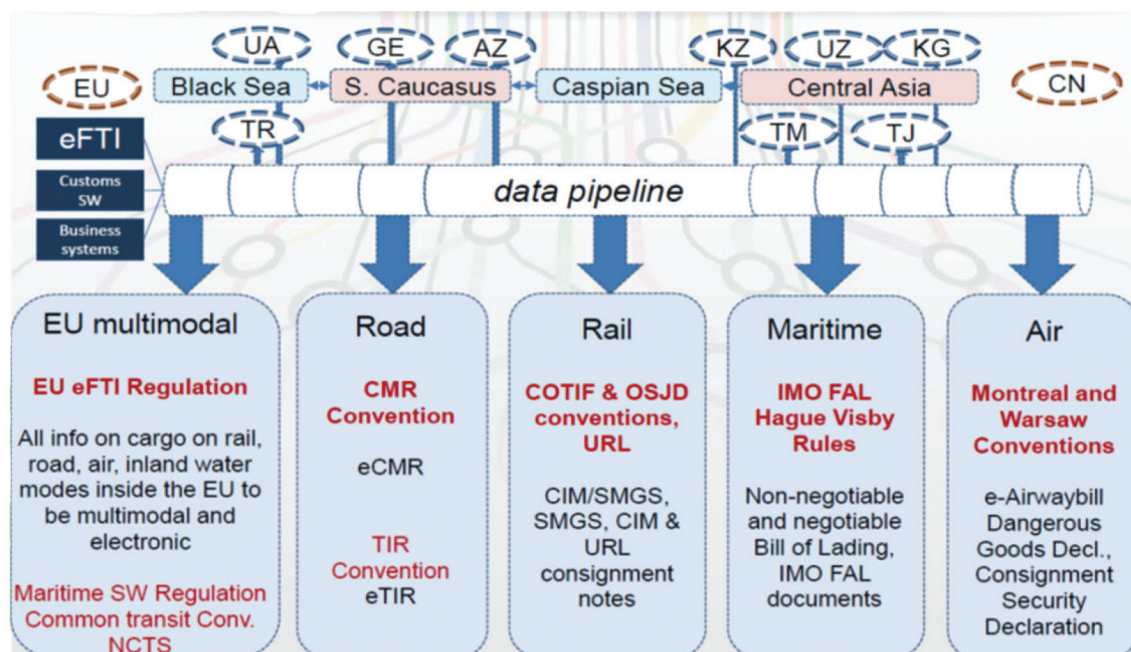
The important conclusions were made that for digital corridor formation it would be necessary to use national platforms supporting this multimodal data exchange in the countries along TITR corridor. And for these national platforms connectivity it's essential to use the concept of a data pipeline (see section 148 of this report). The digitalization scheme proposed by the UNECE–UN/CEFACT experts for Trans-Caspian corridor digitalization is shown in Figure 10.

92. All the above UNECE–UN/CEFACT project initiatives created the basis for developing the “roadmap for a digitalization of multimodal data and document exchange along the Trans-Caspian transport corridor using relevant UN legal instruments and standard” which was adopted at the SPECA Summit in November 2023⁵⁵. This Roadmap includes the vision statement for the region declaring that from 2027 economic operators and competent authorities in the SPECA participating countries shall start using electronic freight transport data from economic operators in line with relevant UN standards and these data will be interoperable between TLS and the relevant transport modes in the TITR corridor.

⁵³ <https://unece.org/speca/documents/2024/02/presentations/13-multimodal-transport-reference-data-model-mmt-rdm-and-0>.

⁵⁴ <https://unece.org/info/SPECA/events/378247>.

⁵⁵ unece.org/sites/default/files/2023-04/SPECA%20Ministerial%20Meeting%2017.04.23%20Joint%20Ministerial%20Statement.pdf.

Figure 10: Digitalization Scheme Proposed for the Trans-Caspian (Middle) Corridor

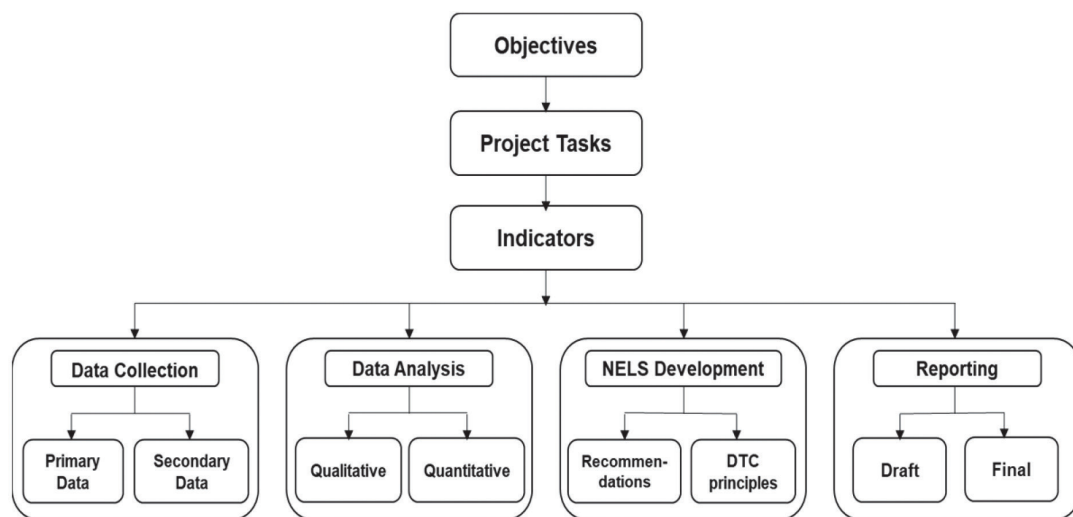
Source: UNECE, 2023.

DEVELOPMENT OF RESEARCH METHODOLOGY

IV

93. The research framework illustrated by the Figure 11 originates from the objectives, defines the specific tasks of the study and digitalization level indicators, focus on the data collection, analysis, development of practical recommendations, DTC principles, technological approaches and reporting.

Figure 11: The Study Framework



Source: Compiled by the author.

94. The framework has four attributes:

- i. **Fact-based and data driven.** The team considers all primary and secondary data, coming from the TLS stakeholders selected. Findings and conclusions are supported by national programs, resolutions of relevant governmental bodies and official statistical data.
- ii. **Extensive stakeholders' engagement.** Public- and private-sector stakeholders and non-governmental organizations (including development partners) are considered for consultative sessions.
- iii. **Usage of established methodologies for data collection and analysis.** The team uses only proven and established tools and techniques.
- iv. **Practical actions.** This applies to recommendations with the prescribed actions which shall be specific, relevant, feasible and time-based.

95. The Study objectives have been specified in Table 3. Taking into account these objectives, the following research methodologies were proposed and used:

- a. data collection for the field research;
- b. assessment of TLS digitalization level with the evaluation and analysis of the country's basic indicators;
- c. business requirements analysis for NELS implementation;

- d. road map developments for the NELS project implementation in the particular countries;
- e. development of digital passports for transport corridors national segments and recommendations for the corresponding digitalization actions.

96. The following table demonstrates how the proposed methodologies were applied to achieve the particular objectives of the Project. The detailed description of the proposed methodologies is provided in sections 98–101.

Table 3: Alignment of Project Objectives and Methodologies

Project Objectives	Methodologies
1. Individual field research and evaluation of the digitalization level in transport and logistics sectors of CAREC countries involved;	Task was accomplished based on methodology B adopted and tested in the course of the UNECE–UN/CEFACT projects implemented in the EaP and SPECA countries in 2023–2024
2. Identification of major needs and opportunities for the development of the core solution for interoperable national e-Logistics platforms in the particular CAREC country based on modern digital technologies and leading international practices;	Task was accomplished based on methodologies C–D and analysis of the best international practices and recommendations for the development of NELS platforms included in the studies of UNESCAP experts in 2016 ^a and 2024 ^b as well as the core NELS solutions developed and adopted in the course of the EU4Digital and DTC projects in the EaP, EAEU and SONCA sub-region of UNESCAP
3. Development of recommendations for implementation of national e-Logistics platform projects in the countries involved, including governance and operational models with Public–Private Partnership options;	Task was accomplished based on the methodologies D as well as the best practices and expertise gained in 2020–2024 in the course of development of the roadmaps and recommendations for the implementation of national e-Logistics platforms in the EaP countries, namely: Belarus, Georgia and Ukraine
4. Development of the main principles and technological approaches for digitalization of the national segments of international transport corridors in the CAREC countries and their connectivity/integration.	Task was accomplished based on the main DTC concept and technological approaches developed in the EU, EaP, EAEU and SPECA countries in 2019–2023

^a <https://www.unescap.org/resources/regional-study-use-logistics-information-systems-increased-efficiency-and-effectiveness>.

^b <https://repository.unescap.org/items/7d4ba9a2-3222-4779-a47e-dd3f0ca09fd9>.

Source: Compiled by the author.

97. **The primary and secondary data were collected** in the course of the field research comprising of the four main components.

The first component consists of key TLS stakeholders' interviews which were conducted by national consultants in the countries involved. The purpose was to solicit primary information based on structured questionnaires which allowed flexibility to explore specific aspects of TLS digitalization.

The second component consists of primary data and information which was collected based on structured questionnaires and interviews with core market players including transport operators (railway and trucking companies), shipping lines, freight forwarders, and cargo owners. The selection of companies and organizations for surveys was also made by the respective national consultants.

The third component was focused on collecting data from the organizations that deal with the particular transport corridors digitalization activities, in particular: TRACECA secretariat, TITR association and its Digitalization Working Group, ADB Transport Division, OTS Working Group.

The fourth component consisted of secondary data and information which were drawn from various databases and reports related to the subject of investigation in this study. Reports of international organizations such as the ADB, EBRD, UNECE, UNESCAP and UN/CEFACT provided useful references to complement those obtained from primary sources.

98. **The methodology for assessment of TLS digitalization level** was originally developed and used in the course of the EU4Digital project implemented in the Eastern Partnership countries in 2019–2020. Later on, in 2023–2024 this methodology was upgraded in the course of UNECE projects for gap analysis of the implementation of the package of standards for digitalization of multimodal data and documents exchange in Azerbaijan and a number of Central Asian countries⁵⁶. This methodology is using the extended list of basic indicators for the TLS digitalization level evaluation in the particular countries and assessing as well the level of application of international standards (UN/CEFACT) in the digitalization of basic transport and logistics processes and documents. The proposed list of indicators is presented in Table 4.

Table 4: List of Basic Indicators for the Proposed Assessment Methodology

Basic Indicators	Type of Electronic Document (UN/CEFACT Standards)
Level of the electronic document development	e-CMR e-SMGS e-Packing List e-Invoice Air Waybill Bill of Lading XML schemes Data Requirements Specification Business Requirements Specification (BRS)
Core Information Systems in transport modalities	Railway Road Transport Sea Ports Aviation
Stages of business process analysis, harmonization of documents and data, standardization of information exchange	Standardization of electronic information exchange and development of standardized electronic documents Simplification and harmonization of data, development of a national model based on the MMT RDM Simplification and harmonization of conventional documents Analysis of transport and logistics processes
TLS organizations and Business associations	Responsible for the analysis, harmonization, standardization and digital transformation of transport and logistics processes and documents
International treaties and conventions	Signing of existing international treaties and conventions governing the use and exchange of electronic documents and data in the transport and logistics sector
Regulatory acts/programs	Specialized regulatory acts and government programs for the digitalization of the economy and Transport and Logistics Sector
Legislative framework	Laws on electronic trade/commerce, electronic document and digital signature, Customs Code, etc.
National strategy	Strategies/programs for the development of the transport and logistics sector
UN/CEFACT single window	Creation of single window systems based on the UN/CEFACT recommendations
National trade facilitation body	A functioning national trade facilitation body endowed with the necessary powers and status

Source: Compiled by the author.

Fundamental trade facilitation elements were added to the list of basic indicators, because without implementation of these measures the digitalization of transport and logistics processes would not have a solid regulatory, administrative, managerial and industrial basis. In particular, these measures included:

- establishing an effective national trade facilitation body endowed with necessary powers;
- adopting a national strategy/program for the TLS development and digitalization;
- creating/updating the necessary enabling legislative framework, including laws on electronic trade/commerce, electronic documents, digital signatures, Customs Code, and others;
- adopting major regulatory acts/programs for the digitalization of the national economy and individual sectors;

⁵⁶ <https://unttc.org/documents/digitalization-data-and-document-exchange-multimodal-transport-and-trade-azerbaijan-using>.

- e. accession to existing international treaties and conventions governing the usage and exchange of electronic documents and data in the transport and logistics sector;
- f. establishing industry institutes/organizations responsible for the analysis, harmonization, standardization and digital transformation of transport and logistics processes and documents.

In the course of the assessment the following qualitative approach was used for the three-level gradation of the particular indicator by their marking of different colors:

	Red colour indicates TLS areas/indicators where no practical or legal solution has been implemented at the national level
	Yellow indicates areas where a legal framework has been established or a pilot project is ongoing, but there is no practical result of the particular digitalization activity
	Green colour indicates a high level of digitalization of functioning electronic documents or technologies in real TLS business processes

99. **Methodology of business requirements analysis for NELS implementation** is based on the business process reengineering (BPR) approach focused on the digital transformation of business processes in the TLSs of CAREC countries, as well as the development of a comprehensive NELS development roadmap. The BPR methodology relies on an analysis of IT systems used in the TLSs, international standards, and best practices to develop business requirements for NELS functionality and a comprehensive implementation roadmap for such a system. The proposed analytical approach includes three main stages:

- a. The first stage is devoted to analyzing the current level of TLS digitalization of the in CAREC countries based on field research. At this BPR level, the analysis includes an understanding of current business processes and the implemented ICT systems supporting these processes. This stage includes an analysis of business requirements through surveys and interviews with various stakeholders. Furthermore, this stage can include an analysis of existing ICT systems and their integration.
- b. The second phase is about the development of NELS platform architecture and modules specification. The functional architecture can be developed together with the NELS governance and operational model envisaged for the NELS project implementation.
- c. The third phase is focused on the development of implementation plan as the main component of the roadmap to the NELS platforms creation in CAREC countries. In the course of the project the national experts and the whole team proposed preparatory roadmaps that can guide the incremental implementation of the NELS platforms projects in CAREC countries with the corresponding structure of their main stages.

100. **The methodology for NELS projects road map development** was adopted based on UNESCAP recommendations for the national Single Window projects implementation⁵⁷. In the course of NELS implementation projects in the CAREC countries the following main stages are to be envisaged and planned:

- a. Regulatory stage – at this stage the necessary legal framework shall be adopted to ensure the proper information exchange between economic operators and competent authorities in the TLS.
- b. Organizational stage – at this stage the governmental bodies and agencies involved shall:
 - Finalize NELS project governance and financial model;
 - Define sources of financing;
 - Develop the project Terms of Reference with technical specification of NELS modules;
 - Develop project Implementation Schedule and estimate costs of its stages;
 - Arrange Procurement Procedures and selection of Project prime contractor
- c. Development and Deployment stage – at this stage NELS core modules and services are to be developed and deployed.
- d. Integration and Piloting stage – at this stage the NELS connection/integration with regulatory systems of governmental bodies and existing platforms in TLS sector shall be implemented and pilots arranged

⁵⁷ Roadmap: Evolution of Single Window – <https://www.unescap.org/sites/default/files/6%20-%20The%20Roadmap-%20Evolution%20of%20Single%20Window.pdf>.

for test information exchanges with all stakeholder agencies and platforms as well as for provision of NELS core services.

- e. Operational stage – this stage includes the nomination or formation of NELS operational company, planning and financing of NELS maintenance and evolution, extension of services portfolio, SLAs with clients.
- f. Capacity building stage for NELS participants and clients in the TLS sector.

101. Methodology for the development of digital passports for national segments of transport corridors

is considered to be the extension of approaches to the formation of electronic passports for transport corridors based on the methodology for passportization of railway in the Organisation for Cooperation between Railways (OSJD) countries⁵⁸. Electronic passports of OSJD transport corridors are intended to accumulate and provide users with information on transport infrastructure, operational parameters, traffic volumes, transportation terms and services of DTC national segments. Such passportization makes it possible to create a unified information bank for analyzing the state of transport infrastructure and freight flows along corridors, assessing the effectiveness of certain routes and the priority of their development. Accumulated and updated data provide for the opportunity to manage the implementation of coordinated transport policy measures during the development of the international transport corridor in the CAREC region.

By analogy with the above mentioned approach, the concept of transport corridor Digital Passport was developed in the course of TRACECA digitalization activities⁵⁹ and can be defined as block of information about elements of the digital infrastructure of the corridor national segments, including IT systems and platforms used, means of communication, technological solutions for the processing and exchange of data and electronic documents used by participants in transportation processes, as well as the list of digital services provided. In general, the Digital Passport of the transport corridor national segment shall contain the following list of parameters:

- Layout and geographical location of the transport corridor nodes/terminals including BCPs;
- Transport and communication connectivity with other nodes/terminals and BCPs;
- Main cargo flows served by each node/BCP;
- Operator/operating company of the node/terminal;
- Used IT systems, platforms and technological solutions;
- Core technological process for cargo handling at the transport node or logistics center;
- List of documents used: paper and electronic – their usage in the technological process;
- List of provided digital/information services;
- Plans for modernization and digitalization.

The collection of relevant data and the compilation of such Digital Passports will enable governmental agencies and international organization involved to develop practical project activities for the digitalization of key transport corridors of the CAREC countries and coordinate their implementation. As far as the national segments of CAREC countries transport corridors are concerned, the task of developing and compiling their digital passports can be solved under the leadership of the CAREC Institute as the extension of CPMM methodology and activities.

⁵⁸ <https://osjd.org/ru/8948/page/106077?id=2883>.

⁵⁹ Digitalization of Freight Transport along TRACECA Corridor – 2023 presentation.

EVALUATION OF THE LEVEL OF TLS DIGITALIZATION AND RECOMMENDATIONS FOR THE IMPLEMENTATION OF NATIONAL E-LOGISTICS PLATFORM PROJECTS

102. Methodologies described in sections 98–101 were effectively used for the data collection and assessment of TLS digitalization level in the CAREC countries involved. In this chapter the assessment results are presented individually for each country with the analysis of major needs and opportunities for the development and creation of the multimodal national e-Logistics platforms based on modern digital technologies and leading international practices. Finally, the preliminary recommendations for the implementation of NELS platform projects are proposed, including governance and operational models with Public–Private Partnership options.

A. Azerbaijan

103. The review of national strategies and programs related to the TLS digitalization in Azerbaijan is presented in the chapter II-A. The list of the main governmental bodies/agencies responsible for their governance and implementation in the country as well as the core stakeholders of our project in this country includes:

- Azerbaijan Ministry of Digital Development and Transport;
- Coordinating Council of the Republic of Azerbaijan on Transit Freight
- Azerbaijan Ministry of Economy;
- Center for Analysis of Economic Reforms and Communication;
- State Customs Committee;
- AZCON (Azerbaijan Transport and Communications) Holding;
- AYNA (Azerbaijan Land Transport Agency);
- Azerbaijan Railways;
- Azerbaijan State Aviation Agency;
- State Maritime and Port Agency;
- State Civil Aviation Agency;
- Silk Way Airlines company;
- Innovation and Digital Development Agency;
- Freight Forwarders Association of Azerbaijan;
- Azerbaijan Caspian Shipping company;
- Artificial Intelligence Lab company;
- Absheron Logistics Center.

The list of stakeholder representatives involved in the study is placed in Annex I.

104. Summary results for the evaluation of Azerbaijan TLS digitalization level are presented in Table 5.

105. As a result of the analysis of TLS digitalization indicators in Azerbaijan the following conclusions can be made.

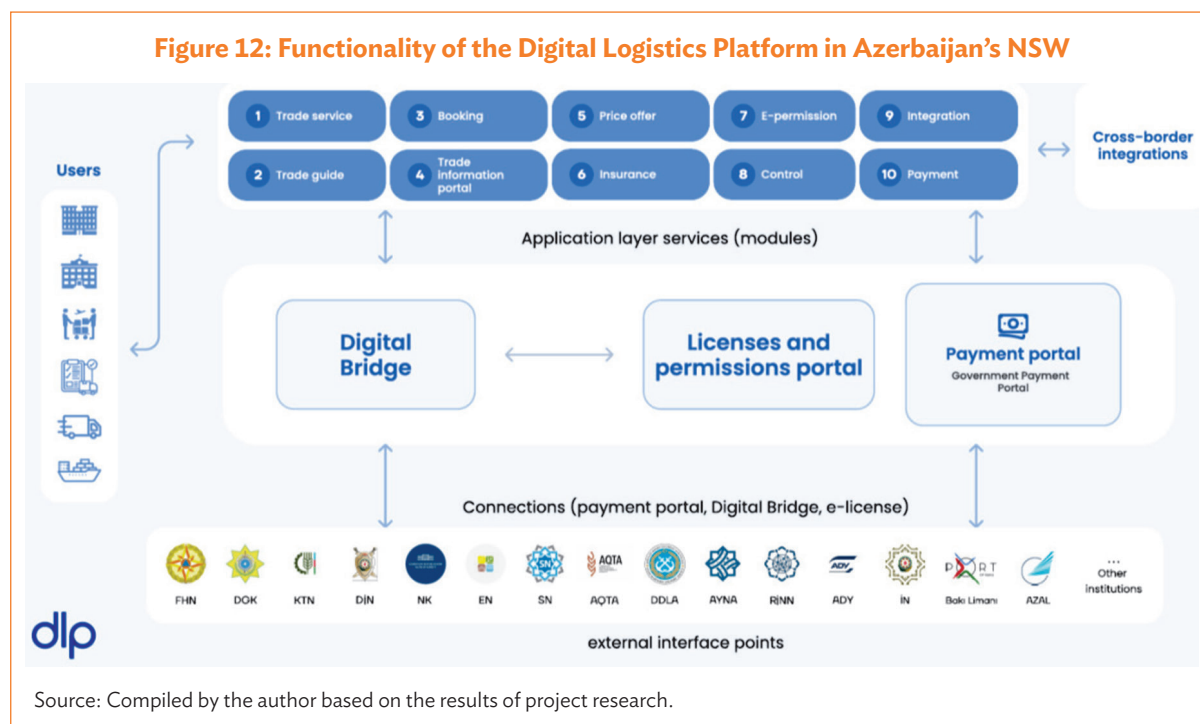
Functions of National trade and transport facilitation bodies in Azerbaijan are performed by the Ministry of Economy and Azexport portal.

Table 5: Evaluation Results for the Level of TLS Digitalization in Azerbaijan

Basic Indicators	Type of Electronic Document (UN/CEFACT Standards)							
	e-CMR	e-SMGS	e-Packing List	e-Invoice	e-Air Waybill	e-Bill of Lading	eTIR	e-Permit
XML schemes								
Data Requirements Specification								
Business Requirements Specification (BRS)								
Core Information Systems (IS) in transport modalities	Railway • ADY Smart Platform • CIM/SMGS electronic consignment note implemented • Currently implementing 2023–2026 Digitalization Program with the following systems under development: – Automation of transportation management system; – Automation of the asset management system; – Building a customer-oriented cargo and commercial system; – Digitalization of management of CAPEX project; – Automation of corporate functions Road transport AYNA Information System, including the following sub-systems: • Special permits for the movement of oversized or heavy vehicles • “E-Carriers” – Information subsystem that ensures registration of information about entrepreneurs performing passenger and cargo transportation • “Digital tachograph” • “E-Permit” – Creation of an electronic system that ensures the registration, distribution, issuance and return of bilateral, transit, as well as 3rd-country “Permission” forms exchanged within the framework of the quota in international transportation. Sea ports In 2023 Port of Baku started implementation of Port Management Information System (PMIS), which connects multiple systems to plan, control and execute various port operations. Aviation No specific IS. For Customs clearance a scanned copy of the document is received by Customs. Import – scanned version of Airway Bill uploaded as PDF as an accompanying document while crossing the border							
Stages of business process analysis, harmonization of documents and data, standardization of information exchange	A number of standardized documents are being developed, but work on standardizing cross-border information exchange has not begun Simplification and harmonization of data, development of a national model for multimodal transport not started yet Analysis of TLS business processes was undertaken in 2022–2023 in the course of the development of TRACECA Digital concept, but mainly for road cargo transportation							
International treaties and conventions	International agreements and conventions on road transport CMR/e-CMR, railway freight transport SMGS/e-SMGS, maritime transport and air transport have been signed for all modes of transport							
Current TLS development programs	• “Strategy of socio-economic development of the Republic of Azerbaijan in 2022–2026” with the dedicated tasks planned for TLS development and digitalization • Action Plan for 2024–2026 on increasing the transit potential of international transport corridors							
Legislative framework	• Law “On electronic signature and electronic document” (2004); • Law “On Electronic Commerce” (2005) • Customs Code of the Republic of Azerbaijan (2011); • Law “On Transport” (2009)							
National strategy	• Digital development concept for 2025–2030 (2025) • Action Plan for 2024–2026 on increasing the transit potential of international transport corridors passing through the territory of the Republic of Azerbaijan and promoting transit cargo transportation (2023) • “Strategy of socio-economic development of the Republic of Azerbaijan in 2022–2026” (2022) • Strategic Road Maps for the national economy and main economic sectors (2016)							
UN/CEFACT Single Window	National Single Window (SW) has been developed in Azerbaijan since 2008 based on e-Customs system and is currently on modernization stage with the development of SW portal and Digital Logistics Platform							
National trade facilitation body	• Ministry of Economy • Azexport portal							

Source: Compiled by the author based on the results of project research.

National Single Window has been developed since 2008 based on eCustoms system with extended eLicensing capabilities and is currently in the process of modernization with the development of the integrated SW portal and Digital Logistics Platform (DLP) functionality as shown in Figure 12.



Azerbaijan national strategy for TLS digitalization is outlined in the dedicated chapters and action plans of the Strategy of socio-economic development in 2022–2026 (see chapter II – A).

Legislative framework in Azerbaijan includes all necessary regulatory acts for the successful development and implementation of the national and multilateral projects in the field of TLS digitalization.

Current TLS development programs are based on the National Strategy 2022–2026, Action Plan for increasing the transit potential of international transport corridors and governed by the Ministry of Digital Development and Transport together with the Coordinating Council of the Republic of Azerbaijan on Transit Freight and subordinate state agencies.

International treaties and conventions – Azerbaijan joined and ratified the main international agreements and conventions for all modes of transport, including for road freight CMR/e-CMR, railway freight SMGS/e-SMGS, maritime and aviation.

TLS business processes analysis, harmonization and standardization of data and documents – the preliminary analysis of TLS business processes was undertaken in 2022–2023 in the course of the development of TRACECA Digital concept, but mainly for road cargo transportation. In view of merging Baku port Alyat with Azerbaijan railways⁶⁰ the new business processes re-engineering and standardization activities are planned by the ADY-led Working Group on TITR digitalization.

Core Information Systems in transport modalities have been actively developed and deployed in Azerbaijan since the reorganization of the core Ministry and transport Agencies, in particular:

⁶⁰ <https://www.prospekti.org/post/azerbaijan-s-strategic-move-merging-baku-port-with-ady>.

In the Railway transport:

- ADY Smart platform providing “one-stop” service to freight owners for the online tariff calculations;
- e-CIM/SMGS implementation for exchange of electronic documents in pilot mode between the Azerbaijan-Georgia and Azerbaijan-Kazakhstan railways;

In the framework of ADY Digitalization Transformation Project for 2023–2026⁶¹ financed by ADB the full digitalization and integration of ADY’s key business processes in one data management system will be completed. In the course of the project the following sub-systems will be developed and installed in this integrated data management system for:

- a. cargo operation management;
- b. asset management;
- c. investment, planning and construction management;
- d. cargo commercial management;
- e. corporate functions.

ADY project includes installation of all hardware components (servers, cables, workstations, auxiliary equipment). The new system will be capable of exchanging data with any government and nongovernment system.

In the Road transport:

- Special permits for the movement of oversized or heavy vehicles – system for issuing permits for the movement of vehicles transported domestic and international cargo loaded with indivisible goods exceeding the parameters of dimensions and weight on public highways.
- “E-Carriers” – AYNA information subsystem that ensures registration of information about entrepreneurs performing passenger and cargo transportation.
- Digital tachograph – this service allows applications and documents for issuing digital tachograph cards to be received for international cargo transportation.
- “E-Permit” – AYNA electronic subsystem that ensures the registration, distribution, issuance and return of bilateral, transit, as well as 3rd-country “Permission” forms exchanged within the framework of the quota in international transportation.

In Sea ports – In 2023 Port of Baku started implementation of Port Management Information System (PMIS), which connects multiple systems to plan, control and execute various port operations. PMIS has been implemented in accordance with Single-Window paradigm with phased works conducted towards integration with Kazakhstan’s Aktau, Kuryk, and Turkmenbashi ports in the Caspian Sea, as well as with the State Customs Committee and “Azerbaijan Railways” JSC within the country.

Level of international standardized electronic documents development – for this indicator the Business Requirements and Data Requirements specifications have been developed for e-SMGS/e-CIM, Packing List and e-Invoice standardized documents in the railway transportation. The development of the e-CMR, e-Air Waybill and e-Bill of Lading is currently at the initial Business Requirements Specification (BRS) stages. The assessment results of the overall level for main standardized electronic documents implementation in Azerbaijan are presented in Annex II to the report with the review of the regional and national activities on eTIR and e-CMR implementation.

The analysis of the evaluation results allows us to conclude that Azerbaijan has demonstrated a strong commitment and national plans to succeed in TLS digitalization and position the country as an important logistics hub in the cross-road of the main transport corridors in the East–West and North–South directions. The centralized governance structure with the dedicated Ministry, Coordinating Council on Transit Freight and AZCON holding helps to consolidate technical and financial resources in order to implement the necessary elements of digital infrastructures and national platforms in accordance with the country strategies. The main practical tasks are considered to be the successful completion of the Single Window modernization

⁶¹ <https://www.adb.org/projects/58049-001/main>.

with the embedded digital transport and logistics platform enabling integration of the technological systems in transport modalities at the national level and interoperability with transport and logistics platforms of neighboring countries.

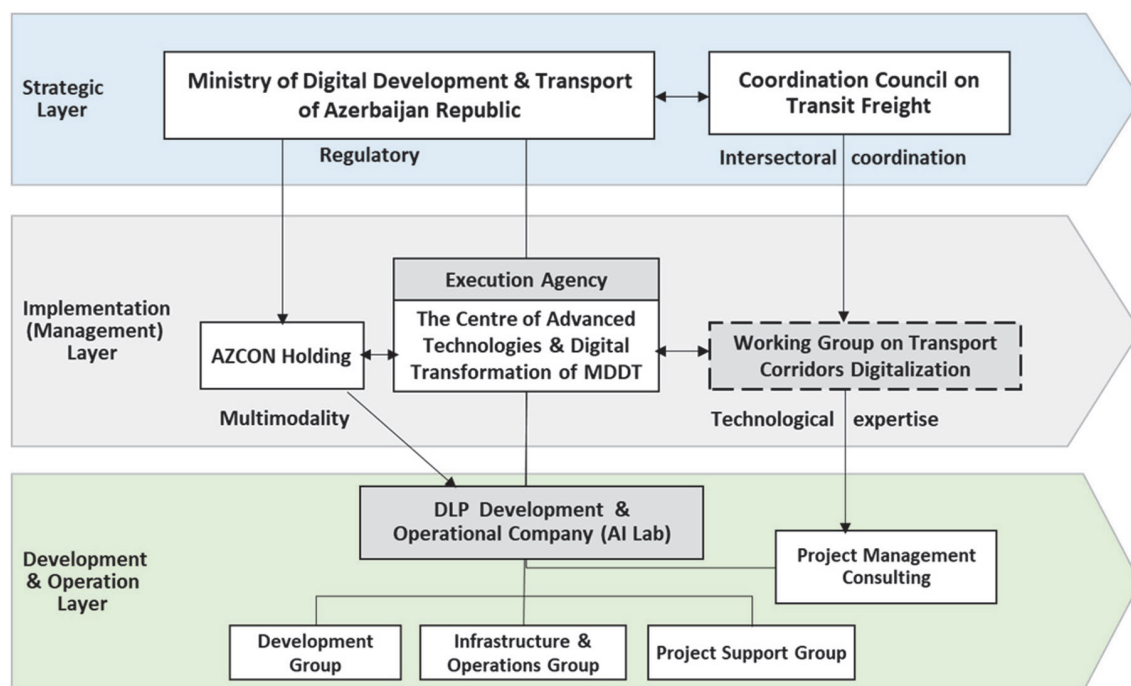
106. The development of the digital transport and logistics platform in Azerbaijan was initiated in 2023 in accordance with the “Action Plan on increasing the transit potential of international transport corridors passing through the territory of the Republic of Azerbaijan and promoting transit cargo transportation”⁶². Besides the task to create a system that ensures the integration of participants of international transport and logistics operations on a single digital platform is also included in the Strategy of socio-economic development of the Republic of Azerbaijan in 2022–2026. In this respect the platform development activities were delegated to the AI Lab company subordinate the Ministry of Digital Development and Transport.

As it was mentioned in the previous section the functional modules for digitalization of transport and logistics operations are included in the development of modernized version of the Azerbaijan NSW. All that create the promising opportunities to implement in one development cycle the functionality of the NELS type of Digital Logistics Platform (DLP) integrated with the national SW trade platform in accordance with UN/CEFACT recommendations specified in section 87 of this report. Such technological solution and prototype with extended integration capabilities can be used as the core NELS platform MVP version and adopted by other CAREC countries in the course of their TLS digitalization projects.

107. The governance model developed and proposed in cooperation with our project national expert for the NELS – DLP platform project implementation in Azerbaijan is shown in Figure 13 and includes three layers: strategic, management and implementation, development and operation.

At the project strategic layer, the Ministry of Digital Development and Transport (MDDT) of Azerbaijan Republic is acting as the main governmental body responsible for the supervision and deployment of DLP in

Figure 13: Governance Model for DLP Project Implementation in Azerbaijan



Source: Compiled by the author based on the results of project research.

⁶² <https://president.az/ru/articles/view/62314>.

the country. The Coordination Council on Transit Freight is in charge of transport corridors development and digitalization plans.

At the project implementation and management layer, the MDDT Center of Advanced Technologies and Digital Transformation is considered to act as the execution body responsible for DLP platform ToR development including its functionality, evolution and integration with other governmental systems and TLS platforms of other countries. To develop the DLP platform additional functionality for the cross-border information exchange and interoperability with similar platforms in the DTC data pipelines it's recommended to form the specialized Working Group on Transport Corridors Digitalization under the Coordination Council on Transit Freight.

In order to ensure the efficiency of the project development process, representatives of the private sector and industry associations as well as external experts are to be invited to the Working Group meetings. The AZCON Holding which manages the core state enterprises in transport modalities shall coordinate their activities related to the development of digital infrastructures and integration with DLP as well as supervise the DLP operational company (together with the Execution Agency).

At the project development and operational layer, the AI Lab company is acting as the main body for the platform development and maintenance as well as its integration with the national SW and TLS platforms of other countries. The DLP operational company can be created in the form of PPP Joint Venture responsible for this platform management, operations and evolution, (see recommended options in section F of this chapter). Such operational company shall be in charge of the development and provision of DLP services portfolio and might have in its structure a number of divisions: Project Support, Infrastructure and Operations, Business Development. At this stage of the project cycle the involvement of the external Project Management consultants can be valuable with the expertise in the digital services portfolio development, its promotion and commercialization at the market.

The roles and responsibilities of all the above parties to be involved in the DLP project implementation are described in Table 6.

Table 6: Main Participants in the DLP Platform Project in Azerbaijan

Organization	Role and Responsibility
Ministry of Digital Development and Transport	- Executive decision-making body for the TLS digitalization projects - Supervises the DLP project development cycle - Pan-government promotion of TLS digitalization policy and DLP project
Coordination Council on Transit Freight	- Coordinates the activities among relevant state authorities - Makes decisions related to the transport corridors development
Working Group on Transport Corridors Digitalization	- Discuss and develop recommendations for the transport corridors digitalization - Prepare other relevant documents and submits to the Council for approval
Centre of Digital Transformation in MDDT	- Manages and supervise the DLP project, defines the project scope - Evaluate and accept project deliverables - Liaise with Working Group and AZCON on main issues related to the project
AZCON Holding	- Coordinates project activities in different transport modalities - Supervises the operational activities of the DLP operator
AI Lab (DLP development and operations)	- DLP development and maintenance - Integration with governmental and TLS systems - Training and knowledge transfer to DLP users
Project Management Consulting	- Joint business consultancy and digital technologies group to support implementation of DLP project - Consultation and advise on the digitalization of TLS process and related system
DLP operator, Project Support Group	- Management of DLP project standards and quality - Support for communication with Execution Agency - Support for training and technology transfer
DLP operator, Development Group	- Technical design and development of DLP modules, program applications and services - Test and delivery of program applications
Infrastructure and Operations Group	- Delivery of the required digital infrastructure – HW and SW - Installation, test, training and maintenance of DLP

Source: Compiled by the author based on the results of project research.

108. The following main stages for DLP platform development project in Azerbaijan are envisaged and recommended:

- a. Regulatory stage – at this stage the necessary legal framework shall be adopted to ensure the proper information exchange between economic operators and competent authorities in the TLS.
- b. Organizational stage – at this stage the Ministry of Digital Development and Transport shall finalize the roles of DLP development and maintenance body as well as decide on the status and legal form of DLP future operational company.
- c. Development and deployment stage – at this stage DLP core modules, multimodal functionality and services are to be developed and deployed.
- d. Integration and piloting stage – at this stage the DLP connection/integration with SW and regulatory systems of governmental bodies and existing transport modality platforms in Azerbaijan shall be implemented and pilots arranged for test information exchanges with core stakeholders for provision of DLP services.
- e. Operational stage – this stage includes the nomination or formation of DLP operational company, planning and financing of the platform maintenance and evolution, extension of services portfolio, SLAs with clients.
- f. Capacity building stage for DLP participants and clients in the Azerbaijan TLS sector shall be planned and the corresponding training courses organized by the DLP operational company.

In the course of the DLP project implementation the following gaps revealed shall be addressed:

- lack of connectivity and interoperability between transport modality systems;
- reliance on scanned documents instead of machine-readable formats;
- partial use of WCO–UN/CEFACT standards

B. Kazakhstan

109. The review of national strategies and programs related to the TLS digitalization in Kazakhstan is presented in the chapter II-B. The list of the main governmental bodies/agencies responsible for their governance and implementation in the country as well as the core stakeholders of our project include:

- Ministry of Digital Development, Innovation and Aerospace Industry;
- Digital Kazakhstan Group of Ministry of Digital Development;
- Ministry of Transport of the Republic of Kazakhstan;
- Transport Control Committee;
- Border Control Services;
- Kazakhstan Customs, State Revenue Committee;
- Sovereign Wealth Fund of Kazakhstan “Samruk-Kazyna”;
- Kazakhstan Railways – Kazakhstan Temir Zholy (KTZ);
- KTZ Express / KTZ Cargo;
- Kazpost (National Post and Logistics Operator);
- Aviation Administration of Kazakhstan;
- ATAMEKEN – Association of the National Freight Forwarders;
- Kazakhstan Association of Freight Forwarders (KAFF);
- National Information Technologies Joint-Stock Company;
- Globallink Logistics;
- Trans-Asia Logistics.

The list of stakeholder representatives involved in the study is placed in Annex I.

110. Summary results for the evaluation of Kazakhstan TLS digitalization level are presented in Table 7.

Table 7: Evaluation Results for the Level of TLS Digitalization in Kazakhstan

Basic Indicators	Type of Electronic Document (UN/CEFACT Standards)							
	e-CMR	e-SMGS	e-Packing List	e-Invoice	e-Air Waybill	e-Bill of Lading	eTIR	e-Permit
XML schemes								
Data Requirements Specification								
Business Requirements Specification (BRS)								
Core Information Systems in transport modalities	Railway - Implementation of an automated system of contractual and commercial work control – ACS VDCs (ASU DKR) at Kazakhstan Railways (KTZ) - Pilot use of the Customs module of the GlobalDTC platform - Implementation software and systems KTZ Cargo Reporting, which uses AI for predictive maintenance and automated cargo handling. - Cooperation with Huawei and Wabtec Corporation to modernize network infrastructure facilities. - Automated document management system “Electronic Train” Road Transport - Pilot implementation eTIR (Digital TIR Carnets): - Pilot for integration of the information and analytical system transport database with the CarGoAlem system. - E-Government integration: Automation of customs and trade documentation through platforms like e-Licensing and e-Customs. - Implementation of ITS for the freight tracking and route optimization. - In 2022, the Unified Transport Document Management System (UTDMS) was developed and deployed. Sea Ports - Implementation of a terminal operating system (TOS) in the port of Kuryk. - Aktau and Kuryk ports deploy digital cargo clearance systems. - Vessel traffic management information system (VTS) in the port of Aktau with its subsequent integration with the VTS of Kuryk and Bautino ports. Aviation - Integration of the transportation process at cargo airports and hubs with the E-freight air cargo electronic support system, - Smart Transport Systems: Pilot projects in Astana and Almaty utilizing IoT for traffic and freight management. - Integration with regional systems like ASYCUDA World. - ASTANA-1 System: An automated customs clearance platform reducing processing times by 30%.							
Stages of business process analysis, harmonization of documents & data, standardization of information exchange	A number of standardized e-Documents are under development and piloting, but the work on standardization of the cross-border information exchange was begun just in 2025.							
	Simplification and harmonization of data, development of a national model for multimodal transport data and e-Documents have not been done yet							
	Analysis and re-engineering of digitalized transport and logistics processes were conducted back in 2019–2020 during the concept development of the EAEU DTC ecosystem, new studies are planned by TITR Association in view of the Middle Corridor active digitalization activities							
International treaties and conventions	Kazakhstan has signed international agreements and conventions on: - Road transport (CMR/e-CMR), - Railway freight transport (SMGS/e-SMGS), - Maritime transport, - Air transport.							
Current TLS development program/Concept	Kazakhstan’s TLS digital transformation is underpinned by the implementation unified National Transport and Logistics Strategy, emphasizing Kazakhstan’s potential as a transit hub, including: - Expansion of digital technologies to improve logistics and transit flow. - Establishment of a unified digital platform for all logistics stakeholders. - Accession and implementation of e-CMR and e-SMGS protocols. - Deployment of cargo tracking and escort services along routes. - Integration of transport operations into a national 24/7 digital platform (e.g., eCustoms, settlements, storage).							

continued on next page

Table 7 *continued*

Basic Indicators	Type of Electronic Document (UN/CEFACT Standards)
Legislative framework	• Law on Transport (2003, as amended) • Law “On Informatization” (2016, amended) • Law “On Digital Assets” (2020, amended 2023) • Customs Code of the Eurasian Economic Union (2018) • Technical Regulations of the EAEU and the Republic of Kazakhstan • Law “On Public–Private Partnerships” (2015, amended)
National strategy	• Strategy Kazakhstan-2050 • State program “Digital Kazakhstan” (2018–2022) • State program of infrastructural development “Nurly Zhol” (2020–2025) • National Development Plan of the Republic of Kazakhstan until 2025 • Plan of the Nation “100 Steps to Implement Five Institutional Reforms” • Concept for the development of Kazakhstan Transport and Logistics Potential by 2030
UN/CEFACT Single window	Kazakhstan is currently developing a National Single Window for foreign trade based on the Digital Trade Platform. Currently, the data flowing into the platform is in digital format, but full automation and interoperability are still under development.
National trade and transport facilitation body	• Ministry of Digital Development, Innovations and Aerospace Industry of the Republic of Kazakhstan • Ministry of Trade and Integration of the Republic of Kazakhstan • Ministry Transport of the Republic of Kazakhstan • Sovereign Wealth Fund of the Republic of Kazakhstan “Samruk-Kazyna”

Source: Compiled by the author based on the results of project research.

111. As a result of analysis of TLS digitalization indicators in Kazakhstan the following conclusions can be made.

National trade and transport facilitation bodies include a number of Ministries which have got different zones of responsibilities and overlapping market interests which might complicate the consolidated decisions related to the complex multimodal TLS digitalization projects. To streamline the development of such multisectoral projects and harmonize market interests of the core Ministries involved it’s advisable to set up a sort of Coordination Committee/Council under the aspis of the Cabinet of Ministers or the Sovereign Wealth Fund of the Republic of Kazakhstan “Samruk-Kazyna” which is the major stakeholder of the main state transport, logistics and digital infrastructure enterprises and companies.

National Single Window is under construction in Kazakhstan based on Digital Trade Platform and has already got the core e-Customs component, e-Licensing system and provides import-export services. So far, the country started in 2025 the development of the national multimodal transport and logistics platform SmartCargo to be integrated into the Single Window in accordance with UN/CEFACT recommendations (section 86).

Kazakhstan national strategy includes a number of state programs approved in the different periods of time with cross-cutting project plans and initiatives. The latest and most comprehensive one is considered to be the “Concept for the development of Kazakhstan Transport and Logistics Potential by 2030” which has got the extensive list of practical projects to be implemented. In view of the recent waves of reorganizations of the core Ministries and main market players involved it’s worthwhile updating these projects list and delegating them to the most capable development parties.

Legislative framework in Kazakhstan includes all main regulatory acts required for the successful development and implementation of the national and multilateral projects in the field of TLS digitalization.

Current TLS development program – TLS digital transformation in Kazakhstan is underpinned currently by the implementation of the unified National Transport and Logistics Strategy, emphasizing Kazakhstan’s potential as a regional transit hub, including:

- expansion of digital technologies to improve logistics and transit flow;
- establishment of a unified digital platform for all logistics stakeholders;

- accession and implementation of e-CMR and e-SMGS protocols;
- deployment of cargo tracking and escort services along routes;
- integration of transport operations into a national 24/7 digital platform (e.g., eCustoms, settlements, storage).

International treaties and conventions – Kazakhstan is actively participating in the development and piloting of organizational and technical solutions for the electronic transport documents in the framework of the international treaties and conventions, in particular:

- e-SMGS** – is partially implemented for rail transport, mostly for operational use in rail freight with PRC and Russia and aligned with OSJD standards, in coordination with KTZ. Some freight operators and exporters already use e-SMGS for shipments to/from Kazakhstan. The legal basis for e-SMGS in Kazakhstan is well-established, supported by national digitalization laws, EAEU regulations and TRACECA agreements.
- eTIR** – is issued to foreign trade participants by the authorized organization KazATO in paper form, and then along the entire route of the cargo it is presented to the customs and other authorities of transit countries in paper form, due to the fact that to date Kazakhstan has not fully joined the international electronic eTIR system. At the same time, a pilot project on eTIR is currently under implementation in cooperation with Uzbekistan.
- e-Permit** – Kazakhstan has been using E-Permit in test mode in trade with Uzbekistan to speed up transport operations and increase trade and transport flow between the two countries. In general, this work is carried out within the framework of the Organization of Turkic States.
- e-CMR** – At this moment Kazakhstan is the only country in Central Asia that has not joined yet the e-CMR protocol. However, efforts were undertaken to facilitate this process and interdepartmental coordination is taking place. In addition, recent amendments in Kazakhstan regulatory framework for the adoption of international treaties have complicated the process for acceptance of the e-CMR protocol.

TLS business processes analysis, harmonization and standardization of data and documents – analysis and re-engineering of digitalized transport and logistics processes were originally undertaken back in 2019–2020 during the development of the EAEU DTC ecosystem and new studies are planned by TITR Association in view of the Middle Corridor digitalization activities. Simplification and harmonization of TLS data, development of the national model for multimodal transport data and e-Documents have not been done yet. A number of standardized e-Documents are under development and piloting, but the work on standardization of the cross-border information exchange was started just in 2025.

Core Information Systems in transport modalities have been actively developed and deployed during the last 10 years, in particular:

In the Railway transport:

- Implementation of an automated system of contractual and commercial work control – ACS VDCs (ASU DKR) at Kazakhstan Railways (KTZ), which effectively manage rail freight and is designed to automate the process of formation of the monthly applications, transportation paperwork and payments.
- In 2023 a pilot use of the Customs module of the DTC platform – Tez Customs was successfully implemented regarding automatic registration and auto-issuance of a transit declaration during end-to-end transit to third countries along the Altynkol – Saryagash and Dostyk – Brest-North routes.
- Implementation software and systems Wabtec, Pangu Model Huawei, TMS, KTZ Cargo Reporting. Kazakhstan Temir Zholy (KTZ) uses AI for predictive maintenance and automated cargo handling.
- Cooperation has begun with Huawei and Wabtec Corporation to modernize network infrastructure facilities, create a Competence Center, use modern cloud solutions, use AI.
- Implementation of an automate document management in transportation “Electronic Train” in the railway cargo transportation.

In the Road transport:

- Implementation eTIR (Digital TIR Carnets) – electronic transit documentation in partnership with the International Road Transport Union (IRU).
- In 2023 a pilot project was launched to issue foreign permit forms of the PRC type “C” at checkpoints with PRC through the integration of the information and analytical system transport database with the CarGoAlem system.
- E-Government integration: Automation of Customs and trade documentation through platforms like e-Licensing and e-Customs.
- Implementation of Intelligent Transport Systems (ITS) for freight tracking and route optimization.
- To convert into electronic format consignment notes and waybills in freight and passenger road transport, in 2022, the Unified Transport Document Management System (UTDMS) was developed and deployed.

In Sea ports:

- Implementation of a terminal operating system (TOS) in the port of Kuryk.
- Aktau and Kuryk ports deployed digital cargo clearance systems.
- Vessel traffic management information system (VTS) in the port of Aktau with its subsequent integration with the VTS of Kuryk and Bautino ports.

In Aviation:

- Integration of the transportation process at cargo airports and hubs with the E-freight air cargo electronic support system, in order to increase the attractiveness of Kazakhstan as a transit aviation hub. It was intended for electronic registration and support of cargo transportation by air, preparation of electronic cargo transportation documents.
- Smart Transport Systems: Pilot projects in Astana and Almaty utilizing IoT for traffic and freight management.

In Customs:

- ASTANA-1 and KEDEN Customs Systems: An automated Customs clearance platform reducing processing times by 30%.
- Paperless trade facilitation via integration with regional systems like ASYCUDA World.

Level of international standardized electronic document development – for this indicator just the development of Business Requirements Specification (BRS) for e-Invoice was started in line with the UN/CEFACT international standard. The development of the remaining standardized electronic documents is currently at the initial planning stages. The assessment results of the overall level for main standardized electronic documents implementation in Kazakhstan are presented in Annex II to the report with the review of the regional and national activities on eTIR and e-CMR implementation.

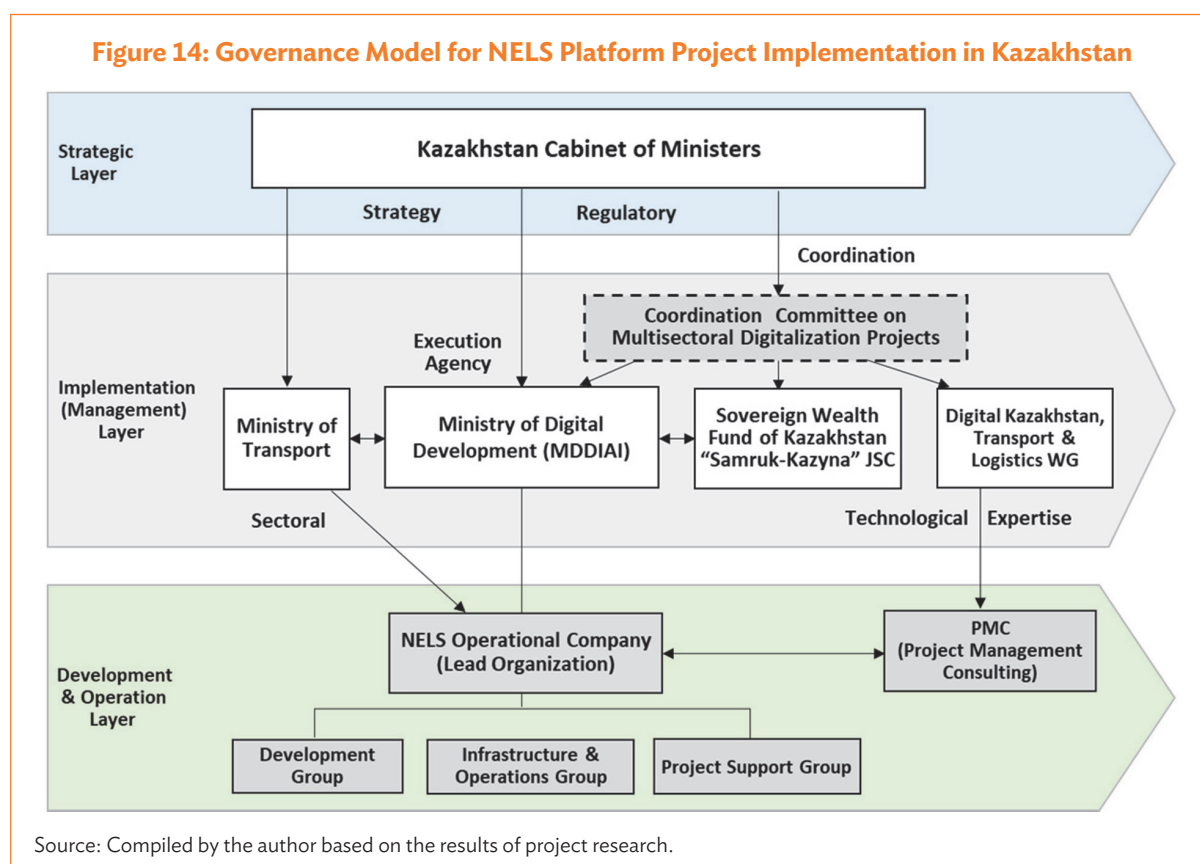
The analysis of the evaluation results supports the conclusion that Kazakhstan has demonstrated significant progress in digitalizing its transport and logistics sector and positioning the country as one of the leaders in CAREC’s digital integration activities. However, achieving full integration of the technological systems in transport modalities at the national level and interoperability with transport and logistics platforms of neighboring countries require additional efforts and further policy coordination, technological upgrades and private sector engagement.

112. For multisectoral digitalization projects coordination, it’s recommended to set up the corresponding Committee/Council under the auspices of the Cabinet of Ministers or the Sovereign Wealth Fund of the Republic of Kazakhstan “Samruk-Kazyna”. Such coordination body can activate discussions and decide on the development of the national multimodal transport and logistics platform to be integrated in the Single Window as well as review and actualize the list of relevant projects in the Concept for the development of

Kazakhstan Transport and Logistics Potential by 2030. That could help to consolidate resources and focus TLS core stakeholders on the implementation of the unified National Transport and Logistics Strategy and build the national digital platform enabling integration of transport operations in the country and cross-border connectivity with the similar platforms in CAREC region. To succeed in such strategic project actions, it's worthwhile adopting the best international practices and recommendations for the development of NELS platforms capable of serving the multimodal transport and logistics operations and provide effective cross-border information exchange based on standardized data sets and edocuments.

113. The following steps for TLS digitalization specified in the Action Plan for the implementation of the Concept for the development of transport and logistics potential of the Republic of Kazakhstan can be used as the ground for NELS platform project initiation: step No. 67 – Development and implementation of information systems to improve the efficiency of interaction between different modes of transport in multimodal transport and step No. 66 – Development and implementation of the information and analytical system “Digital Corridors”. The recommendations for such project implementation were developed in cooperation with Kazakhstan national expert and in accordance with methodology described in section 99 of this report.

114. The governance model developed and proposed for the NELS platform project implementation in Kazakhstan is shown in Figure 14 and includes three layers: strategic, management and implementation, development and operation.



At the project strategic layer, the Government of the Republic of Kazakhstan shall act as the main governmental body to initiate and supervise the NELS project development cycle. The coordination of this strategy implementation can be provided by the Coordination Committee on Multisectoral Digitalization Projects in Kazakhstan, which can include representatives of the main governmental bodies responsible for the

TLS sector. Within the Coordination Committee, the specialized Working Group on eLogistics and DTC shall be created to discuss and prepare recommendations in the course of different stages of NELS project Feasibility Study and implementation. To increase the efficiency of the project development process, representatives of the private sector and industry associations shall be invited to the Working Group and to the Coordination Committee sessions.

At the project management and implementation layer, the Ministry of Digital Development, Innovations and Aerospace Industry (MDDIAI) in cooperation with the Ministry of Transport of the Republic of Kazakhstan and relevant TLS companies owned by the Sovereign Wealth Fund of Kazakhstan “Samruk-Kazyna” shall initiate the Feasibility Study for NELS creation in the country.

Based on the results of the feasibility study, MDDIAI will develop the Terms of Reference for the NELS platform implementation project, as well as arrange procurement procedures for the selection of a prime contractor to become the NELS platform development and operational company.

At the project development and operation layer, the prime contractor will act as the Lead Organization authorized by the governmental decision for NELS platform development, maintenance and operational activities. The roles and responsibilities of all the above parties to be involved in the NELS project implementation in Kazakhstan are described in Table 8.

Table 8: Main Participants in the NELS Platform Project in Kazakhstan

Organization	Role and Responsibility
Government of the Republic of Kazakhstan	Executive decision-making body for the TLS digitalization projects
Coordination Committee on Multisectoral Digitalization Projects	Coordination and cooperation with ministries and governmental organizations involved in TLS digitalization and NELS project implementation
Ministry of Digital Development, (MDDIAI) Ministry of Transport of the Republic of Kazakhstan	- MDDIAI – Execution Agency of the NELS platform project: - Development of the NELS project ToR; - Organization of procurement procedures and selection of the prime contractor - Ministry of Transport is to be involved for ToR development for main issues related to NELS platform functionality
Sovereign Wealth Fund of Kazakhstan “Samruk-Kazyna” (Transport and Logistics portfolio companies)	- Transport and Logistics Portfolio Companies of Sovereign Wealth Fund of Kazakhstan “Samruk-Kazyna” JSC: - promotion of TLS digitalization policy and NELS project in the Fund - Executive decision-making body for the strategic execution of NELS project - Decisions on the project scope, resource requested, governance model in Fund portfolio companies
Digital Kazakhstan and its Transport and Logistics WG	- Management and supervision of NELS Project implementation - Liaise with Coordination Committee on main Issues related to NELS project
Project Management Consulting	- Joint business consultancy and digital technologies group to support implementation of NELS platform - Consultation and advice on the digitalization of TLS process & related system
NELS operator, Project Support Group	- Management of NELS project standards and quality - Support for communication with Execution Agency - Support for training and technology transfer
NELS Operator, Development Group	- Analysis, technical design and development of NELS modules, program applications and services - Test and delivery of program applications - Training and technology transfer of NELS users
Infrastructure and Operations Group	- Delivery of the required digital infrastructure – HW and SW - Installation, test, training and maintenance of NELS platform

Source: Compiled by the author based on the results of project research.

115. The following main stages for NELS platform development project in Kazakhstan are envisaged and recommended:

- a. Regulatory stage – at this at this stage the necessary legal framework shall be adopted to ensure the proper information exchange between economic operators and competent authorities in the TLS.
- b. Organizational stage – at this stage the governmental bodies and agencies involved shall establish the Coordination Committee on Multisectoral Digitalization Projects and initiate the Feasibility Study for NELS platform implementation. As a result of this Study the detailed road map has to be developed for NELS project implementation including ToR and procurement process for the prime contractor selection.
- c. Development and deployment stage – at this stage NELS platform core modules and services are to be developed and deployed by the prime contractor.
- d. Integration and piloting stage – at this stage the NELS platform connection/integration with regulatory systems of governmental bodies and existing platforms in transport modalities shall be implemented and pilots arranged for test information exchange with core TLS stakeholders for provision of NELS platform services.
- e. Operational stage – this stage includes the nomination or formation of NELS operational company, planning and financing of NELS maintenance and evolution, extension of services portfolio, SLAs with clients.
- f. Capacity building stage for NELS participants and clients shall be planned and the corresponding training courses organized by the NELS operational company

In the course of the NELS platform implementation the following gaps revealed shall be addressed:

- overlapped institutional responsibilities;
- lengthy accession to e-CMR protocol;
- fragmentation and lack of connectivity between transport modality systems;
- limited cross-border interoperability;
- lack port community system connection with Azerbaijan

C. Kyrgyz Republic

116. The review of national strategies and programs related to the TLS digitalization in Kyrgyz Republic is presented in the chapter II-C. The list of the main governmental bodies/agencies responsible for their governance and implementation in the country as well as the core stakeholders of our project in this country includes:

- Ministry of Transport and Communications
- Development Partners Coordination Council (DPCC);
- National Trade Facilitation Council of the Kyrgyz Republic;
- Ministry of Digital Development;
- Ministry of Economy and Finance;
- State Customs Service;
- State Enterprise “Tulpar Single Window”;
- State Enterprises “Tunduk” and Infocom;
- Kyrgyz Railways
- Transport Operators’ Associations/Trucking Unions (Kyrgyz Auto Transport Union);
- Kyrgyz Association of Freight Forwarders (KAFF);
- Chamber of Commerce and Industry of Kyrgyz Republic;
- Multifunctional Global Hub.

The list of stakeholder representatives involved in the study is placed in Annex I.

117. Summary results for the evaluation of Kyrgyz TLS digitalization level are presented in Table 9.

Table 9: Evaluation Results for the Level of TLS Digitalization in the Kyrgyz Republic

Basic Indicators	Type of Electronic Document (UN/CEFACT Standards)						
	e-CMR	e-SMGS/ e-CIM	e-Packing List	e-Invoice	e-Air Waybill	eTIR	e-Permit
XML schemes							
Data Requirements Specification							
Business Requirements Specification (BRS)							
Core Information Systems (IS) in transport modalities	Railway Kyrgyz Temir Zholu (KTZh) – Digital Freight System Road transport ASU-T Information System – Transport Management Information System Aviation Civil Aviation Information System (AIS) linked to IATA and ICAO The national interoperability platform “Tunduk” operates under the Digital Development Ministry operates as the interdepartmental electronic interaction systems “Tunduk” system of the Kyrgyz government (data exchange layer).						
Business process analysis, harmonization of documents and data, standardization of information exchange	Kyrgyz Republic has not yet adopted a national transport/logistics data model aligned with MMTRDM. There is no government/industry roadmap for this yet. Some simplification activities have occurred through Customs reform and trade facilitation projects (e.g., WTO TFA commitments), but conventional documents still lack cross-agency harmonization TLS process analysis conducted under donor projects (ADB, UNECE, UNESCAP), but no comprehensive, institutionalized or recurring national-level business process reengineering effort is in place.						
International treaties and conventions	Kyrgyz Republic has joined and signed the major international agreements on trade facilitation and conventions on road transport CMR/e-CMR, railway freight transport SMGS/e-SMGS and air transport						
Current TLS development programs	- National Trade Facilitation Roadmap (2021–2025). - President’s decree on creation of digital green transit corridors through Kyrgyz Republic to third countries (2022) - National Strategy for Railway Development (2018–2040)						
Legislative framework	- Law “On Transport” (1998) - Law “On Automobile Transport” (2013) - Law “On Railway Transport” (2016) - Law of “On Electronic Governance” (2017) - Law on Digital Signature (2017) - Law “About Customs regulation (???) - Law “Law on Electronic Commerce” - Law “About licensed authorization system” (2024)						
National strategy	- National Development Strategy of the Kyrgyz Republic until 2040. - National Trade Facilitation Roadmap (2021–2025).						
UN/CEFACT Single Window	The “Tulpar system” is the official Single Window Information System (SWIS) designed to automate cross-border trade formalities, the Ministry of Economy and Commerce is responsible for system development.						
National trade facilitation body	National Trade Facilitation Council of the Kyrgyz Republic established in 2017						

Source: Compiled by the author based on the results of project research.

118. As a result of analysis of TLS digitalization indicators in Kyrgyz Republic the following conclusions can be made.

The main National Trade Facilitation body is considered to be the National Trade Facilitation Council of the Kyrgyz Republic, established by the government decree in July, 2017 and serves as the official national body to coordinate and implement trade facilitation reforms as required under Article 23 of the WTO Trade Facilitation Agreement. The Council comprises high-level representatives from government ministries (Economy, Transport, Customs, Border Services, Digital Development, etc.).

The main objective of Single Window Tulpar project is to enable seamless electronic data submission across trade documents. With active backing from WCO, UNESCAP, and UN/CEFACT, the system is expanding into cross-border pilot projects and regional integration and creating a modern, interoperable national trade facilitation mechanism. The Tulpar system is operated by the state enterprise “Single Window Centre” known as the One Stop-Shop Center, which accepts applications and supporting documents electronically, processes submissions via the NSW and provides guidance and training to clients.

National strategies are based on the 2040 development vision and National Trade Facilitation Roadmap (2021–2025) which emphasize digital infrastructure and e-governance as central priorities. The Kyrgyz Republic has progressively aligned its national digital development agenda with the regional vision of fostering a digitally interconnected, inclusive, and resilient Central Asia. The alignment is evident across five key pillars outlined in the strategy: digital infrastructure, digital skills, digital platforms and services, public sector transformation, and inclusive digital participation.

Legislative framework in Kyrgyz Republic includes all main regulatory acts required for the successful development and implementation of the national and multilateral projects in the field of TLS digitalization. But the country lacks sector-specific legislation for transport logistics, especially around electronic transport documents (e.g., e-CMR, e-SMGS), data standardization and interoperability and legal mandates for integration across transport/logistics actors. There is no dedicated TLS digitalization law or regulatory act and that complicates coordination across the ministries involved (Transport, Digital Development, Customs, etc.).

Current TLS development programs are considered to be the National Strategy for Railway Development, the National Trade Facilitation Roadmap and the Presidential Decree on creation of digital green transit corridors through Kyrgyz Republic to third countries. This Decree launched a coordinated, multi-agency initiative to modernize border crossings, digitize transit processes, and establish eco efficient digital corridors through Kyrgyz Republic. However, challenges remain in harmonizing data systems, improving inter-agency coordination, and ensuring alignment with international standards.

International treaties and conventions – Kyrgyz Republic has made substantial progress in digitalization of trade and logistics transactions by using electronic transport documents in the framework of the international treaties and conventions, in particular:

- i. **e-CMR** was adopted in 2022 when Kyrgyz Republic ratified the e-CMR protocol (under the UN CMR Convention), formalizing the move to fully paperless goods transport. This initiative aims to eliminate physical consignment notes at each transit step, significantly reducing administrative delays and costs. As a land-linked but mountainous country, adopting e-CMR strengthens Kyrgyz Republic’s competitiveness in regional and international logistics.
- ii. **e-SMGS** – Kyrgyz Republic is a party to OSJD with some pilot work via international rail corridors (TRACECA/OSJD), but not yet fully implemented.
- iii. **eTIR** – in March 2022, Kyrgyz Republic became part of the IRU (International Road Transport Union)-supported Digital TIR/EPD system, standardizing electronic pre-declarations and customs guarantees. Implemented within frameworks operated by the OTS and GIZ (German Agency for International Cooperation), this digital transit regime allows carriers to submit guarantees and transit declarations electronically, streamlining procedures at borders and reducing delays and corruption risks.
- iv. **e-Permit** system facilitating electronic issuance of permits for international freight movement was rolled out in Kyrgyz Republic in April 2024. This initiative simplifies electronic issuance and verification of permits for cross-border freight trucking. By automating authorizations and integrating them with regional systems, it enhances speed, safety, and harmonization across Central Asia. This system is managed by the Ministry of Transport and Communications which takes the lead in developing and implementing the regional system (Asia Permit), aligned with similar platforms in neighboring countries (Uzbekistan, Kazakhstan, Tajikistan) to streamline issuance of electronic cargo permits.

TLS business processes analysis and standardization of data sets and documents – as for this indicator Kyrgyz Republic has not yet adopted a national transport/logistics data model. Some TLS process analysis activities were undertaken in the course of the donor projects (ADB, UNECE, UNESCAP), but no comprehensive, institutionalized or recurring national-level business process reengineering efforts are in place.

Core Information Systems in transport modalities have been actively developed and deployed during the last 7 years, in particular:

In the Railways – KTZh Digital Freight System for managing railway cargo transportation, booking, and tracking, managed by state-owned railway company JSC Kyrgyz Temir Zholu. It's digital features include digital consignment notes, tracking integration with neighboring countries' railway networks (Kazakhstan, Uzbekistan).

In the Road transport – ASU-T Information System (Transport Management Information System) for monitoring freight and passenger road transport permits, licensing, and border crossing, managed by Ministry of Transport and Communications (MTC). It is used for integration with customs and e-permit systems as well as for monitoring trucks crossing Kyrgyz borders under TIR or other international regimes.

In Aviation – Civil Aviation Information System (AIS) linked to IATA and ICAO systems for global compliance and managed by Civil Aviation Agency under the Ministry of Transport. The system manages flight schedules, aviation safety, air cargo clearance.

In Customs – Automated Information Customs System is operated for customs and border transport control managed by State Customs Service. It is integrated with the national interoperability platform “Tunduk”, ASU-T, eTIR, and Eurasian Economic Union (EAEU) customs systems. Main functions of the system are electronic declaration, transit control, and customs clearance.

Level of international standardized electronic document development – no comprehensive national initiative exists yet for standardizing electronic document formats or interoperable information exchange, efforts in this field are fragmented and sector-specific. For e-Air Waybill legal and technical conditions were recognized (via IATA standard) but not systematically applied by carriers and forwarders operating in Kyrgyz Republic. The e-Invoice is legally recognized under tax laws and partially used in domestic commerce and B2G transactions, but not widely adopted in transport logistics. The assessment results of the overall level for main standardized electronic documents implementation in Kyrgyz Republic are presented in Annex II to the report with the review of the regional and national activities on eTIR and e-CMR implementation.

119. This year Kyrgyz Republic is to complete its national Single Window program with the impressive practical results⁶³. The national Trade Facilitation Council noted its successful implementation with the main emphasis placed on the digitalization of trade processes and infrastructure improvements. The program extension and focus in 2025–2027 is to be placed on initiatives aimed at strengthening TLS connectivity and human capacity development. Special attention is to be paid to cooperation within CAREC region, where Kyrgyz Republic has proved to become an active player.

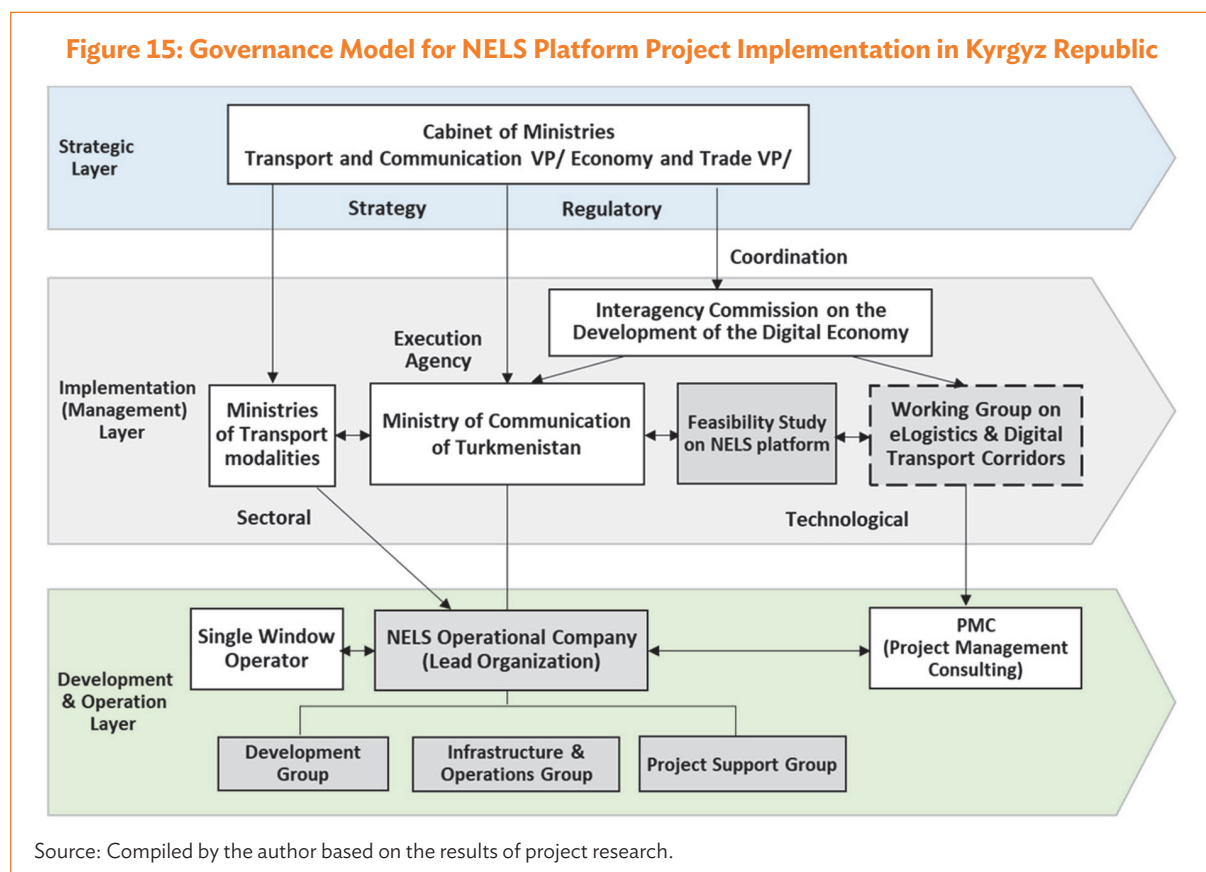
Kyrgyz Republic has cooperated with the ADB under CAREC-funded programs to enhance regional connectivity, including the modernization of cross-border data and customs systems. ADB's ongoing regional project, facilitating CAREC digital trade and transport, launched in 2023, aims to enhance digitalization of transport corridors under the CAREC program, with a focus in Kyrgyz Republic on data exchange with Kazakhstan and Uzbekistan at the Torugart, Irkeshtam and Dostuk borders. The project is to be completed in 2026. Another ongoing TLS digitalization activity in the DTC project (Central Asia + EAEU integration) with participation of Kyrgyz Republic, Kazakhstan, Uzbekistan, Russia. The main purpose of this project is to create a unified digital corridor for cross-border freight transport and tracking with the following components: E-waybills, e-permits, real-time cargo tracking.

⁶³ <https://www.akchabar.kg/en/news/kyrgyzstan-i-mezhdunarodnye-partnery-podveli-itogi-i-nametili-plany-po-uproshheniyu-torgovli>.

120. The analysis of the evaluation results allows us to conclude that the Kyrgyz Republic has progressively aligned its national digital development agenda with the regional vision of fostering a digitally interconnected TLS in CAREC region. However, the extension of NSW functionality and achieving full integration of the technological systems in transport modalities at the national level as well as interoperability with transport and logistics platforms of neighboring countries require additional efforts. To extend NSW functionality the Feasibility Study project could be proposed for NELS platform creation in Kyrgyz Republic with the following objectives (similar to Kazakhstan):

- Develop and implement the NELS platform as the third principal components of the national Single Window to support multimodal transport, data exchange among all supply chain participants and digitalization of transport corridors.
- Ensure interoperability of such platform with regional solutions (CAREC, TRACECA) and its adoption of international standards (UN/CEFACT, ITU recommendations).
- Integrate NELS platform with the Single Window system for automating export, import, and transit procedures.

121. The governance model developed and proposed in cooperation with our project national expert for the NELS platform project implementation in Kyrgyz Republic is shown in Figure 15 and includes three layers: strategic, management and implementation, development and operation.



At the project strategic layer, the Cabinet of Ministers of Kyrgyz Republic shall act as the main governmental decision-making body to initiate and supervise the NELS project development cycle. The coordination of this project implementation will be provided by the National Trade Facilitation Council which includes representatives of the main governmental bodies responsible for the trade and TLS sectors. Under the aspis of this Council the specialized Working Group on eLogistics and DTC shall be created to discuss and prepare recommendations in the course of different stages of NELS project Feasibility Study and its implementation.

At the project management and implementation layer, the Ministry of Transport and Communications, acting as the Execution Agency, in cooperation with the Ministry of Economy and Commerce shall analyze the Feasibility Study results and develop the Terms of Reference for NELS platform implementation project as well as arrange procurement procedures for the selection of prime contractor to become NELS platform development and operational company.

At the project development and operation layer, the prime contractor shall act as the Lead Organization authorized by the governmental decision for NELS platform development, maintenance and operational activities. At the development stage the Lead organization shall be working in close cooperation with the NSW operator – Single Window Center and the operator of the national interoperability platform “Tunduk” to ensure all these platforms connectivity and integration in the course of NELS deployment.

The roles and responsibilities of all the above parties to be involved in the NELS project implementation in Kyrgyz Republic are described in Table 10.

Table 10: Main Participants in the NELS Platform Project in the Kyrgyz Republic

Organization	Role and Responsibility
Ministry of Transport and Communications	- Supervises the NELS project development cycle - Defines the project scope, requested resources and governance model
National Trade Facilitation Council	- Coordinates the activities among relevant state authorities - Makes decisions related to the national platform's integration
Working Group on eLogistics and DTC	- Discuss and develop recommendations for the transport corridors digitalization - Prepares NELS Feasibility Study proposal and submits to the Council
Ministry of Economy and Commerce	- Supervises and manages the NSW development and NELS integration - Evaluates and accepts project deliverables
NELS Contractor (Lead Organization)	- NELS platform development and maintenance - Integration with governmental and TLS systems
Project Management Consulting	- Joint business consultancy and digital technologies group to support implementation of NELS project - Consultation and advise on the digitalization of TLS process and related system
NELS operator, Project Support Group	- Management of NELS project standards and quality - Support for communication with Execution Agency - Support for training and technology transfer
NELS operator, Development Group	- Technical design and development of NELS modules, program applications and services - Test and delivery of program applications
Infrastructure and Operations Group	- Delivery of the required digital infrastructure – HW and SW - Installation, test, training and maintenance of NELS

Source: Compiled by the author based on the results of project research.

122. The following main stages for NELS platform Feasibility Study project in Kyrgyz Republic are envisaged and recommended:

- Regulatory stage – at this stage the necessary legal framework shall be adopted to ensure the proper information exchange between economic operators and competent authorities in the TLS.
- Organizational stage – at this stage the Execution Agency shall implement the Feasibility Study for NELS creation in Kyrgyz Republic in order to evaluate and plan all technical and economic parameters of the project envisaged. As a result of the project ToR shall be developed and procurement procedures organized for the selection of NELS project prime contractor.
- Development and deployment stage – at this stage NELS core modules and services are to be developed and deployed by the prime contractor nominated.
- Integration and piloting stage – at this stage the NELS connection/integration with NSW, “Tunduk” systems and existing technological platforms in TLS sector shall be implemented with pilots arranged for test information exchanges with the national SW platform.

- e. Operational stage – this stage includes the nomination or formation of NELS operational company, planning and financing of NELS maintenance and evolution, extension of services portfolio, SLAs with clients.
- f. Capacity building stage shall be envisaged and implemented for NELS participants and clients in the Kyrgyz Republic TLS sector by the NELS operational company.

In the course of the NELS platform implementation the following gaps revealed shall be addressed:

- lack of unified TLS digitalization law and regulatory framework;
- limited business process reengineering activities;
- fragmentation and lack of connectivity between transport modality systems;
- limited cross-border interoperability with Kazakhstan, Uzbekistan and other CAREC countries.

D. Turkmenistan

123. The review of national strategies and programs related to the TLS digitalization in Turkmenistan is presented in the chapter II-D. The list of the main governmental bodies/agencies responsible for their governance and implementation in the country as well as the core stakeholders of our project in this country includes:

- Ministry of Communications of Turkmenistan;
- Ministry of Railway Transport of Turkmenistan;
- Ministry of Motor Transport of Turkmenistan;
- State Service for Maritime and River Transport of Turkmenistan;
- State Customs Service of Turkmenistan;
- Ministry of Finance and Economy
- Ministry of Agriculture and Environmental Protection
- Ministry of Trade and Foreign Economic Relations
- Ministry of Health and Medical Industry
- Ministry of Internal Affairs
- Main State Service “Turkmenstandartlary”
- State Commodity and Raw Materials Exchange of Turkmenistan
- Agency “Turkmemdemiryollary” (railway transport),
- Agency “Turkmenavtoulaglary” (road transport);
- Agency “Turkmedenizderyayollary” (maritime and river transport),
- Agency “Turkmenhovaellary” (aviation transport).

The list of stakeholder representatives involved in the study is placed in Annex I.

124. Summary results for the evaluation of Turkmenistan TLS digitalization level are presented in Table 11.

125. As a result of analysis of TLS digitalization indicators in Turkmenistan the following conclusions can be made.

The main National Trade Facilitation body is considered to be the Interdepartmental Commission for the Development of the Digital Economy, established on January 10, 2020, to oversee the implementation of the Concept for the Development of the Digital Economy of Turkmenistan for 2019–2025. Besides, for the implementation of the “Single Window for Export–Import Operations” project, a separate Interdepartmental Commission was formed under the chairmanship of the State Customs Service of Turkmenistan. All relevant state bodies and agencies responsible for issuing permits and licenses participate in this commission coordination efforts to create a unified platform for all export–import operations.

Table 11: Evaluation Results for the Level of TLS Digitalization in Turkmenistan

Basic Indicators	Type of Electronic Document (UN/CEFACT Standards)						
	e-CMR	e-SMGS	e-Packing List	e-Invoice	e-Air Waybill	eBLD	eTIR
XML schemes							
Data Requirements Specification							
Business Requirements Specification (BRS)							
Core Information Systems (IS) in transport modalities	Railway Local IT system digitalization of documents exchange Participation in digitalization activities of CASCA+ transport corridor Road transport Separate IT and automation systems in different regions partially integrated to the national level Single Window, e-CMR pilots Sea Ports Port Turkmenbashi digital platform in the deployment stage for cross-border information exchange with Azerbaijan and Kazakhstan ports Aviation Local IT and automation systems						
Stages of business process analysis, harmonization of documents and data, standardization of information exchange	A number of standardized documents are being developed in the framework of SW project and used by the Customs Service, but work on standardizing cross-border information exchange has not been started Simplification and harmonization of data, development of a national model for multimodal transport not started yet Analysis and re-engineering of digitalized transport and logistics processes have not been initiated.						
International treaties and conventions	Turkmenistan has joined and signed the major international agreements on Trade Facilitation and conventions on road transport CMR/e-CMR, railway freight transport SMGS/e-SMGS, maritime and air transport						
Current TLS development programs	State Program for the Development of the Digital Economy in Turkmenistan 2021–2025 with the following main digitalization tasks: - TLS development is defined as one of the major factors in socio-economic development, and its digitalization noted as a modern trend for achieving efficient and attractive transport and logistics systems. - TLS development shall correspond to the growth of Turkmenistan's trade relations with foreign countries and ensure the creation of profitable, reliable, and accessible digitalized transit corridors						
Legislative framework	- Law of Turkmenistan “On Electronic Document Management” - Law of Turkmenistan “On Information and its Protection” - Law of Turkmenistan on the Customs Service of Turkmenistan - Customs Code of Turkmenistan - Law of Turkmenistan “On Cybersecurity” - Water Code of Turkmenistan - Air Code of Turkmenistan - Law of Turkmenistan on Railway Transport of Turkmenistan - Law of Turkmenistan on Road Transport of Turkmenistan - Merchant Shipping Code of Turkmenistan - Law of Turkmenistan on Road Transport of Turkmenistan						
National strategy	- National Program for the Socio-Economic Development of Turkmenistan until 2030 - State Program for the Development of the Digital Economy in Turkmenistan 2021–2025						
UN/CEFACT Single Window	National Single Window (SW) has been developed since 2020 when UNDP, UNCTAD, and the State Customs Service of Turkmenistan signed the project document “Single Window for Export–Import Operations,” implemented in Turkmenistan in 2021–2023.						
National trade facilitation body	Interdepartmental commission on the digital economy development in Turkmenistan under Cabinet of Ministers						

Source: Compiled by the author based on the results of project research.

The main objective of Single Window project in Turkmenistan was to provide the transition of export, import, and transit procedures from paper to electronic format. As a result, customs procedures have been significantly accelerated, and the time and financial costs of export–import and transit operations have been reduced. Similar to other CAREC countries the national SW in Turkmenistan is based on the eCustoms system with eLicensing components and can be developed further towards the creation of the national transport and logistics platform.

National strategy is based on the National Program for the Socio-Economic Development of Turkmenistan until 2030 and TLS components of 2021–2025 Development program of the Digital Economy in Turkmenistan with the main tasks of state transport policy focused on forming a highly efficient national transport system to meet the growing demand for freight transportation, as well as increasing the competitiveness of transport operators at the international transport services markets.

Legislative framework – Turkmenistan has got the comprehensive regulatory base governing digitalization, electronic document management, information security, and innovation activities, which creates prerequisites for the successful digital transformation of the country TLS. Despite the existence of basic laws on electronic document management and cybersecurity, Turkmenistan lacks sectoral by-laws regulating the use of electronic transport documents (e-CMR, e-SMGS, e-Bill of Lading) and the recognition of electronic signatures in the national and international operations.

Current TLS development programs – the main strategic document guiding the development of the digitalized TLS is the “State Program for the Development of the Digital Economy in Turkmenistan for 2019–2025.” The main objectives of this program are described in the chapter 2D of this report.

International treaties and conventions – as a result of the consistent accession to key international agreements and conventions, Turkmenistan is gradually forming a modern regulatory framework that meets the requirements of the global digital economy and international logistics. These steps open up the practical opportunities for the implementation of international standardized electronic documents, simplification of trade procedures, as well as for expanding cooperation with foreign partners within the framework of international transport corridors and digital trade platforms.

TLS business processes analysis and standardization of data sets and documents – preliminary analysis and re-engineering of trade business processes was originally conducted in the course of the Single Window project implementation. But in the UNESCAP 2022 assessment it was recommended to undertake more detailed re-engineering of business processes in transport modalities in order to get clear understanding of existing difficulties and problems in multimodal transportation. Besides, the development of a national model for multimodal transport data sets and standardized documents, as well as the work on standardization of the cross-border information exchange have not been started yet.

Level of international standardized electronic document development – for this indicator just the development stages for e-CMR were started in the framework of corresponding activities of OTS Transport Committee. The development of the rest standardized electronic documents has not been initiated yet. The assessment results of the overall level for main standardized electronic documents implementation in Turkmenistan are presented in Annex II to the report with the review of the regional and national activities on eTIR and e-CMR implementation.

The analysis of the evaluation results allows us to conclude that Turkmenistan demonstrates significant progress in creating a legal framework and developing digitalization initiatives for the transport and logistics sector. However, actions remain fragmented and require further integration of sectoral IT systems, harmonization of standards, and extension of the functionality of existing Single Window platform. Special attention shall be paid to the NSW modernization in accordance with UN/CEFACT recommendations by the development and deployment of the national transport and logistics platform, the implementation of electronic transport documents (e-CMR, e-SMGS, e-Bill of Lading), as well as the integration of national solutions with international digital platforms.

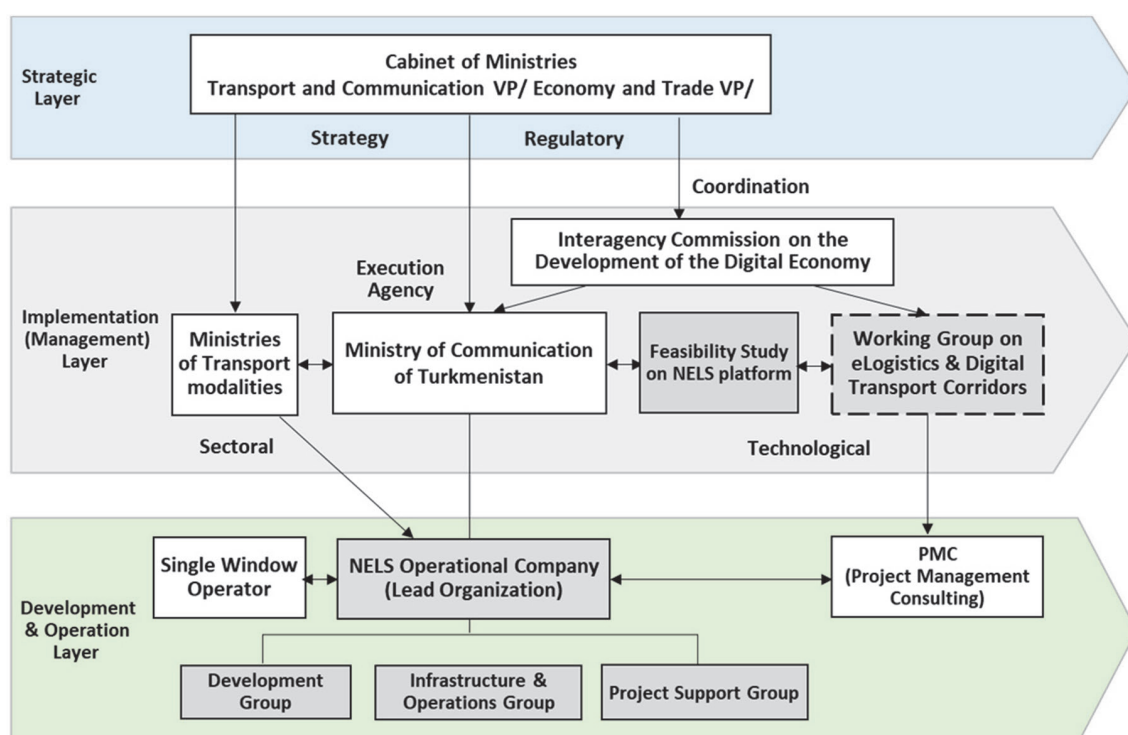
126. At the end of 2024 Turkmenistan government announced the 3rd stage of the digital transformation aiming to implement successful digital projects across sectors, including trade and transport in order to ensure the country integration into the international digital economy and regional cooperation. The main cooperation areas with Central Asian countries include strengthening collaboration for transit cargo transportation and cross-border information exchange in transport corridors to implement SPECA road map. In view of these decisions and latest reorganization of Turkmenistan governmental bodies responsible for TLS development it is recommended to initiate discussions on the development of the NELS multimodal platform at the Interdepartmental Commission on the Digital Economy under the Cabinet of Ministers. To start with, the Feasibility Study project could be proposed for NELS platform creation in Turkmenistan with the following objectives:

- Develop and implement the NELS platform to support multimodal transport, data exchange among all supply chain participants, including government agencies and private sector.
- Ensure interoperability of such platform with regional solutions (CAREC, TRACECA) and its adoption of international standards (UN/CEFACT, ITU recommendations).
- Integrate NELS platform in the Single Window system for automating export, import, and transit procedures, to expand SW functionality.

The implementation of the proposed Feasibility Study project might be supported by the CAREC Institute and will help focus core governmental bodies and TLS stakeholders in Turkmenistan on the creation of technological solutions enabling integration of transport operations in the country and cross-border connectivity with the similar digital platforms in CAREC region.

127. The governance model developed and proposed in cooperation with our project national expert for the NELS platform project implementation in Turkmenistan is shown in Figure 16 and includes three layers: strategic, management and implementation, development and operation.

Figure 16: Governance Model for NELS Platform Project Implementation in Turkmenistan



Source: Compiled by the author based on the results of project research.

At the project strategic layer, the Cabinet of Ministers of Turkmenistan shall act as the main governmental decision-making body to initiate and supervise the NELS project development cycle. Such a role for coordination of the national digitalization projects is indicated in the “State Program for the Development of the Digital Economy in Turkmenistan for 2021–2025”. The coordination of this strategy implementation will be provided by the Interagency Commission on the Development of the Digital Economy in Turkmenistan, which includes representatives of the main governmental bodies responsible for the TLS sector. Within the Commission, the specialized Working Group on eLogistics and DTC shall be created to discuss and prepare recommendations in the course of different stages of NELS project Feasibility Study and its implementation.

At the project implementation layer, the Ministry of Communication (MoC) as the Execution Agency in cooperation with the relevant Ministries of Transport modalities shall analyze the Feasibility Study results and develop the Terms of Reference for NELS platform implementation project as well as arrange procurement procedures for the selection of prime contractor to become NELS platform development and operational company.

At the project development and operation layer such company can be nominated as Lead Organization and authorized by the governmental decision for NELS platform development, maintenance and operational activities. The roles and responsibilities of all the above parties to be involved in the NELS project implementation are described in the Table 12.

Table 12: Main Participants in the NELS Platform Project in Turkmenistan

Organization	Role and Responsibility
Cabinet of Ministers	Executive decision-making body for the TLS digitalization projects
Interagency Commission	Coordination and cooperation with ministries and governmental organizations involved in TLS digitalization and NELS project implementation
MoC and Ministries of Transport Modalities	- Ministry of Communication – Execution Agency of the NELS platform project: - Development of the NELS project ToR; - Organization of procurement procedures and selection of the prime contractor - Ministries of Transport Modalities are to be involved for ToR development for main issues related to NELS platform functionality
Project Management Consulting	- Joint business consultancy and digital technologies group to support implementation of NELS platform, composed of TLS process and digitalization experts from the public and the private sectors - Consultation and advice on the digitalization of TLS process and related system
NELS operator, Project Support Group	- Management of NELS project standards and quality - Support for communication with Execution Agency - Support for training and technology transfer
NELS operator, Development Group	- Analysis, technical design and development of NELS modules, program applications and services - Test and delivery of program applications - Training and technology transfer of NELS users
Infrastructure and Operations Group	- Delivery of the required digital infrastructure – HW and SW - Installation, test, training and maintenance of NELS platform

Source: Compiled by the author based on the results of project research.

128. The following main stages for NELS platform project implementation in Turkmenistan are envisaged and recommended:

- Regulatory stage – at this stage the necessary legal framework shall be adopted to ensure the proper information exchange between economic operators and competent authorities in the TLS.
- Organizational stage – at this stage the Execution Agency shall implement the Feasibility Study for NELS creation in Turkmenistan with the participation of the transport modality Ministries in order to evaluate and plan all technical and economical parameters of the project envisaged. As a result of the project ToR shall be developed and procurement procedures organized for the selection of NELS project prime contractor.

- c. Development and deployment stage – at this stage NELS core modules and services are to be developed and deployed by the prime contractor nominated.
- d. Integration and piloting stage – at this stage the NELS connection/integration with regulatory systems of governmental bodies and existing technological platforms in TLS sector shall be implemented with pilots arranged for test information exchanges with the national SW platform.
- e. Operational stage – this stage includes the nomination or formation of NELS operational company, planning and financing of NELS maintenance and evolution, extension of services portfolio, SLAs with clients.
- f. Capacity building stage shall be envisaged and implemented for NELS participants and clients in the Turkmenistan TLS sector by the NELS operational company.

In the course of the NELS platform implementation the following gaps revealed shall be addressed:

- harmonization of responsibilities between the new Ministerial structures in TLS;
- lack of national law and regulatory framework on eDocuments and digital signatures;
- limited cross-border interoperability;
- lack of port community system connection with Azerbaijan;
- limited business process reengineering activities;
- partial use of WCO-UN/CEFACT standards.

E. Uzbekistan

129. The review of national strategies and programs related to the TLS digitalization in Uzbekistan is presented in the chapter II-E. The list of the main governmental bodies/agencies responsible for their governance and implementation in the country as well as the core stakeholders of our project include:

- Ministry of Transport of the Republic of Uzbekistan;
- Ministry of Investments, Industry and Trade;
- State Customs Committee;
- Centre for the Study of Problems of Transport and Logistics Development;
- Digital Transport Centre;
- Uzbekistan Railways (UTY);
- Uztemiryul Cargo;
- Committee for roads;
- Civil Aviation Agency;
- Uzbekistan Airways (cargo division);
- Transport Inspectorate;
- Association of International Road Carriers of Uzbekistan;
- Universal Logistics Services company;
- First Dry Port Terminal.

The list of stakeholder representatives involved in the study is placed in Annex I.

130. Summary results for the evaluation of Uzbekistan TLS digitalization level are presented in Table 13.

131. As a result of analysis of TLS digitalization indicators in Uzbekistan the following conclusions can be made.

Functions of national trade facilitation bodies are performed in Uzbekistan by the Ministry of Investments, Industry and Foreign Trade and Foreign Trade Portal.

The **National Single Window** was developed and institutionalized in 2019 based on e-Customs system integrated with Licensing systems of Ministry of Health, State Veterinary Committee, Plant Quarantine Service, Environmental Inspection, and “Uzstandard”.

Table 13: Evaluation Results for the Level of TLS Digitalization in Uzbekistan

Basic Indicators	Type of Electronic Document (UN/CEFACT Standards)							
Level of the electronic document development	e-CMR	e-SMGS	Packing List	e-Invoice	e-Air Waybill	eTIR	e-Permit	eTransit
XML schemes								
Data Requirements Specification								
Business Requirements Specification (BRS)								
Core Information Systems (IS) in transport modalities	Railway • “Single Window” for railway transport (e-nakl.railway.uz) • CIM/SMGS electronic consignment note under development Road transport E-logistika stage 1, with all operations of shippers, forwarders, carriers, and customers transferred to electronic format: • eTIR – pilot cargo transportation under the eTIR procedure was carried out between Uzbekistan and Kazakhstan in 2020 • e-Permit – electronic permits for international road transport • e-Transit – Customs advance notification service for transit cargo and vehicles • e-Navbat – Electronic queue system at the border Aviation – e-Freight is under development							
Stages of business process analysis, harmonization of documents and data, standardization of information exchange	A number of standardized documents are being developed e-CMR, e-SMGS, e-Invoice but work on standardizing cross-border information exchange has not been started							
	Simplification and harmonization of data, development of a national model for multimodal transport not started yet							
	Analysis of TLS business processes was undertaken in 2024–2025 in the course of the development the first stage of E-logistika systems implementation but mainly for road cargo transportation							
International treaties and conventions	International agreements and conventions on road transport CMR/e-CMR, railway freight transport SMGS/e-SMGS and air transport have been signed for all modes of transport							
Current TLS development programs	Concept for the Development of the Transport and Logistics System of the Republic of Uzbekistan until 2030 with the following main digitalization tasks: • Establishment of an electronic document management system in transport by creating a digital platform for processing shipping documents and integrating it with digital systems of foreign countries involved. • Full implementation of the “e-logistics” information system for shippers, consignees, and carriers through digitalization of technological processes in cargo transportation. • Creation of a unified electronic database of transport and logistics centers, development of an electronic map reflecting their locations and key indicators							
Legislative framework	• Law on Electronic Document Management (2004) • Law on E-Government (2015) • Customs Code of the Republic of Uzbekistan (2016); • Law “On electronic Digital Signature (2022); • Law on Development Strategy “New Uzbekistan – 2022–2026							
National strategy	• Digital Uzbekistan (2030) • Strategy for the Development of the Transport System of the Republic of Uzbekistan until 2035 • Decree of the President of Uzbekistan on measures for the effective organization of public administration in the field of transport (2023) • Resolution of the President of Uzbekistan Republic on Measures for further Development of the Transport and Logistics System (2025)							
UN/CEFACT Single Window	National Single Window (SW) got developed and institutionalized in Uzbekistan in 2019 based on e-Customs system integrated with Licensing systems of Ministry of Health, State Veterinary Committee, Plant Quarantine Service In 2020 the Unified Electronic Information System for Foreign Trade Operations (UEISFTO) was deployed with Foreign Trade Portal							
National trade facilitation body	• Ministry of Investments, Industry and Foreign Trade • Uzbekistan Customs							

Source: Compiled by the author based on the results of project research.

Uzbekistan national strategy for TLS development and digitalization is outlined in the recent Resolution on Measures for further Development of the Transport and Logistics System and includes the following priority areas:

- diversification of foreign trade routes through further development of international and regional cooperation, elimination of existing barriers;
- development of the TLS services, facilitation and implementation of the multimodality solutions, stimulating the creation of large national transport operators specializing in the provision of services in 3PL format and above;
- full realization of the country's transit potential, including the attraction of additional transit cargo flows by applying a flexible tariff policy and simplifying customs procedures;
- comprehensive and advanced development of transport infrastructure based on expanding the scope of external and internal sources of financing and application of innovative technologies, creation of a modern network of transport and logistics centers;
- formation of platforms for the country's logistics system with integration into international information systems, widespread introduction of digital and innovative technologies in international freight transport, improvement of the system of training and retraining of personnel in the field of logistics.

Legislative framework in Uzbekistan includes all necessary regulatory acts for the successful development and implementation of the national and multilateral projects in the field of TLS digitalization.

Current TLS development program is based on the National Strategy 2035, Concept for the Development of the Transport and Logistics System of the Republic of Uzbekistan until 2030 and governed by the Ministry of Transport together with its specialized Centres and subordinate agencies;

International treaties and conventions – Uzbekistan joined and ratified the international agreements and conventions for the main modes of transport, including for road freight CMR/e-CMR, railway freight SMGS/e-SMGS and aviation.

TLS business processes analysis and standardization of data and documents were undertaken in 2024–2025 in the course of the development the first stage of E-logistika systems implementation but mainly for road cargo transportation.

Core Information Systems in transport modalities have been actively developed and deployed in Uzbekistan in the last 5 years in view of the specialized Centres and digitalization task forces formed in the structure of the Ministry of Transport and Uzbekistan Temir Yollari (UTY).

In the Railway Transport:

- “Single Window” platform for railway cargo transportation with issued electronic waybills and coordinated transit shipments. This platform is to be integrated into the common TLS digital ecosystem in Uzbekistan;
- So far Uzbekistan did not participate in pilot transportations using e-SMGS along the TRACECA route but is planning to join the Memorandum of Understanding between Azerbaijan, Georgia, Turkey, Kazakhstan, and Ukraine for the purpose of conducting multilateral pilot.

In the Road Transport:

- Digital Platform “E-logistika” was launched by the Ministry of Transport in 2025 and is considered to become the core element of TLS digital ecosystem in Uzbekistan. By E-logistika all operations of shippers, forwarders, carriers, and customers have been transferred to electronic format. This platform provides an online service for searching and offering transportation, tracking delivery, managing warehouse services and includes the following functional components: User Registration and Authentication Module, Cargo and Transport Search and Posting Module, Order Management Module, Analytics and Reporting Module, Cargo and Transport Listing Module.

- In 2023 the Regulation on the Electronic Registration of Consignment Notes and the schedule for implementing the e-CMR system were approved. According to this decision, the system for processing, storing, and accounting e-CMRs was launched and in the second half of 2024, electronic consignment notes became mandatory for all companies when transporting goods. Since that time an electronic invoice (e-Invoice) should be generated along with the electronic consignment note for the cargo shipment.
- In 2020, the first pilot cargo transportation under the eTIR procedure was carried out between Uzbekistan and Kazakhstan, and later on in 2022 the first fully digital transportation using eTIR electronic guarantees took place between Uzbekistan and Azerbaijan.
- In 2021, Uzbekistan–Turkey road cargo transportation was piloted using the e-Permit electronic system, with Kazakhstan joining the pilot in 2024 and Azerbaijan – from 2025.
- E-Transit solution was deployed as the Customs pre-arrival notification service for transit cargo and vehicles. The carrier sends cargo, route, and vehicle data in advance, minimizing formalities at the border crossing point.

In Aviation – e-Air Waybill, work on this electronic document has not been started and paper waybills are currently being used. Uzbekistan is a party to the Montreal Protocol No. 4 (MP4 IATA).

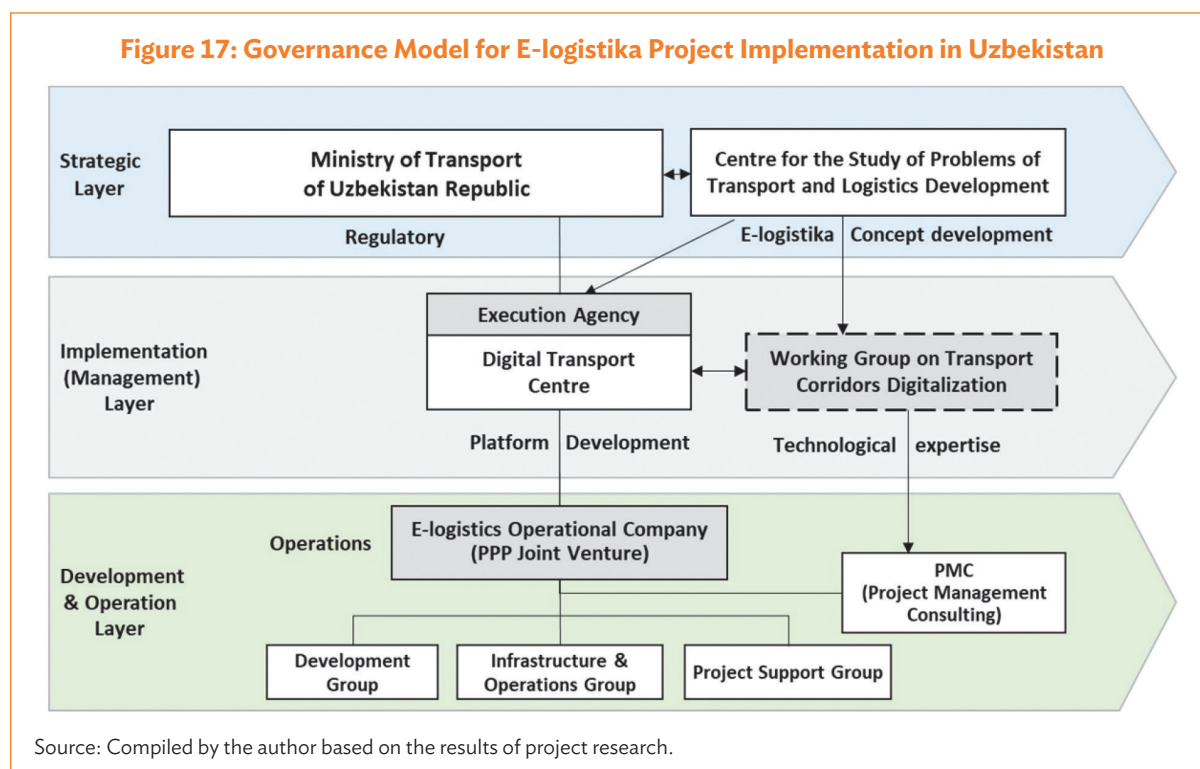
Level of international standardized electronic document development – for this indicator the Business Requirements and Data Requirements specifications have been developed for e-CMR and e-SMGS standardized documents in the road and railway transportation. The standardized e-Invoice document was deployed and is used for the national road cargo transportation. The development of the e-Air Waybill is currently at the initial BRS stages. The assessment results of the overall level for main standardized electronic documents implementation in Uzbekistan are presented in Annex II to the report with the review of the regional and national activities on eTIR and e-CMR implementation.

The analysis of the evaluation results allows us to conclude that Uzbekistan is progressing well with the main TLS digitalization tasks and projects stipulated in the national strategies and recently adopted Concept for the Development of the Transport and Logistics System 2030. The well-thought strategies and national programs with sufficient powers delegated to the Ministry of Transport and its specialized agencies help to develop fast-track digitalization projects and deploy effectively new systems and technological solutions. The concept contains chapters with a strong focus on the practical actions in the field of TLS and transport corridors digitalization, in particular:

- Widespread introduction and promotion of the use of digital and innovative technologies in international freight transport, in particular the conclusion of bilateral and multilateral agreements on cross-border mutual recognition of electronic documents.
- Creation of an integrated system for planning, coordination and operational management of cargo trains traffic by integrating individual elements of the transportation process into a single logistics chain to ensure optimal interaction with other modes of transport to improve the efficiency of multimodal cargo transportation.
- Formation of the electronic document management and exchange system in TLS through the creation of a digital platform for registration of accompanying cargo documents and its integration with the digital systems of foreign countries.

132. The development and deployment of the first stage of E-logistics system in Uzbekistan means that the country made the strategic decision to create the national digital TLS platform. The actual concept of E-logistics platform was crafted by the Centre for the Study of Problems of Transport and Logistics Development with the software solutions developed by the Digital Transport Center. At the first stage of the platform deployment the current functionality mainly covers the road cargo transportation. At the next stages the platform concept shall be extended by the multimodal functionality and integration capabilities in view of the principal role of E-logistics systems in the digitalization of the national segments of the international transport corridors crossing Uzbekistan. In view of the highly important tasks related to the development of the country transit potential and included the number of core transport corridors in East–West and North–South directions for the coordination of such digitalization activities it's recommended to form the specialized DTC Working Group with participation of the recognized national experts from different transport modalities.

133. The governance model developed and proposed in cooperation with our project national expert for E-logistics multimodal platform project implementation in Uzbekistan is shown in Figure 17 and includes three layers: strategic, management and implementation, development and operation.



At the project strategic layer, the Ministry of Transport of Uzbekistan Republic is acting as the main governmental body responsible for the supervision and deployment of E-logistika system in the country. The subordinate Centre for Study of Problems of Transport and Logistics Development is coordinating TLS and transport corridors development and digitalization activities and is responsible for E-logistika platform ToR development including its functionality, evolution and integration with other systems in the course of transport corridors digitalization.

At the project implementation and management layer, the Digital Transport Center is acting as the main body for the platform development and maintenance as well as its integration with governmental systems and TLS platforms of other countries. To develop the E-logistika platform additional functionality for the cross-border information exchange and interoperability with similar platforms in the DTC data pipelines it's recommended to form the specialized Working Group on Transport Corridors Digitalization in Uzbekistan.

At the project development and operational layer, the E-logistics system operator can be created in the form of PPP Joint Venture responsible for E-logistika platform management, operations and evolution, (see recommended options in section F of this chapter). Such operational company shall be in charge of the development and provision of E-logistika services portfolio and might have in its structure a number of divisions: Project Support, Infrastructure and Operations, Business Development. At this stage of the project cycle the involvement of the external Project Management consultants can be valuable with the expertise in the digital services portfolio development, its promotion and commercialization at the market.

The roles and responsibilities of all the above parties to be involved in the E-logistika project implementation are described in Table 14.

Table 14: Main Participants in the E-logistika Platform Project in Uzbekistan

Organization	Role and Responsibility
Ministry of Transport	Executive decision-making body for the TLS digitalization projects
Centre for Study of Problems of Transport and Logistics Development	- Coordination and cooperation with ministries and governmental organizations involved in TLS digitalization and E-logistika project implementation - Decisions on the project scope, resource requested and ToR development - Promotion and popularization of the system for carriers, forwarders, owners and dispatchers
Digital Transport Centre	- Execution Agency of the E-logistika project – functional modules development and platform maintenance; - Platform integration with governmental systems and TLS platforms of other countries
Informal Working Group on Transport Digitalization	- Working group with practical expertise from Ministry of transport, railway administration, state custom committee and etc. - Development of recommendations on DTC national segments and their integration.
Project Management Consulting	- Joint business consultancy and digital technologies group to support implementation of E-logistika platform, composed of TLS process and digitalization experts from the public and the private sectors - Consultation and advice on the digitalization of TLS process and related system
E-logistika operator, Project Support Group	- Management of E-logistika project standards and quality - Support for communication with Execution Agency - Support for training and technology transfer
E-logistika operator, Development Group	- Analysis, technical design and development of E-logistika modules, program applications and services - Test and delivery of program applications - Training and technology transfer of E-logistika users
Infrastructure and Operations Group	- Delivery of the required digital infrastructure – HW and SW - Installation, test, training and maintenance of E-logistika platform

Source: Compiled by the author based on the results of project research.

134. The following main stages for E-logistika platform development project in Uzbekistan are envisaged and recommended:

- Regulatory stage – at this stage the necessary legal framework shall be adopted to ensure the proper information exchange between economic operators and competent authorities in the TLS.
- Organizational stage – at this stage the Ministry of Transport and its Centre for Study of Problems in Transport and Logistics shall decide on the extension of E-logistika platform functionality and develop the ToR for its evolution to the national multimodal system capable for connectivity and integration into the digitalized transport corridors of CAREC region. At this stage the Working Group on Transport Corridors Digitalization shall be organized.
- Development and deployment stage – at this stage E-logistika core modules and services are to be developed and deployed for its multimodal functionality and connectivity.
- Integration and piloting stage – at this stage the E-logistika connection/integration with IT systems of governmental bodies and existing platforms in TLS sector shall be implemented and pilots arranged for test information exchanges with main stakeholders for provision of E-logistika core services.
- Operational stage – this stage includes the formation of E-logistika operational company with possible engagement of private partner in PPP joint venture, planning and financing of NELS maintenance and evolution, development and commercialization of services portfolio, SLAs with clients.
- Capacity building stage for E-logistika system participants and clients shall be envisaged and planned in the Uzbekistan TLS sector.

In the course of the E-logistika platform implementation the following identified gaps should be addressed:

- lack of connectivity and interoperability between transport modality systems;
- limited cross-border interoperability with Kazakhstan, Kyrgyz Republic and Turkmenistan;
- limited business process reengineering activities.

135. The main conclusions for the above chapters dedicated to the evaluation and analysis of TLS digitalization level and common recommendations for the CAREC countries involved are considered to be as follows – all countries have significant needs and practical opportunities to consolidate the fragmented TLS digitalization efforts by the development and implementation of the national E-logistics platform and system to become the missing element of their trade Single Windows. In each country, the national TLS platform is to integrate technological systems of transport modalities, digitalize and orchestrate multimodal business processes for the transit cargo transportation by using standardized formats of international electronic documents and ensuring their cross-border exchange. The best practical opportunity to make it happen is to undertake feasibility studies and develop the proper governance model with the road map for NELS project implementation in the particular countries as well as to decide on the organization and business structure for this platform operation. In the course of the national TLS digitalization activities recognized trade facilitation experts⁶⁴ recommend a stronger focus on system integration, private sector participation and transport corridor-level interoperability. TLS cybersecurity and data security risks shall be addressed as well by establishing national transport cybersecurity framework, centralized data protection under NELS and adoption of secure validation model for eDocuments.

F. PPP Options for the Implementation and Operation of NELS Platforms

136. As mentioned in chapter III, NELS could be based on the specialized TLS digitalization platform integrated in the national Single Window systems of CAREC countries in accordance with UN/CEFACT recommendations. UNECE planning and implementation guide for Single Window systems⁶⁵ classifies the following type of business models available for NELS project development and financing:

- Systems developed and financed by governmental agencies (public business model);
- Systems built on entirely self-sustainable concession model;
- Systems based on public-private partnerships.

The main features of the above models are summarized in Table 15.

Table 15: Main Features of NELS Business Models

Business Model	Project Development and Financing	Operation Financing	Evolution Financing
Public model	Government/Donors	Government	Government/Donors
Concession model	Concessionaire	Concessionaire	Concessionaire
Public Private Partnership (PPP)	Government/Donors	PPP entity	PPP entity

Source: World Bank, 2016.

The public business model is used when funding for NELS project implementation, platform operation and evolution is provided mainly by the government or with donor support. The main risk of a strong government role in financing of all stages of the NELS lifecycle is related to the absence of resources to ensure platform evolution. This situation can negatively impact the performances of NELS service sub-systems and the option of coupling private sector and donors may be envisaged. The donors can be invited in the setting up of the NELS platform or may intervene later in financing the evolution of the system.

⁶⁴ <https://www.unescap.org/node/31163>.

⁶⁵ <https://unece.org/info/publications/pub/2383>.

The concession model is applicable when the private sector is interested and ready to invest in NELS project implementation as well as the platform maintenance and operation. In this process, the profitable operation is the main task and NELS concessionaire shall provide paid services. Thus, the target profitability may cause high costs of services provided by NELS operator. To avoid that scenario the government should supervise the cost effectiveness of the systems and mobilize donors to finance the NELS investment and evolution programs.

The Public-Private Partnership (PPP) model relates to NELS set up as part of a PPP between the state and the private sector. In general, NELS operator established under PPP arrangements will be in charge of provision system services. But the cost of services is to be negotiated or approved by the Governmental bodies aimed at harmonizing the national market conditions. The advantage with PPP is that its complementarity with other types of funding available which gives the possibility to the government to act as a stakeholder in the joint venture with the private partner, or with donors depending on the opportunities and national context. The PPP model based on the governmental shareholding in Joint Ventures (JV) is well developed and recognized by the World Bank which provides the professional guidance for such project's implementation⁶⁶.

137. To select the most effective PPP model for NELS implementation in CAREC countries the partnership framework was analyzed using the methodology proposed by Deloitte⁶⁷ for structuring PPPs of infrastructure projects. This methodology is based on the main components of the project implementation – Design, Build, Finance, Operate, and Maintain. Results of the conducted analysis of partnership framework for CAREC countries involved are summarized in the Table 16.

Table 16: PPP Framework Analysis

Stages	Considerations	Current Situation in CAREC Countries
Determining roles of public authorities	Regulatory framework	Current laws and regulations allow PPP models, however there is no enough experience in large scale PPPs. So the support of international organizations is necessary
	Political environment	Governments play a central role in TLS strategy development, but there are budget limitations for direct investments. As such the focus shall be made on service-oriented platforms and ROI estimations
Project needs and objectives	Time of project implementation	NELS implementation is worthwhile speeding up to establish CAREC countries as the ready-made and digitalized logistics hubs for international transport corridors
	Innovation	Additional value-added services and NELS commercialization are needed to attract and secure clients (especially external)
Determining ownership of NELS components	Financial terms	To create NELS in operation, large scale investments are necessary, but it's difficult to Government to be a sole financier
	Operational Capacities	Operational capacities, innovation of services and their commercialization are mainly available in the private sector
	Risks	To balance risks Government is to be responsible for core services, private sector – for the value-added services portfolio

Source: Compiled by the author based on the results of project research.

In view of the above considerations and specifics of the current situation in the TLS of participating The project expert team came to the conclusion that the most effective PPP model for NELS project implementation is considered to be the so-called OMM – Operations, Maintenance and Management⁶⁸. In the OMM PPP arrangements a public partner (government agency or authority) contracts with a private partner to set-up a Joint Venture (JV) in order to operate, maintain, and manage a system providing the services portfolio. Under these JV contract arrangements, the public partner retains shareholding of this

⁶⁶ <https://ppp.worldbank.org/public-private-partnership/agreements/joint-ventures-empresas-mixtas#overview>.

⁶⁷ <https://www2.deloitte.com/me/en/pages/public-sector/articles/partnering-value.html>.

⁶⁸ <https://medium.com/blog-faiaz/public-private-partnerships-ppp-101-1702b6ac8883>.

system, but the private party is to invest its own capital in the NELS operation and evolution. Based on this assumption the further analysis was undertaken for the application of OMM arrangements to the main components of NELS project implementation in the CAREC countries. The obtained results are presented in the Table 17.

Table 17: Results of the OMM Model Analysis of the Main Components of NELS Projects

Component	Recommendation	Explanation
Design	Government procurement	Government should select the contractor to design and build the complete set of NELS functional modules to ensure full operation of its platform and services portfolio
Build	Government procurement	Design + Build approach for single contractor or project consortium supports reduced costs, ensures operability and allows development for additional value-added services. Government retains control of the overall system design and platform implementation.
Finance	Various models can be blended	Different types of financial models can be used according to requirements of the revenue model selected
Operate	PPP Joint Venture (different roles)	Government organizations responsible for the core services portfolio. Private sector responsible for NELS operation and added value services.
Maintain	Private Partner (within Joint Venture)	Because of long term operations, private sector is expected to invest continuously in system innovation and evolution

Source: Compiled by the author based on the results of project research.

The public partner shall become the JV shareholder and invest the ready-made NELS platform and core services into JV statutory capital but the private partner shall invest its own capital in the NELS maintenance and evolution. As a result, the public partner retains control over the NELS infrastructure and services as the shareholder and the private partner operates the company.

In the long run advantages of the government having a stake in the NELS operational company are considered to be as follows:

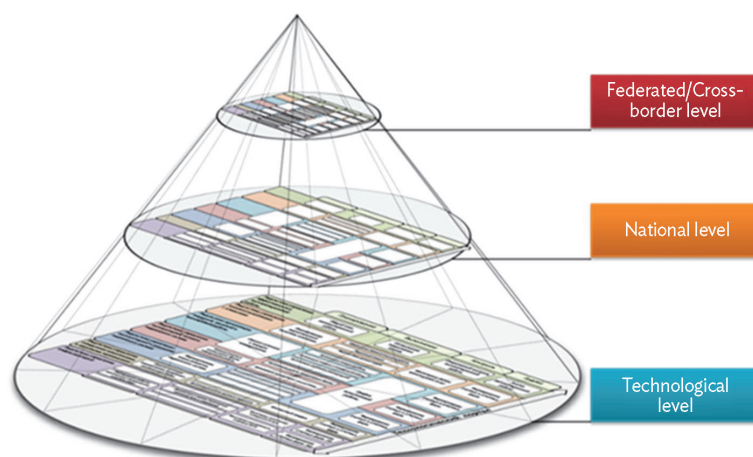
- The public party can exercise day-to-day oversight of joint-venture operations;
- Transparency with accounts and finances controlled at the JV Board level;
- Public perception that NELS services are provided under governmental supervision;
- Sustainability – continuity of NELS operation, even in case of private partner changes;
- Share stake in the NELS service business.

MAIN PRINCIPLES AND TECHNOLOGICAL APPROACHES FOR DIGITALIZATION OF NATIONAL SEGMENTS OF INTERNATIONAL TRANSPORT CORRIDORS

138. As mentioned in sections 77–78 the original DTC concept was developed in 2018–2019 in the course of the EU4Digital project by the experts of eLogistics and DTC Working Group.⁶⁹ In accordance with DTC concept a digitalized transport corridor is defined as a federated network (chain) of connected digital platforms that integrate the information resources of the TLS participants and create a trusted information space around it in the form of a “data pipeline” in order to digitalize and improve the efficiency of business processes in transcontinental supply chains and provide a portfolio of digital services. In 2023–2024 the UNESCAP study project was implemented in the North and Central Asian countries with the strategic recommendations for digitalization of the railway and multimodal cargo transportation based on national e-Logistics platforms. The functional requirements and recommendations for the development and implementation of national e-Logistics platforms in the CAREC countries involved were considered in Chapter 5 of this report.

139. When developing DTC national segments, the following levels shall be distinguished in the interaction of information systems of DTC participants as a heterogeneous interregional information network, see Figure 18.

Figure 18: Multilayer Architecture for Information Exchange among DTC Participants



Source: EU4Digital Facility Report, 2020.

140. **The first DTC technological level** includes the information systems of the main transport corridor participants: cargo owners, trade organizations, carriers, owners of transport and logistics infrastructure and vehicles, national regulatory and supervisory authorities, financial institutions, freight forwarders, insurance companies, cargo protection enterprises, etc.

The second level of DTC national segments is composed of NELS, built on the basis of TLS integration platforms.

⁶⁹ <https://eufordigital.eu/wp-content/uploads/2020/06/DTC-report-draft.pdf>.

The third DTC supranational level is based on interregional information and service platforms with a federated structure, built as “single window” and forming data pipelines that integrate NELS’ of the countries participating in the particular corridor. Such supranational platforms can be created on the basis of balanced business models and joint ventures of key players in the TLS of the corridor participating countries.

141. The main feature of the federated approach to building DTC architecture is the principle of preserving digital sovereignty of each national segment. As a structural and organizational principle, federalization equalizes the rights of DTC participating countries and also provides a sufficient degree of freedom to operate and deliver services at their national level. Therefore, for the supranational level of DTC architecture, federalism and equitable interconnection of national segments are effective principles for harmonizing the market interests of DTC member countries. Compliance with this principle of building DTC can become an effective tool for the coordinated development of digital and transport infrastructures in the countries participating in a particular transport and trade corridor as well as contribute to the effective implementation of its transit potential and increase competitiveness.

142. When developing projects for DTC creation, the following basic requirements for its functional levels and infrastructure elements should be taken into account:

- a. A federal-level system should not replace the information systems of participants in transport corridors (the first level of DTC architecture) or NELS (the second level of DTC architecture), but create synergetic effects from the interaction of these systems within the framework of the integral DTC architecture and ensure information security of cross-border transactions.
- b. DTCs should be created through the seamless integration of national segments capable of serving multimodal cargo transportation. To implement this principle, it is advisable to build national segments using interoperable digital platforms. Such platforms can be used as digital infrastructure “building blocks” and enable DTCs of any configuration to be formed by composing NELSs of participating countries into the required transit corridor.
- c. To seamlessly integrate NELS platforms and DTC national segments, it is necessary to properly address interoperability issues at all levels – regulatory, organizational, semantic (documentary), and technical. In the particular country, the NELS platform acts as an integrator of information flows, processing data received from multimodal transport participants and converting them into standardized international electronic document formats. Thus, interoperable NELS platforms, as well as standardized data and electronic documents, will ensure interoperability between national DTC segments.
- d. The control and monitoring of the cargo transportation in the DTC shall be provided along the entire transportation route.
- e. It is necessary to form in the DTC a single trusted information space for its participants, which can be created in the form of a data pipeline. For the effective information exchange in the DTC, electronic documents management and exchange of structured data/messages shall be implemented in accordance with international standardized formats;
- f. In the course of DTC development re-engineering and digitalization of multimodal business processes shall be undertaken.
- g. To optimize DTC operation, it is advisable to develop and use digital models of infrastructure elements and objects and simulate real-time processes, using relevant data obtained from the first (technological) level or from the NELS level.
- h. DTC platforms should shall be capable of providing an extensive portfolio of value-added digital services for key participants in the supply chains.

143. Taking into account all the above requirements, the project consultants from the international Lab for Digitalization of Transport and Logistics processes developed the following principles for building digital transport corridors⁷⁰:

- i. The principle of preserving the digital sovereignty of the countries participating in the DTC, implemented by creating national DTC segments, which can be integrated into transport corridors of various configurations.

⁷⁰ <https://icp.az/2023/2-10.pdf>.

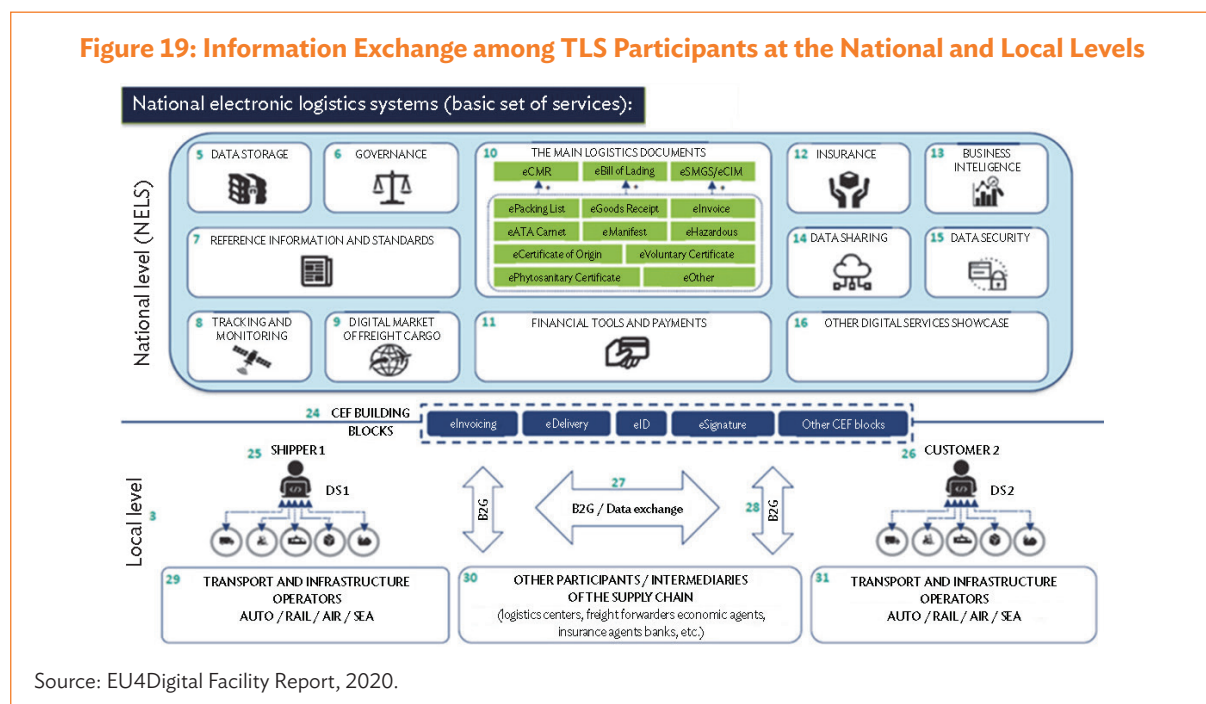
- ii. The principle of interoperability of national segments, integrating information systems and digital platforms of DTC participants at the technological level.
- iii. The principle of a federated approach to the formation of a DTC supranational integration platform.
- iv. The principle of multimodality, which involves the creation of systems and digital platforms that serve transportation by all major modes of transport.
- v. The principle of visualization - monitoring and traceability of cargo transportation.
- vi. The principle of digital trust and information security, based on the creation of a trusted information space in the DTC, modern methods of identifying participants and objects, as well as ensuring a high level of information security when exchanging data and electronic documents.
- vii. The principle of seamless cross-border information exchange using standardized data formats and electronic documents, ensuring their legal significance.

144. The applicability and validity of the above-formulated principles was proved in the course of assessment of the functional features of recognized DTC projects which had been developed in the Eurasian countries – FENIX pilots for the EU TEN-T corridors, DTC ecosystem of Eurasian Economic Union countries, World Bank “Platform-of-Platforms” project for the Middle Corridor digitalization in the South Caucasus and Central Asia, DTC data pipeline project for electronic logistics documents exchange on China–Europe Railway Express routes. It should be mentioned, that the proposed principles are very much in line with the main objectives of the CAREC Transport and Digital Strategies 2030, related to e-Logistics actions and creation of interoperable digital platforms.

In the course of designing technical solutions for NELS implementation the following main tasks shall be considered:

- a. Selection of technological solution for NELS integration platform to ensure connectivity with IT systems of TLS participants at the technological level;
- b. Provision of secure and validated information exchange in the TLS and in cross-border exchanges with neighboring countries (DTC and data pipelines);
- c. Formation of trusted information space in the TLS of CAREC countries;

145. In accordance with DTC principles proposed the following scenario for information interaction between TLS participants in the particular CAREC country can be developed based on NELS functional architecture (see section 79 of this report) and illustrated in Figure 19.



The national level is the domain of trade facilitation, including national logistics management systems (NELS) and interconnected service systems. This level covers a core set of transport and logistics services, as well as regulatory compliance. The local level encompasses business-to-business (B2B) and business-to-government (B2G) transactions, including information exchange processes that lead to logistics operations, documents, and permits/prohibitions. In this information environment, NELS provides authorization, data storage, registration of completed transactions, logistics data exchange, monitoring/tracking services, and much more. The NELS service portfolio can gradually evolve, starting with basic components for specific sets of logistics data exchange, and can be expanded to include nationwide services such as a digital marketplace, insurance, and others. In B2B interactions, businesses exchange information between entities within and across borders. Information exchange through NELS can ensure trust and reduce administrative burdens, as information entered once is shared with authorities and business partners. In B2G interactions, information for regulatory and statistical purposes is provided/transmitted to government agencies through NELS as a single window.

146. Key government agencies and TLS participants at the national and local levels interact through NELS and exchange G2B, B2G, and B2B data through authorized EDI operators or by directly integrating with the NELS platform. This interaction scheme ensures the efficient and secure exchange of information between TLS participants at the national and local levels and guarantees the necessary data processing in NELS, as well as its transmission to the interstate cross-border level in standardized dataset formats or electronic documents. Specialized NELS modules ensure the necessary data storage, exchange, and security, and enable the provision of a basic set of services, including supply chain transparency and cargo tracking. Furthermore, this makes the organization of information exchange for multimodal transport and logistics at the national level more efficient and convenient, and ensures the interconnectivity and compatibility of IT systems used by various modes of transport.

147. To resolve the main technical tasks A and C (section 144) the specialized digital platform with extensive integration capabilities shall be developed. The development of a basic technological solution for NELS platforms in CAREC countries will ensure interoperability of national segments of the digital transport corridor. The interconnection of NELS platforms and the formation of data transmission channels between them are consistent with the fundamental principles of digitalization of transport corridors. The platform architecture (see Figure 4) includes a client block of modules and a full integration layer with modules providing connection to NELS, data storage, management, security, validation, and exchange. The orchestration layer should ensure the digitalization of key multimodal business processes and include NELS service modules created in a specific country to facilitate the exchange of various data sets for all modes of transport, including the electronic consignment note (e-Bill of Lading), electronic goods and transport bill (e-CMR), electronic SMGS/CIM, electronic certificate of origin (eCertificate of Origin), electronic transport invoice (eTIR), electronic permit (e-Permit), and others. The proposed solution can be used as the heterogeneous digital platform which integrates information resources of TLS participants in the particular CAREC country and capable of creating data pipelines for international transport corridors in order to digitalize business processes in the supply chain for multi-modal cargo shipments. Such platform enables the formation of the trusted information space that connects all participants in the national TLS and DTC participants from other countries as well as facilitate the information exchange between them.

148. Data pipeline concept⁷¹ was originally proposed by the UNECE/UNESCAP in 2011 and based on two main principles. First one – primary trade and shipping data (usually provided by the original shipper) is collected, shared and can be used by authorized supply chain participants to implement their functions. Such an approach, based on data looping, is focused on reusing existing business data and data flows within the international supply chain for compliance and regulatory purposes. In essence, supply chain participants provide data that can be reused by other supply chain participants in a shared information space for their intended purpose. Information management, access, and security within this space can be ensured using a variety of technologies and approaches. In general, the information exchanged between participants includes:

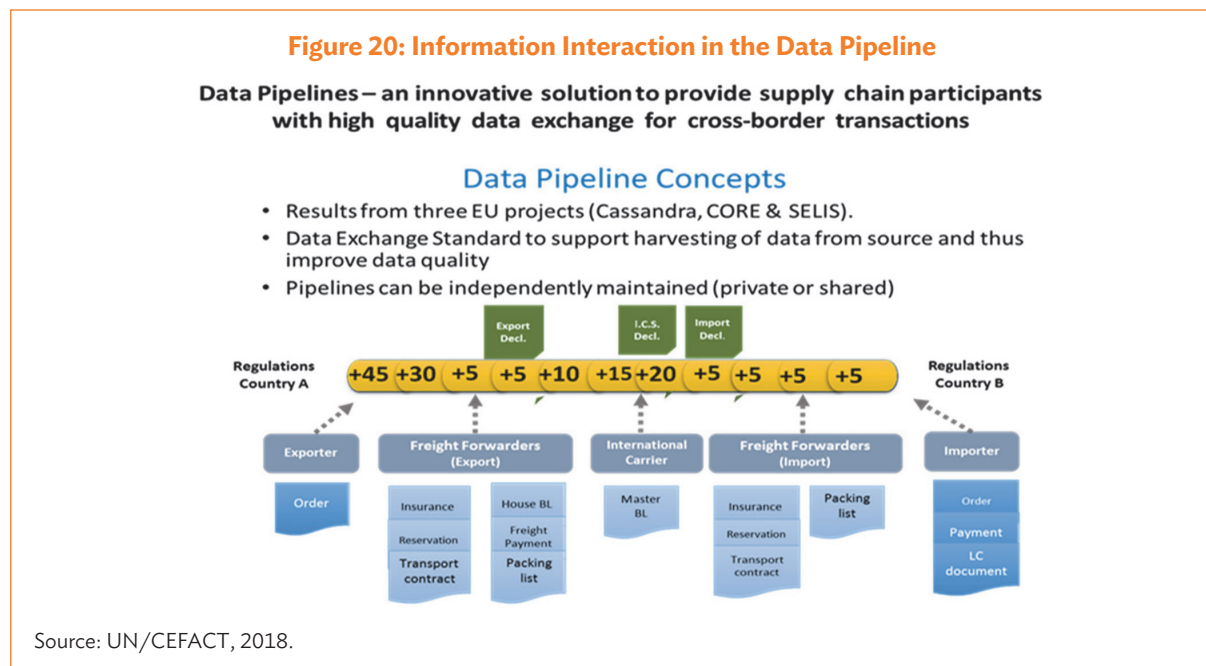
- transaction data (collected by the shipper and consignee);
- physical data (recorded by difference IoT devices used for tracking and monitoring);

⁷¹ https://unece.org/fileadmin/DAM/trade/Trade_Facilitation_Forum/BkgrdDocs/UNPaper_DataPipeline.pdf.

- relevant commercial risk management data (e.g., different checks and technical compliance data as well as contractual transportation conditions).

In the traditional paper-based logistics and transportation process, companies submit data to various government agencies (e.g., customs, statistics, veterinary control) via mandatory forms and data transfer to government information systems. Instead of such “data transfer” (the “push” model), the radical change proposed in data pipelines is a transformation towards “authorized data access” (the “pull” principle), where government agencies requiring information can extract it from companies’ existing information systems through a data pipeline or gain authorized access to this information. The key benefit for government agencies is that they will have access to original, high-quality data directly at the source. They can obtain data at any time, not just at the point of border crossing, thereby improving governance by meeting advance information requirements and risk analysis.

The second core principle of the integrated data pipeline concept is the notion of synchronization points, which define when shared information should be available to parties in international transactions. In the pipeline concept, information is structured around routing points where information enters the pipeline (“input points”) or is extracted from it (“output points”). As goods move, various events occur that could potentially be “input points,” “output points,” or both. A diagram illustrating such information interaction in the data pipeline according to these principles is shown in Figure 20.



149. In 2023 UNECE/UNCEAFCT published the White Paper on Data Pipeline concept for improving data quality in the international supply chains. The data pipeline concept allows data obtained from the source to be provided once and reused throughout the supply chain, regardless of the mode of transport, party, or border agency requesting access. This approach provides participants in international supply chains with high-quality data and creates the preconditions for reliable and secure cross-border information exchange in transport corridors. When integrating certified NELS platforms into an international transport corridor data pipeline, additional requirements must be met to ensure the quality and sovereignty of the data received from a specific country’s national DTC segment:

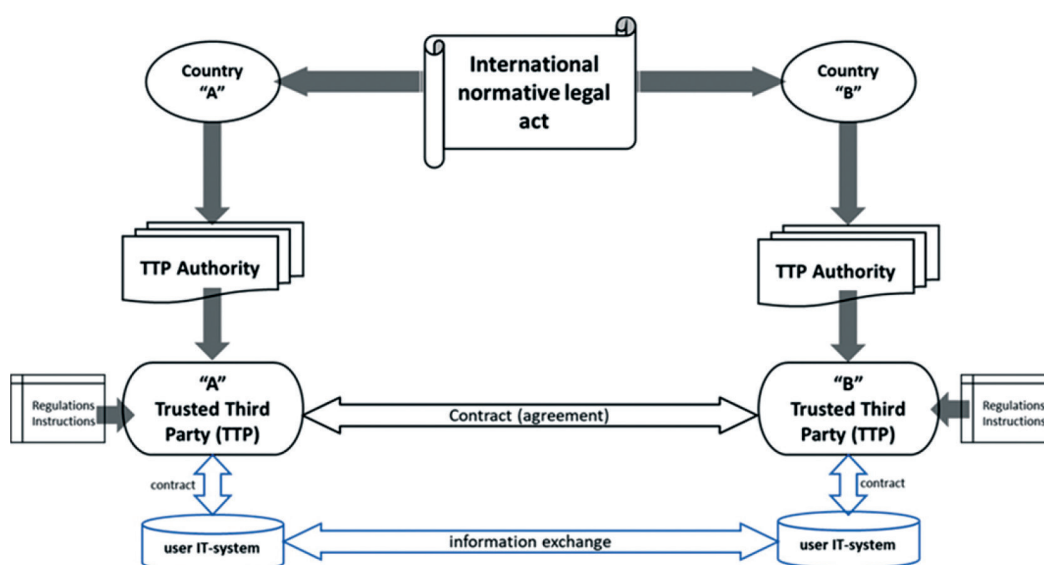
- authorization, identification and authentication of participants in the national DTC segment;
- cross-border and interstate transfer of validated and legally significant data and electronic documents;

- protection of national data from modifications;
- operational and long-term storage of data while maintaining confidentiality

150. The main task of cross-border exchange of data and electronic documents between the national segments of transport corridors in CAREC countries (task B in section 144) is to ensure their validity and legal significance. According to the regulatory acts of most countries, an electronic document is considered as legally significant if it is created in electronic format using mandatory details and signed by a certified means of electronic digital signature verifying its authenticity and integrity. To ensure the legally significant cross-border information exchange, it is necessary to solve the problem of mutual recognition of electronic signatures by the participating countries, since it has strong national specifics. In the international practice, there are various mechanisms for mutual recognition (ensuring trust) of electronic documents (hereinafter, “e-document”) and the main ones are considered to be:

- cross-certification reflecting information security policies for commonly used crypto algorithms (e.g., eIDAS in the EU, Verifiable Credentials mechanism in W3C⁷²);
- service for verifying an electronic signature by a Trusted Third Party (TTP Validation Authority) with display of certificate policies in the case when the crypto algorithms of one of the parties have restrictions on cross-border distribution (not generally used);
- block-chain solutions based on distributed ledger technologies.

Figure 21: Legal Scheme for E-Document Recognition Using the TTP Mechanism



Source: UNECE, 2023.

151. The public bodies of the EU and CAREC countries are not ready yet to recognize the operation of cryptographic facilities of other states on their territories, or to export their own cryptography as such the cross-certification I. approach is not currently applicable. As for TTP approach it's widely used in the EAEU and SPECA countries for the bilateral cross-border G2G information exchange but require the intergovernmental agreements between the countries involved. Trusted Third Party is considered to be the governmental organization or its authorized agent that provides the following information security services:

- verifies the authenticity of electronic documents;
- provides guarantees of trust in the cross-border international data transactions;
- exchange of electronic documents ensures the legitimacy of the use of electronic signatures.

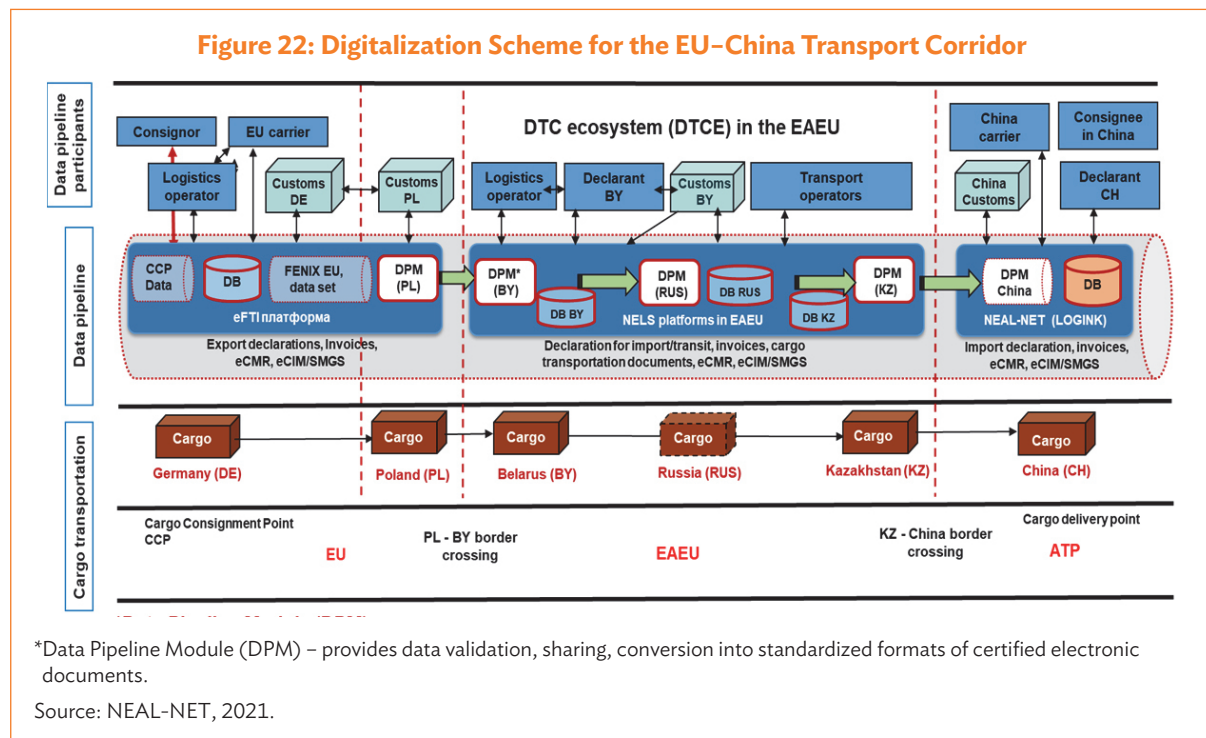
⁷² <https://www.w3.org/TR/vc-overview/>.

The TTP legal scheme used for the cross-border exchange of eDocuments is shown schematically in Figure 21⁷³.

152. Data quality and sovereignty requirements stipulated in the section 150 can be met by using a Public Key Infrastructure (PKI) embedded in the DTC as a corporate blockchain with a single root certification authority. Such a specialized PKI infrastructure can take on the role of a trust mechanism between participants of the international DTC and involves the use of NELS networked platforms with distributed blockchain nodes that act as communication hubs in DTC national segments. Such block-chain based technical solution will allow:

- storing digital certificates in a distributed registry, effectively controlled by all DTC participants and accessible in each blockchain node that has an identical reference version of the shared data;
- avoiding anonymity of the actions of DTC participants and recording their actions based on the issued certificate (eFTI requirements);
- act as a communications hub that ensures communication between NELS of the participating countries, as well as build a secure data pipeline and effectively protect the information environment of the DTC and critical elements of its digital infrastructure in national segments from the point of view of possible intrusions and unauthorized data exchange;
- ensure compliance with the requirements of digital sovereignty of each individual DTC participating country.

The above technical solution was developed in 2020–2021 by experts of the eLogistics and DTC Working Group and used for the concept of GUAM transport corridor digitalization⁷⁴. The concept was based on the creation of the network of blockchain nodes hosted in the NELS platforms of GUAM countries to build the data pipeline for digitalized transport corridor. Later on, the same approach was used for the development of technical solution for the legally significant cross-border information exchange by block-chain based data pipelines modules in DTC which was endorsed by the 28th NEAL-NET Technical Meeting with participation of LOGINX experts. The corresponding scheme proposed for the digitalization of the EU–China transport corridor is shown in Figure 22.



⁷³ https://en.wikipedia.org/wiki/Trusted_third_party?ysclid=mduoydsnzl328989528.

⁷⁴ <https://plmo.cyber.az/2021/papers/139-141.pdf>.

153. Gartner predicts⁷⁵ that by 2026 more than half supply chain organizations will use AI and Machine Learning to augment decision-making capabilities. Artificial Intelligence can support the creation of an autonomous supply chain, which will be able to automatically plan the logistics processes in real-time and run automated operational actions with the following innovative features:

- Orchestrated use of multiple platform and technologies including AI helps to automate the complex transactional processes in supply chain and transport corridors;
- Control and decision making in the supply chain will progressively move from a “form of art” where decisions are based on gut feeling and experience—to a fact and data-based decision-making capability.

Generative AI can help to collect data from across the supply chain in real-time and involve in this process the core participants and business partners to modernize supply chains with predictive modeling. Generative AI enables faster, more effective collaboration between people and can proactively identify supply chain anomalies and correct them in real-time. Supply chain shall incorporate generative AI, including simulation and modeling of complex systems, transportation optimization and customer service.

154. CAREC Advanced Transit System and Information Common Exchange (CATS/ICE)⁷⁶ is a key initiative to introduce a paperless trade and transport systems within the CAREC program. This system aims to facilitate cross-border trade by enabling the exchange and mutual recognition of trade-related data and documents in electronic form. The goal is to simplify transit documentation and procedures, ultimately promoting intra-regional trade and cargo transportation among CAREC countries. As for the common information exchange aspect the following CATS/ICE features can be used in the course of transport corridors digitalization in CAREC countries

- a. CATS/ICE focuses on facilitating the electronic exchange of data and documents related to trade and transit, such as customs declarations, transport documents, and bond information.
- b. The system aims to enable the mutual recognition of electronic documents and data by different Customs authorities and other relevant agencies in CAREC countries, reducing the need for paper-based processes.
- c. CATS/ICE seeks to ensure interoperability among national and subregional Single Windows and other systems used for trade-related and TLS data exchange.

The rationale and main objectives of CATS/ICE project are considered to be⁷⁷:

- align CAREC transit procedures with other regional transit systems procedures;
- build a regional customs-to-customs transit information exchange platform;
- enhance customs-to-customs and customs-to-business partnerships;
- streamline and harmonize existing transit documentation;
- create a single harmonized electronic regional transit system.

The CATS/ICE pilot approach for the information common exchange is illustrated by the diagram in Figure 23. The CATS and ICE systems are to be deployed in each of the CAREC country that participates in the pilot. Each country will have access to a copy of the CATS system, while ICE is installed in the Cloud to communicate with all copies of CATS to act as the mediator. Any communications between the CATS modules are done through ICE by the way of message exchange. Such technological solution can be effectively used to facilitate G2G and G2B information exchange in DTCs and requires NELS platform integration with CATS/ICE nodes in the CAREC countries.

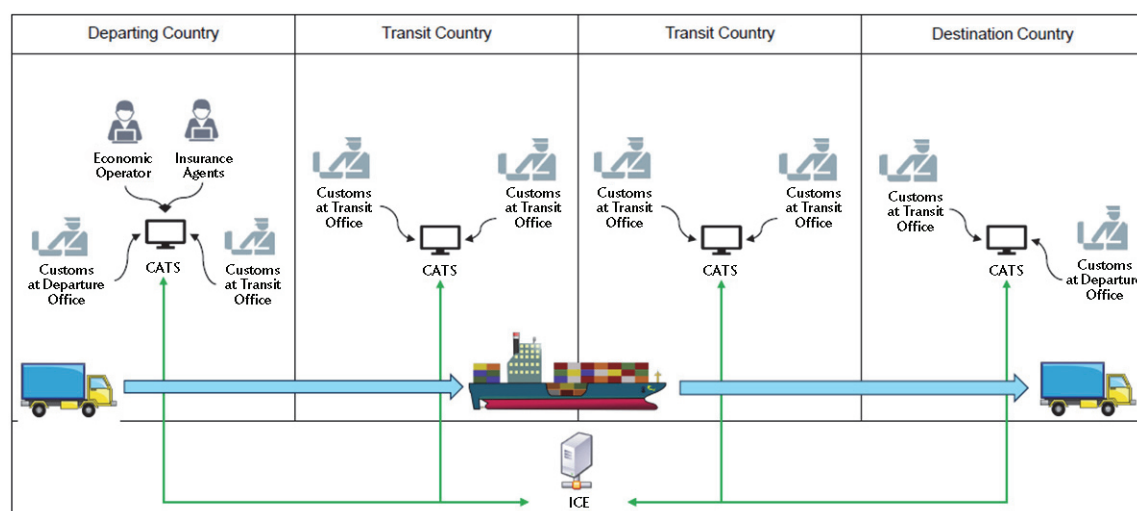
155. Coordinated Border Management (CBM) approach has been developed in CAREC countries since 2014. CPMM studies reveal consistently that border crossing points (BCPs) constitute the major bottleneck and obstacle to better international transport and trade in the CAREC region. The complex and often repetitive customs clearance procedures and other agencies on both sides of the border conspire with inadequate

⁷⁵ <https://www.gartner.com/en/supply-chain/topics/future-of-supply-chain>.

⁷⁶ https://www.carecprogram.org/uploads/Session-05_ADB_Development-Progress-CATS-and-ICE_ENG.pdf.

⁷⁷ https://www.carecprogram.org/uploads/Session-01_Agenda-and-Status-of-CATS-and-ICE-Implementation_ENG.pdf.

Figure 23: Common Information Exchange in the CATS/ICE Pilot



Source: ADB, 2024.

infrastructure to create these bottlenecks. Border management has become complex because of the many state agencies involved and CBM calls for cooperation between relevant border control agencies as well as digitalization of the BCP procedures and documents that can be harmonized. The CAREC countries are actively working on BCPs digitalization in the core transport corridors to enhance regional connectivity and trade. This involves implementing digital solutions like single-window systems for cargo tracking, streamlining customs procedures, and promoting paperless procedures to reduce processing times and costs. In the course of BCPs digitalization the following actions can be undertaken:

- Implementation of Single-Window BCP systems to improve customer services;
- Cross-border paperless procedures with processing and exchange of electronic documents in standardized format;
- Digital solutions for Integrated Border Management (IBM) which can streamline processes and improve information exchange between BCPs parties involved.

In the latest discussions of the CAREC corridor 2 (Middle Corridor) development study⁷⁸ it was mentioned that the following digital solutions were required for the major BCPs modernization:

- Red Bridge BCP (AZE-GEO) – upgrade with digitalization and coordination of operations;
- Sarpi BCP Upgrade (GEO-TUR) – digitalization and adoption of common forms;
- Baku and Hovshan BCP upgrade (AZE) – digitalization and recognition of forms;
- Bakhty BCP Upgrade (KAZ-PRC) – digitalization and recognition of forms;
- Torugart BCP Upgrade (KGZ-PRC) – digitalization and recognition of forms.

The corresponding proposals for Borders Upgrades with Integration, Logistics and Development (BUILD)⁷⁹ based on standardized data exchange in BCP single Window solutions and CPMM new components with Single Electronic Window and list of e-Documents for assessment of BCP digitalization⁸⁰ were discussed at the 24th CAREC Customs Coordination Committee (CCC) meeting in Bishkek⁸¹. Besides, ADB introduced at this event the ‘Cross-Border Trade and Transport Facilitation Index’ (CBTTFI) approach for digitalization of customs procedures at BCPs.

⁷⁸ https://www.carecprogram.org/uploads/Session-05_ADB_Development-Progress-CATS-and-ICE_ENG.pdf.

⁷⁹ <https://www.carecprogram.org/?event=24th-carec-customs-cooperation-committee-meeting>.

⁸⁰ https://www.carecprogram.org/uploads/S2_BUILD_CCC.pdf.

⁸¹ https://www.carecprogram.org/uploads/S3b_Corridor-Performance-Measurement-and-Monitoring.pdf.

RECOMMENDATIONS FOR THE DIGITALIZATION OF NATIONAL SEGMENTS OF THE CORE CAREC CORRIDORS

156. For the development of such recommendations, we used the DTC basic definition as a network of connected national digital platforms that integrate information resources of TLS participants in the international transport corridor and form a trusted information space surrounding it in the form of a “data pipeline” in order to digitalize and improve the efficiency of transit business processes. The second principal point for recommendations was based on discussions and results of the 1st international DTC Forum held in 2024 in the framework of UNESCAP Asia-Pacific Trade Facilitation Week in Samarkand⁸² with impact on the readiness and seamless cross-border connectivity of the DTC national segments in the countries participating in the particular international transport corridors. This can be achieved in case of NELS platforms interoperability, usage of the unified solutions for TLS digital infrastructure elements and international standards for exchange of electronic documents between CAREC countries. In this respect the following core building blocks of digital infrastructures (described in chapter VI) can be recommended for the formation of DTC national segments in the CAREC countries involved:

- NELS platform with integration, multimodal processes orchestration and service modules;
- Data Pipeline Modules for trusted national and cross-border information exchange;
- eDocuments modules for standardized international transport and shipping documents;
- Converters for handling data formats and electronic documents between transport modalities;
- CATs modules providing information exchange with and between Customs authorities;
- BCP Single Window solutions for digitalization of business processes at border crossing.

Besides, NELS platform shall be integrated with the governmental systems controlling and managing transport and trade flows in the country as well as technological systems of transport modalities. And in general, national segments of the transport corridors in CAREC countries include as well the following TLS infrastructure elements: BCPs – border crossing points; intermodal transport hubs (where cargo can be reloaded from one transport mode to another) and logistics centers/dry ports.

Regarding general recommendations for priorities in the development of TLS digital infrastructures in the CAREC countries participating in this project, we would follow the conclusions of the CAREC corridor 2 development study prioritizing short-term interventions in the digitalization of border-crossing points, transport logistics centers and transport operators as well as digitalization and adoption of standardized eDocuments and data formats – i.e., actions related to main participants of the DTC technological level. At the latest CAREC CCC meeting the effective approach for BCP digitalization was proposed based on Electronic Single Window approach and electronic pre-declaration using a set of eDocuments: eTIR, e-CMR, e-Phyto etc.

For particular country recommendations to implement the specific building blocks of TLS digital infrastructures in CAREC countries the transport corridor Digital Passport methodology was proposed (see section 101 of this report) and used as the basis for the development of DTC national segment functional solutions. With the involvement of the national TLS stakeholders and experts, in every CAREC country involved the core transit transport corridor was selected with the current major transport flow as a sample case for drawing up a Digital Passport and recommendations for digitalization of the particular national segment. Some of the recommendations proposed can be common for all CAREC countries involved in this project.

⁸² <https://www.unescap.org/events/2024/asia-pacific-trade-facilitation-forum-2024>.

157. Today, many transport and warehouse operators in the selected CAREC countries are still using the very basic software tools without the awareness of the modern applications such as Terminal Operating System (TOS), Warehouse Management System (WMS) and Transport Management Systems (TMS). To address this issue and stimulate the digitalization level of DTC participants at the technological level the effective approach was proposed in the framework of USAid Middle Corridor Transportation and Logistics Program in Georgia⁸³. The Program aimed to transform Georgia into a globally competitive hub for transport and logistics, creating high-value jobs and boosting income from new trade activity generated by the increase in cargo flow. The concept of Digitalization Helpdesk was proposed for the road cargo transportation companies – members of the Georgian International Road Carriers Association (GIRCA) with the following actions to be performed by this Helpdesk team:

- selection of cargo trucking and logistics companies which are willing and qualified enough to become the digitalization beneficiaries;
- assessment of their business processes, workflow and IT systems to identify gaps in digitalization and provide recommendations for improvement where applicable;
- provide recommendations on digital solutions including comparative analysis;
- provide feasible implementation plan for identified solutions.

In the course of these actions Digitalization Helpdesk was entitled to explore the need for ready-made or customized software solutions such as TOS, WMS, TMS and others, to be aligned with specific business processes, integration issues between disparate systems, improvement of efficiency and effectiveness, as well as the rapid resolution of technical problems that could disrupt operations.

A. Azerbaijan

158. In the course of selection and recommendations development for the digitalization of the core transport corridor national segment in Azerbaijan the following facts were taken into consideration. Azerbaijan is a core participant of two major transcontinental transport corridors:

- The Middle Corridor, or the Trans-Caspian International Transport Route (TITR), which facilitates the transport of goods from PRC to Turkey, as well as to the EU countries and vice versa. The cargo can be transported through the Middle Corridor national segment in Azerbaijan via two routes. The first route involves the ports of Poti and Batumi in Georgia, while the second route runs along the Baku-Tbilisi-Kars (BTK) railway. This branch was established in 2014 and considered to become a crucial part of the Middle Corridor network connecting Asia and Europe.
- The western branch of international North-South Transport Corridor which links Northern European countries, Russia and Iran with onward to the Persian Gulf and Indian Ocean. This corridor was established in 2020 and originally designed to provide transport links between the countries of Northern Europe and India via Iran.

The operating BTK segment of the Middle Corridor traversing Azerbaijan was selected as the digitalization case in this country following recommendations of project stakeholders and the national consultant because of the following reasons:

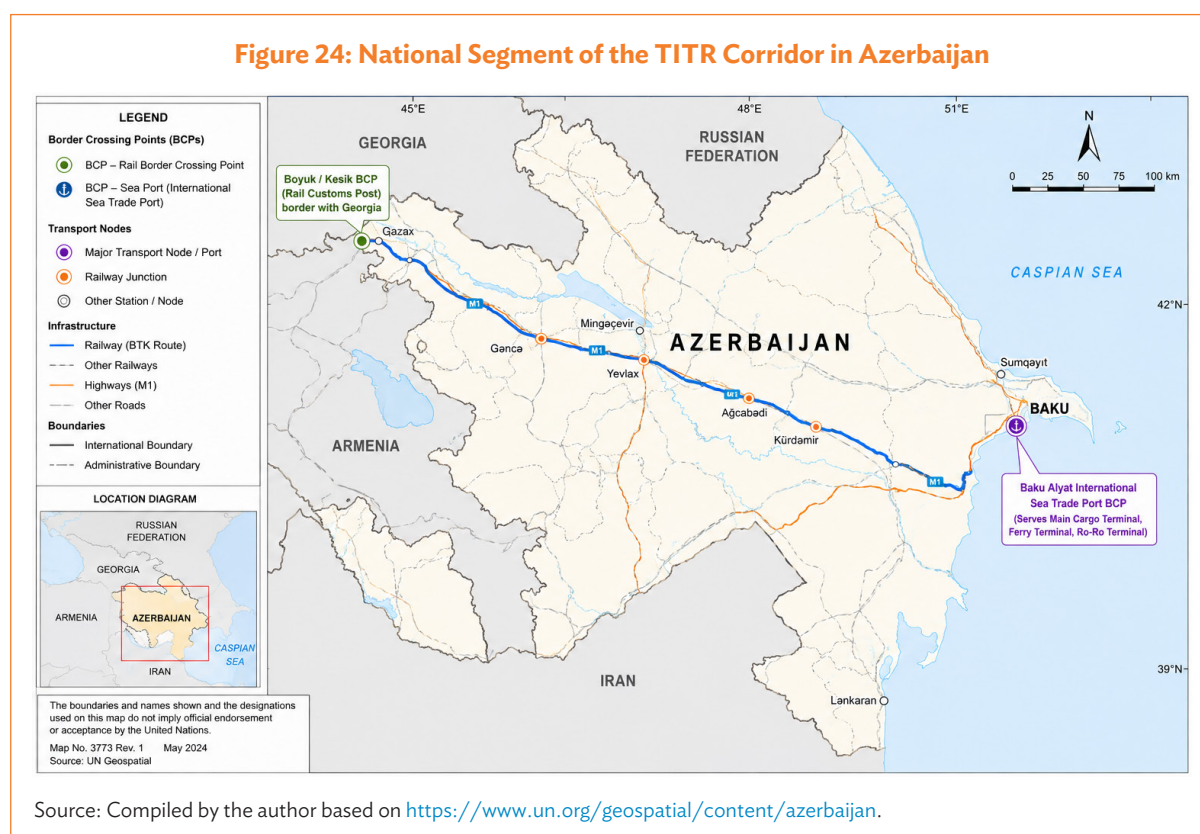
- The Middle Corridor, facilitating East-West and West-East freight transport, is a strategically significant transit route for Azerbaijan;
- In 2024, Azerbaijan initiated efforts to extend BTK branch of the Middle Corridor along the eastern shore of the Caspian Sea, connecting PRC, Tajikistan, Kyrgyz Republic, Uzbekistan, Turkmenistan, and the Caspian Sea. This was marked by the creation of the Eurasian Transport Route International Association during a September meeting in Baku.
- To ensure the reliable and efficient operation of existing national segments the above corridors, Azerbaijan, Kazakhstan, and Georgia have established joint ventures such as Middle Corridor Multimodal Ltd. and BTKI Railways LLC.

⁸³ <https://bm.ge/en/news/usa-id-partners-with-maersk-to-support-the-middle-corridor>.

The Azerbaijan BTK segment of the Middle Corridor (TITR) runs from the western bank of Caspian Sea to the border with Georgian border. Its major BCPs and transport nodes include:

- Baku Alyat International Sea Trade Port and BCP which serves Main Cargo Terminal, Ferry Terminal, Ro-Ro terminal;
- Boyuk/Kesik BCP with customs post on the border with Georgia for serving railway cargo transportation.

The scheme of TITR national segment in Azerbaijan is shown in Figure 24.



Source: Compiled by the author based on <https://www.un.org/geospatial/content/azerbaijan>.

159. The data collected for the Digital Passport and recommendations for the digitalization of the Middle Corridor national segment in Azerbaijan are presented in Table 18.

The collected data indicated that multiple activities for the Middle Corridor national segment digitalization in Azerbaijan were mainly focused on railway business processes re-engineering, standardization and deployment of e-SMGS pilots with neighboring countries. In the framework of its digital transformation program ADY created the Digital Development Department which is in charge of full digitalization and integration of ADY's key business processes in one data management system. In view of ADY merge with the Baku Port Alyat the unique opportunity was created to digitalize and integrate all the components of its Middle Corridor national segment based on single technological platform. Bearing in mind the proactive development of Digital Logistics Platform (DLP) as the principal component of the national SW in Azerbaijan our recommendations are mainly related to the integration and technical interoperability of all the above solutions by means of DLP platform and data pipeline approach.

Table 18: Digital Passport for the National Segment of the Middle Corridor in Azerbaijan

Digital Passport Components	Data and Description Provided by Stakeholders
Transport and communication connectivity with other nodes/terminals and BCPs	Rail Connectivity: Port of Baku has access to 4 main international railways: • Railway from Baku to the south of Russia and extending to the northwest; • Railway extending to the west, from Georgia to the Black Sea and the coast of Turkey (Baku-Tbilisi-Kars railway); • Railway extending to the south-west, to Iran and then to Turkey; • Railway running south to Astara on Azerbaijan's border with Iran. Maritime Links: Cargo traffic functions within the Caspian Sea basin with ports of Aktau and Kuryk (Kazakhstan), Makhachkala and Guryev (Russia), Bender-Anzali (Iran) and Turkmenbashi (Turkmenistan). With 80% of its total activity being transit cargo from Kazakhstan and Turkmenistan, the ferry terminal at Port of Baku is the main entry platform in the Eurasian transport network. Digital Connectivity: The Port of Baku has implemented a Port Management Information System to manage real-time and historical data, track operations, and generate reports. A unique Dispatcher Software automates various port processes, this digitalization effort aims to streamline operations and facilitate better communication and data sharing with other ports.
Main cargo flows served by each node/BCP	• Baku International Sea Port: general cargo, dry bulk, containerized goods. It also plays a significant role in the transportation of wheeled vehicles, particularly between Türkiye and Central Asian countries. Furthermore, the port is developing infrastructure for handling fertilizers, contributing to the flow of this commodity from Central Asia to Western markets. • Baku-Tbilisi-Kars railway: general cargo, dry and bulk, agricultural goods, raw materials, containerized goods, oil products.
Operator/operating company managing the node/terminal	• "Azerbaijan Railways" Closed Joint Stock Company (ADY) is a state-owned enterprise dedicated to delivering reliable rail transport for passengers and cargo, since 2025 got merged with ADY • Marabda-Kartsakhi Railway rail freight operator new joint venture created by Azerbaijan Railways (ADY) and Georgian rail in the context of the Baku-Tbilisi-Kars (BTK) railway. • Baku International Sea Trade Port Authority.
IT systems, platforms and technological solutions used in the transport corridor national segments	• eCustoms system – the Unified Automated Management System of Customs (UAMSC) Authorities is used to automate customs procedures. The data flows into Single Window are accepted in electronic format: the user enters the system with his e-signature and upload documents in PDF format, which are considered as electronic ones. • Trans-Caspian Customs Transit Portal aims at implementing digital and streamlined customs solutions to facilitate the quick and efficient transportation of goods along the Middle Corridor. • ADY Smart platform, allows tracking all stages of cargo transportation in real-time. By using ADY Smart, shippers can track all processes in real-time, from cargo registration to transportation • Piloting of the unified CIM/SMGS electronic waybill, which accelerates international freight operations by replacing multiple documents with a single standardized format e-CIM/SMGS thus enabling seamless automated data exchange in the TITR. • Baku International Sea Port (Alyat): Port Management Information System (PMIS), which connects multiple systems to plan, control and execute various port operations. Phased works are conducted towards integration with Kazakhstan's Aktau, Kuryk, and Turkmenistan's Turkmenbashi ports in the Caspian Sea, as well as with the State Customs Committee and "Azerbaijan Railways" JSC within the country. • Baku-Tbilisi-Kars railway: According to bilateral agreements, e-CIM/SMGS exchange is carried out in pilot mode between the Azerbaijan-Georgia and Azerbaijan-Kazakhstan railways.
List of documents processed: paper and electronic	Rail transport: • The electronic information exchange in international railway transport at Azerbaijan Railways is organized in accordance with the bilateral agreements agreed with the administrations of neighboring railways. • e-CIM/SMGS exchange is carried out in pilot mode between the Azerbaijan-Georgia and Azerbaijan-Kazakhstan railways. • The invoice data is exchanged 100% electronically in import and transit regime. The electronic version of CIM/SMGS is being tested currently in TRACECA route. • The data exchange with Customs authorities of other countries is held in digital form (in XML format). Electronic data exchange between the railway operator and Customs is developed. • To register cargoes a scanned copy of the documents is received by Customs. A scanned version of Bill of Lading uploaded as PDF as an accompanying document while crossing the border scanned version of the SMGS uploaded as PDF as an accompanying document during crossing the border for import.

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Table 18 continued

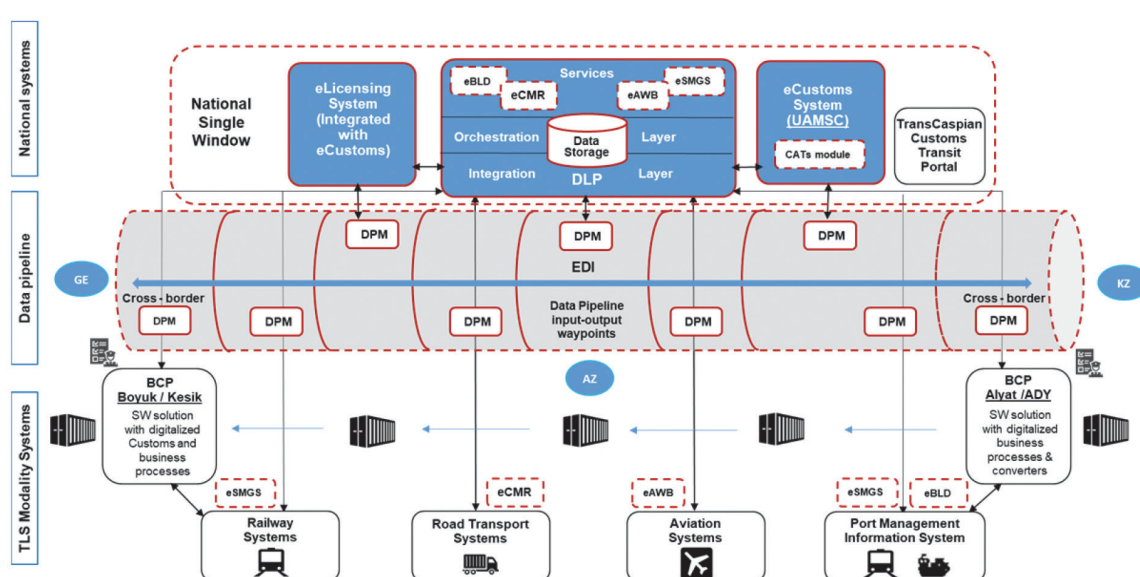
Digital Passport Components	Data and Description Provided by Stakeholders
	Maritime: - Bill of Lading must be submitted to the customs authority together with the customs declaration in written or electronic (in pdf) forms. - Registration of goods in the port of Alyat (Azerbaijan) is carried out, depending on the type of transportation, on the basis of the following paper documents: - SMGS or CIM/SMGS – for wagons on the board of the vessel - CMR, TIR Carnet – for trucks on the board of the vessel - Cargo Manifest/Declaration and Bill of Lading
List of provided digital/information services	- Data exchange with Customs authorities of other countries. - The invoice data exchange in import and transit regime. - e-CIM/SMGS exchange in pilot mode with Georgia and Kazakhstan railways. - e-Permit with Turkey and Uzbekistan. - Trans-Caspian Customs Transit Portal, aimed at implementing digital and streamlined customs solutions to facilitate the quick and efficient transportation of goods along the Middle Corridor.
Plans for modernization and digitalization	- Introduction of e-CMR and e-SMGS. - Full implementation of Digital Logistics Platform. - ADY digital transformation program for 2025–2027 (ADB financed) - Development and installation of an integrated data management system at ADY for asset and cargo operation management, investment planning and construction management, cargo commercial management and corporate functions. The new system will be capable of exchanging data with any government and non-government system.

Source: Compiled by the author based on the results of project research.

160. The list of recommendations for digitalization of Azerbaijan Middle Corridor national segment includes the following bullet points and is illustrated by the functional scheme in Figure 25.

- To implement effectively the Coordinated Border Management (CBM) approach it's recommended to digitalize business processes at the national segment BCPs by the development of BCP single-window solution. That involves the detailed analysis and re-engineering of cross-border control and documentary procedures into paperless processing and exchange of electronic documents in standardized formats. Such approach has already been included in the CAREC Middle

Figure 25: Integration and Data Exchange Scheme for the National DTC Segment in Azerbaijan



Source: Compiled by the author based on the results of project research.

Corridor study recommendations (see section 154) and its implementation was initiated by the ADY Digital Development Department in the framework of the digitalization plans of TITR Association. The integration of single-window BCP sub-systems with NELS platform as well as with eCustoms system and CATs module will ensure their effective connectivity in the national segment of the Middle Corridor in Azerbaijan. The secure EDI between these systems can be provided by the Data Pipelines Modules (DPM).

- b. The processing and exchange of electronic documents in BCP will require the adoption and recognition of their standardized formats. In this case the specialized converters shall be developed and used in the BCP single-window solution for conversion of transport and shipping electronic documents provided by the freight forwarder in the course of customs pre-arrival and clearance procedures into formats adopted in Azerbaijan. It shall be done in accordance with SPECA road map implementation for the digitalization of multimodal data and document exchange along the Trans-Caspian transport corridor (see section 92). In fact, the generation of standardized electronic documents is considered to be the “input point” for DTC data pipeline (see section 149).
- c. The data obtained from TLS participants and generated standardized electronic documents can be stored in the NELS Master database and will be available for authorized access by governmental agencies involved in the control of transit processes in the country. The corresponding governmental IT systems are to be connected with DLP which becomes, along with the combined eCustoms and eLicensing, the third principal system of the integrated national trade Single Window in the country. TransCaspian Customs Transit Portal and CATs module will be used as the main modules for eCustoms declarations and information exchange between customs authorities of the Middle Corridor countries in the CAREC region.
- d. Transport modality systems in Azerbaijan, Alyat PMIS and Boyuk BCP shall be connected with NELS via platform integration layer. The data obtained from Azerbaijan BCPs and these participants of DTC technological level can be processed at the NELS orchestration layer in order to create the standardized international electronic transport documents to be used in the data pipeline of the DTC national segment. The required service modules for e-SMGS, e-CMR, e-Airway Bill and e-Bill of Lading electronic documents generation and processing may be located either in the NELS service layer or in the modal transport IT systems.
- e. In the TITR countries e-SMGS standardized electronic documents can be used for the ferry shipments of containers block trains between Aktau and Alyat ports. To provide the cross-border EDI transfer of such legally significant electronic documents between Kazakhstan and Azerbaijan it's recommended to use the mechanism of TTP Validation Authority (described in sections 151) or the corporate blockchain solution with PKI infrastructure (section 152).

161. All the above-mentioned elements of digital infrastructures are to be interconnected in the DTC data pipeline and use Data Pipeline Modules (DPM) as information “input waypoints” or “output waypoints”. As such the unified trusted DTC information space can be built along the national segment of TITR corridor in Azerbaijan. The data related to the particular cargo transit shipment and all evolved electronic documents or their modifications are worth storing in the DLP master database to be available only by means of authorized and authenticated access. This functional approach focused on the creation of the national DLP platform in the country will help preserve the digital sovereignty and data protection in the Azerbaijan TLS as well as prove the country technological capabilities to digitalize national segments of the core international transport corridors in the South Caucasus region.

B. Kazakhstan

162. In the course of selection and recommendations development for the digitalization of the core transport corridor national segment in Kazakhstan the following facts were taken into consideration. Kazakhstan is a core participant of two major transcontinental transport corridors:

- Trans-Caspian International Transport Route (TITR/Middle Corridor) which connects PRC to Europe via Kazakhstan, the Caspian Sea, Azerbaijan, Georgia, the Black Sea and Türkiye. This multimodal railways-maritime corridor is considered to be a priority for Kazakhstan, with ongoing efforts to unify tariffs, improve service, and attract international operators. The TITR agreements between participating countries form a legal basis for transit routes, such as the “Western Europe–Western PRC” corridor, and support Kazakhstan’s role as a major Eurasian logistics hub.
- The Eastern branch of international North–South Transport Corridor which links Northern European countries, Russia and Kazakhstan to Iran and onward to the Persian Gulf and Indian Ocean, with a focus on rail and maritime connectivity.

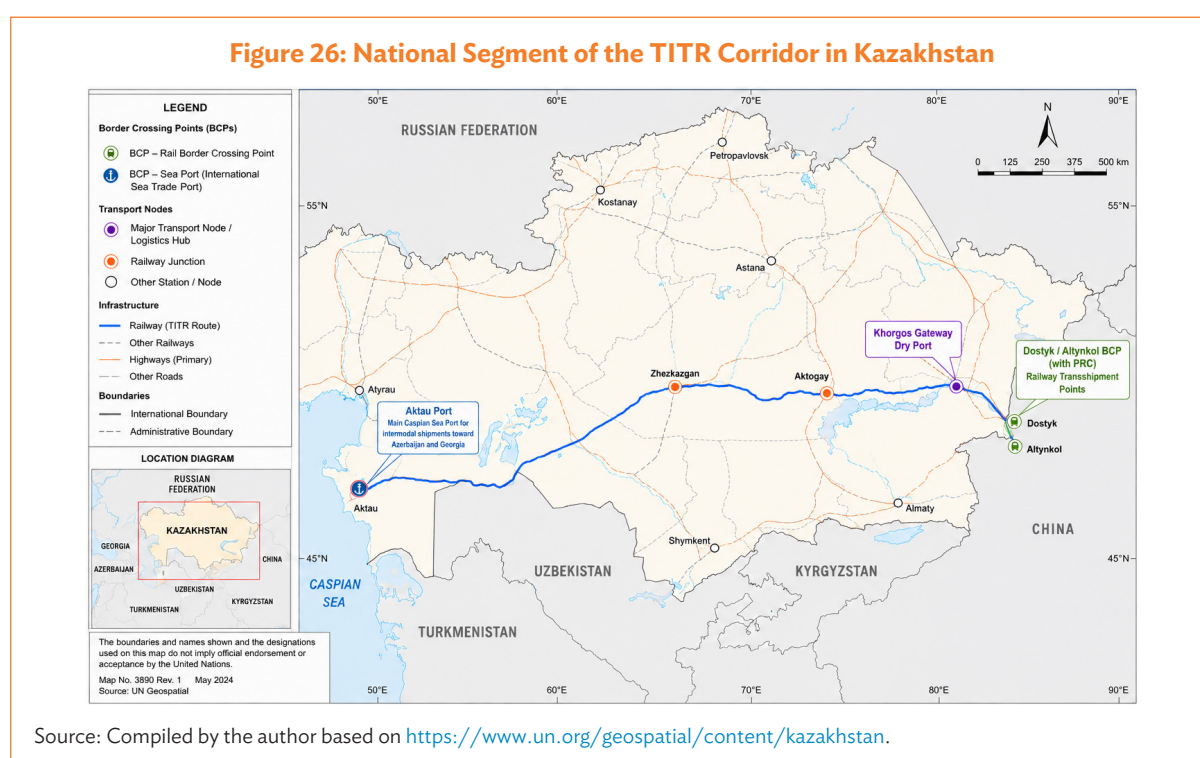
The operating northern branch of Middle Corridor traversing Kazakhstan was selected as the digitalization case in this country following recommendations of project stakeholders and the national consultant because of the following reasons:

- Kazakhstan’s segment of the Middle Corridor is a critical enabler of faster, more resilient China–Europe trade, with ongoing upgrades set to boost its competitiveness against traditional routes. A land-sea route for China–EU trade, reducing exposure to Northern Route or Suez disruptions with strong government and partner backing. Kazakhstan’s share around 80% of Middle Corridor traffic.
- This segment provides for the strong freight volumes capabilities – throughput on the Middle Corridor in 2024 was ~4.1–4.5 million tons, with growth target up to 10 million tons by 2030 (supported by infrastructure upgrades)
- Digitalization of TITR branch of the Middle Corridor has got strong support of participating CAREC countries – Azerbaijan, Georgia, Kazakhstan and Uzbekistan.

The Kazakhstan segment of the Middle Corridor (TITR) runs from the eastern border with PRC to the Caspian Sea, connecting key multimodal nodes and border crossings. The major nodes and BCPs include:

- Dostyk/Altynkol, BCP with PRC, important railway transshipment points;
- Khorgos Gateway and Dry Port, major inland terminal and logistics hub supporting multimodal integration and customs clearance;
- Aktogay and Zhezkazgan, key railway junctions along the East–West corridor;
- Aktau Port, main Caspian Sea port for intermodal shipments toward Azerbaijan and Georgia.

The scheme of TITR national segment in Kazakhstan is shown in Figure 26.



Source: Compiled by the author based on <https://www.un.org/geospatial/content/kazakhstan>.

163. The data collected for the Digital Passport of the Middle Corridor national segment in Kazakhstan are presented in Table 19.

Table 19: Digital Passport for the National Segment of the Middle Corridor in Kazakhstan

Digital Passport Components	Data and Description Provided by Stakeholders
Transport and communication connectivity with other nodes/terminals and BCPs	The corridor is well-integrated via railway (Kazakhstan Temir Zholy – KTZ) and road networks, with communication systems established through centralized dispatch, customs clearance platforms, and logistics service providers. • Rail Connectivity: Continuous gauge-adjusted rail network with international standard operations at key gauge-change points (e.g., Dostyk, Altynkol) and Europe via Russia; connections to Uzbekistan (Dostyk). • Road Connectivity: Integrated with CAREC Corridor 1b and 6b. Digital communication is supported by satellite tracking and mobile data networks. International highways (e.g., Western Europe-Western PRC corridor). • Maritime Links: Aktau and Kuryk connect to Azerbaijan (Baku) via ferry and container lines, digitally coordinated by the Caspian Integrated Logistics platforms. • Digital Connectivity: Fiber-optic networks, GSM/4G coverage at major nodes; satellite backup in remote BCPs. • Interoperability: Limited integration with Chinese/Uzbek digital systems (e.g., track-and-trace).
Main cargo flows served by each node/BCP	• Dostyk/Altynkol: Containerized consumer goods, electronics, machinery from PRC to Europe and vice versa. • Khorgos Dry Port: LCL/FCL transshipment, customs pre-clearance, and warehousing. • Aktau and Kuryk Ports: Petrochemical products, metals, grain, and container cargo to/from Caucasus and EU.
Operator/operating company managing the node/terminal	• Kazakhstan Temir Zholy (KTZ): National railway operator; manages rail infrastructure, terminals and container flows. • KTZ Express: Manages Khorgos Dry Port and logistics terminals. • KTZ Freight Transportation: Coordinates rolling stock and transport operations. • NC “Aktau International Sea Commercial Port” JSC, KMTF (Kazmortransflot) and Kuryk Port LLP: Maritime terminal operators. • Khorgos Gateway/DP World: Logistics services and bonded zone at Khorgos. • BCPs: State Revenue Committee (customs), private logistics firms (e.g., Khorgos Gateway). • KazPost and QazTrade: Involved in trade facilitation & parcel logistics.
IT systems, platforms and technological solutions used in the transport corridor national segments	• Customs: ASTANA-1 (automated customs clearance), integrated with Unified Transit System. • Tracking: GPS/GLONASS for trucks; KTZ’s ERP for rail cargo. • Port Community System: Limited digital integration at Aktau. • Blockchain Pilot: Khorgos for cross-border e-docs with PRC. • KTZ’s ASU-TZ (Automated System for Freight Transport) • KTZ Express’s TMS/WMS platforms • Unified Automated Information System of Customs Authorities (UAIS) • e-Transit/e-CMR/e-SMGS pilot implementations • Port Management Systems (Aktau, Kuryk): Digital vessel and cargo planning • Blockchain pilot projects (with Astana Hub and AIFC) for cross-border cargo traceability • KazNex and Trade Facilitation Portals • Digital platforms by DP World (Cargoes Flow) at Khorgos
List of documents processed: paper and electronic	• Electronic Documents: – e-SMGS (electronic rail consignment note) – e-CMR (pilot stage) – Electronic invoices (EDI/XML) – Digital phytosanitary and veterinary certificates – eTIR (test implementation with UNESCAP) – Customs pre-declaration and transit guarantees • Paper Documents (still widely used alongside digital systems): – Waybills – Bills of lading – Packing lists – Certificates of origin – Manual invoices (where digital integration is lacking).

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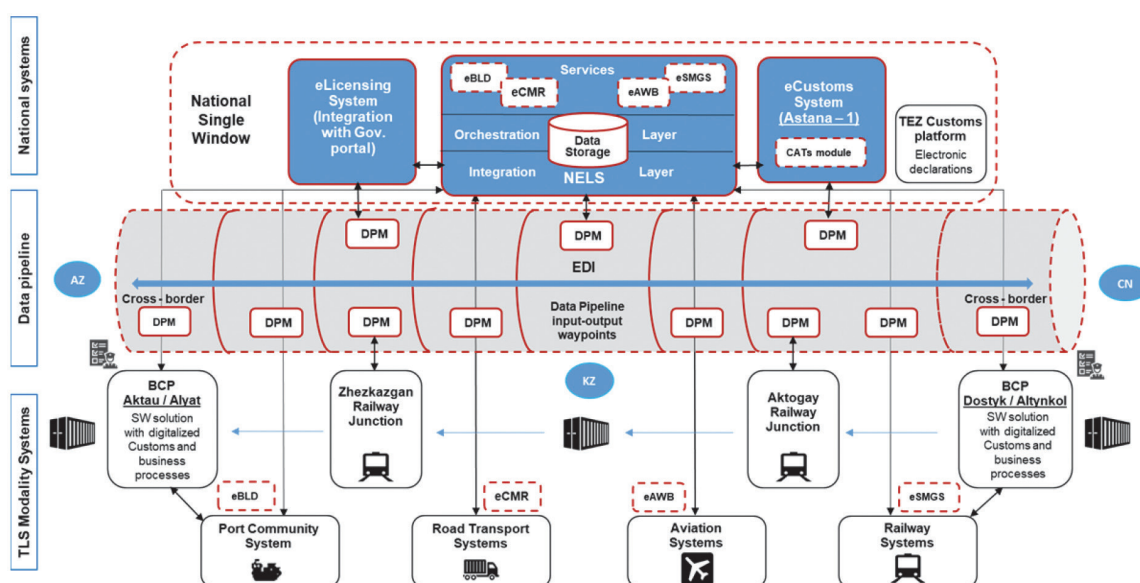
Table 19 continued

Digital Passport Components	Data and Description Provided by Stakeholders
List of provided digital/information services	• E-Tracking: Real-time cargo visibility (rail/truck). Real-time cargo tracking (via KTZ and Khorgos platforms) • Pre-clearance for Customs transit • Scheduling and vessel arrival management (Port Aktau) • E-queue systems for BCPs • E-Payment: Customs fees via e-Gov portal. • Electronic payments and billing for cargo handling • Remote document upload and verification for trade documents • Data Exchange: Limited API integration with Chinese/Uzbek systems. • Access to corridor-wide dashboards for corridor performance monitoring (piloted by TRACECA, CAREC)
Plans for modernization and digitalization	• Full-scale implementation of e-SMGS for rail cargo across Kazakhstan-PRC-Azerbaijan route by 2026 • Integrated National e-Logistics Platform • Expansion of Port Community Systems for interoperability with other Caspian and Black Sea ports • Blockchain-based cargo traceability systems (pilot by AIFC, KTZ, and IT developers) • Unified multimodal transport booking system to link KTZ, DP World, port operators • AI/ML-based cargo forecasting and route optimization tools in development • Digital corridor coordination platforms between CAREC and TRACECA countries (2025–2027 roadmap) • 2024–2026: Full rollout of NUA 2.0 for multi-modal tracking. • Khorgos Smart Port: AI-based queue management (piloted). • Blockchain: Expand to BCPs for end-to-end e-docs. • 5G Pilot: At Aktau Port for IoT (cranes, warehouses).

Source: Compiled by the author based on the results of project research.

164. The collected data proved the strong and multiple digitalization activities along Kazakhstan segment of the Middle Corridor but they are mainly focused on the fragmented improvements of particular business processes, electronic transport documents processing and local modality systems and services. In this respect our recommendations are mainly related to the integration of all these systems, technological components and services in the holistic digitalized segment of the Middle Corridor in Kazakhstan by means of NELS platform and data pipeline solutions. The list of recommendations for digitalization of Kazakhstan Middle Corridor national segment includes the following bullet points and is illustrated by the functional scheme in Figure 27.

- To implement effectively the Coordinated Border Management (CBM) approach it's recommended to digitalize business processes at the national segment BCPs by the development of BCP single-window solution. That involves the detailed analysis and re-engineering of cross-border control and documentary procedures into paperless processing and exchange of electronic documents in standardized formats. The integration of single-window BCP sub-systems with NELS platform will ensure the effective EDI connectivity with eCustoms system and CATs module in Kazakhstan. The secure EDI between these systems can be provided by the Data Pipelines Modules (DPM).
- The processing and exchange of electronic documents in BCP will require the adoption and recognition of their standardized formats. In this case the specialized converters shall be developed and used in the BCP single-window solution for conversion of transport and shipping electronic documents provided by the freight forwarder in the course of customs pre-arrival and clearance procedures into formats adopted in Kazakhstan. It shall be done in accordance with SPECA road map implementation for the digitalization of multimodal data and document exchange along the Trans-Caspian transport corridor (see section 92). In fact, the generation of standardized electronic documents are considered to be the "input point" for DTC data pipeline (see section 149).
- The data obtained from TLS participants and generated standardized electronic documents can be stored in the NELS Master database and will be available for the authorized access of governmental agencies involved in the control of transit processes in the country. The corresponding governmental IT systems are to be connected with NELS which becomes, along with eCustoms (Astana -1) and

Figure 27: Integration and Data Exchange Scheme for the National DTC Segment in Kazakhstan

Source: Compiled by the author based on the results of project research.

eLicensing, the third principal system of the integrated national trade Single Window in the country. TEZ Customs platform from GlobalDTC⁸⁴ and CATs module will be used as the main modules for eCustoms declarations and information exchange between customs authorities of the Middle Corridor countries in the CAREC region.

- d. Transport modality systems in Kazakhstan, Khorgos Gateway inland terminal, Aktogay and Zhezkazgan railway junctions as well as Aktau and Kuryk ports shall be connected with NELS via platform integration layer. The data obtained from BCPs and these participants of DTC technological level can be processed at the NELS orchestration layer in order to create the standardized international electronic transport documents to be used in the data pipeline of the DTC national segment. The required service modules for e-SMGS, e-CMR, e-Airway Bill and e-Bill of Lading electronic documents generation and processing may be located either in the NELS service layer or in the modal transport IT systems.
- e. At Aktau Port, the Port Community System is used for the ferry shipments of containers from railway block trains to Azerbaijan port Alyat the e-SMGS document can be used and valid in the maritime transportation. To provide the EDI transfer of such legally significant electronic documents between Kazakhstan and Azerbaijan it's recommended to use the mechanism of TTP Validation Authority (described in sections 151) or the corporate blockchain solution with PKI infrastructure (section 152).

165. All the above-mentioned elements of digital infrastructures are to be interconnected in the DTC data pipeline and use Data Pipeline Modules (DPM) as information “input waypoints” or “output waypoints”. As such the unified trusted DTC information space can be built along the national segment of TITR corridor in Kazakhstan. The data related to the particular cargo transit shipment and all evolved electronic documents or their modifications are worth storing in the NELS master database to be available only by means of authorized and authenticated access. This functional approach focused on the creation of NELS platform in the country will help preserve the digital sovereignty and data protection in the Kazakhstan TLS as well as prove the country ambitions and capabilities to become the most advanced transport and logistics regional hub in Central Asia.

⁸⁴ <https://dst.news/news/psa-facilitates-digitalisation-of-trade-along-middle-corridor-through-new-joint-venture-global-dtc/>.

C. Kyrgyz Republic

166. The Kyrgyz Republic is a core participant of the following major interregional transport corridors and serves as a crucial transit country for several important transport routes connecting Asia and Europe, including the Middle Corridor (TITR) and CAREC main corridors. These corridors leverage both road and rail networks, with increasing focus on developing new intermodal routes. Main corridor routes through Kyrgyz Republic and international entry/exit Border Crossing Points (BCPs) are considered to be as follows:

- Bishkek–Osh–Irkeshtam (to PRC): Irkeshtam BCP
- Bishkek–Naryn–Torugart (to PRC): Torugart BCP
- Osh–Kara-Suu (to Uzbekistan): Dostuk/Kyzyl-Kiya BCP
- Bishkek–Kordai/Ak-Tilek (to Kazakhstan): Ak-Tilek (Kordai) BCP

Middle Corridor (TITR) and its China–Kyrgyzstan–Uzbekistan (CKU) segment connects PRC with Europe via Central Asia, passing through Kyrgyz Republic, Uzbekistan, and Turkmenistan before reaching the Caspian Sea and continuing through Azerbaijan, Georgia, and Turkey. The CKU corridor segment is in use and has great potential, but while rail handles segments in PRC and Uzbekistan the middle section through Kyrgyz Republic still transports cargo via trucks as there is currently no direct rail connection through Kyrgyz Republic on CAREC Corridor 2. Cargo from PRC moves by truck across Irkeshtam BCPs (see Figure 1) with container traffic carried by road in Kyrgyz Republic via Osh to the Kara-Suu/Savay BCPs with Uzbekistan.

The construction project for CKU railway segment in Kyrgyzstan was launched in December 2024 and is currently under active implementation⁸⁵. The CKU railway route will go through the existing Torugart Pass and will reach Jalalabad region of Kyrgyzstan finally terminating in Andijan, Uzbekistan as shown in Figure 28. This project aims to create a new railway link between PRC, Kyrgyzstan, Uzbekistan and enhance connectivity between China and Central Asia, and potentially onward to Europe. From Uzbekistan, the corridor has the potential to connect to the Middle East via Afghanistan or Europe via Turkmenistan, the Caspian Sea, and the

Figure 28: National Segment of CAREC Corridor 2 in the Kyrgyz Republic



Source: Compiled by the author based on <https://www.un.org/geospatial/content/kyrgyzstan>.

⁸⁵ <https://eurasianet.org/china-kyrgyzstan-uzbekistan-railway-officially-launched-but-sidetracked-at-least-until-summer>.

Caucasus. The big advantage would be faster movement of goods, lower costs and the ability to connect with several other international railways routes.

CAREC Corridor 1 includes the 500-kilometer Bishkek–Naryn–Torugart road as the one of the main transport routes of Kyrgyz Republic and the part of “Europe–East Asia” trade flows. The road is the most significant of the two major highways linking Kyrgyz Republic and PRC, where, through the Kara-Kum highway, it provides access to the Pakistan and the Indian Ocean ports and also allows Russia and Kazakhstan to get to these ports.

CKU is the part of CAREC Corridor 2 which links Mediterranean region with East Asia (PRC–Irkeshtam–Osh–Andijan–Tashkent–Samarkand–Bukhara–Caspian ports). The total length of the Osh–Sarytash–Irkeshtam highway is 258 km. The corridor was fully completed in 2012 and ensures safe and unimpeded movement of vehicles.

CAREC Corridor 3 – passing through the Russian Federation–Semey–Almaty–Bishkek–Osh–Sarytash–Karamyk–Tajikistan–Afghanistan–Iran–Persian Gulf ports is the sole North–South land route connecting Kyrgyz Republic’s north and south through mountainous terrain—critical for national cohesion and trade flow between Bishkek and Osh. This corridor forms part of a larger regional transit network linking Central Asia to the Middle East and South Asia, making Kyrgyz Republic a transit bridge for goods moving toward Pakistan and Iran via Afghanistan.

For Kyrgyz Republic, Corridor 2 with CKU segment is of particular importance because of the country’s landlocked status and reliance on the international transit transport routes. Corridor 2 strengthens Kyrgyz Republic’s role as a bridge between Central Asia and PRC, enhancing its bargaining power in regional trade. The Corridor as a gateway for transit trade provides a vital channel for imports (fuel and energy supplies, critical for Kyrgyz Republic’s economy, machinery, consumer goods) and exports (agriculture, minerals, textiles).

Following our consultations with the project core stakeholders in Kyrgyz Republic the main focus of the proposed digitalization activities and recommendations was made on CAREC Corridor 2 national segment in the country with potential extension to the CKU segment under development. CAREC Corridor 2 in Kyrgyz Republic runs mainly along the road segment Irkeshtam → Sary-Tash → Osh. Osh is the main intermodal hub/terminal, Sary-Tash is the core road junction, see Figure 1. Main Kyrgyz BCPs on CAREC Corridor-2:

- Irkeshtam and Torugart on the PRC–Kyrgyz border;
- Kara-Suu/Savay–Karasu/Andijan on the Kyrgyz–Uzbek border, was reopened in 2024/2025.

The CKU national segment under construction will be served by Torugart BCP with railway route coming via Mammal to Jalalabad with the corresponding BCP at the Kyrgyz Republic–Uzbekistan border.

167. Data collected for the Digital Passport and recommendations for the digitalization of the national segment of CAREC corridor 2 in Kyrgyz Republic are presented in Table 20.

168. The collected data proves that Kyrgyz Republic is proactively developing and piloting different technological solutions for TLS digitalization, including the initial stages of the National Single Window deployment and eCustoms system. The country has recently adopted the new National Development Program until 2030 with the ambitious task to become a regional hub turning Kyrgyz Republic into a logistics, trade and transit center between PRC, the EAEU countries and South Asia⁸⁶. But a stronger legal, institutional, and technical foundation is needed to ensure that TLS digitalization delivers, interoperable, and regionally integrated transport corridors.

Key projects include the China–Kyrgyzstan–Uzbekistan railway and the North–South highway with upgrades to aviation infrastructure to support expanded domestic and international connectivity. In this respect our recommendations are mainly focused on the development and deployment of multimodal components of

⁸⁶ https://24.kg/english/332212____National_Development_Program_of_Kyrgyzstan_until_2030_approved/.

Table 20: Digital Passport for the National Segment of CAREC Corridor 2 in the Kyrgyz Republic

Digital Passport Components	Data and Description Provided by Stakeholders
Transport and communication connectivity with other nodes/terminals and BCPs	- Osh (city/Osh International Airport), the primary southern logistics node on the Kyrgyz side – Southern regional hub and main Kyrgyz terminal for Corridor 2 road traffic; onward road links with Sary-Tash→Irkeshtam. - Kara-Suu checkpoint at the border between Kyrgyz Republic and Uzbekistan was reopened on September 12, 2024. The Kara-Suu crossing is located near the town of Kara-Suu in Kyrgyz Republic's southern Osh region, on the border with Uzbekistan's Andijan region. - Irkeshtam/Erkeshtam (BCP), the Kyrgyz border node on Corridor 2 (Osh–Sary–Tash–Irkeshtam) – The principal PRC–Kyrgyz Republic BCP on Corridor 2 serving international freight flows to/from Kashgar which is the main corridor terminal at the PRC border. It's used for heavy freight (trucks), is seasonally sensitive (high-altitude passes) and has specific permit/customs procedures on both sides.
Main cargo flows served by each node/BCP	- Osh is a major southern Kyrgyz hub for both domestic production and transit traffic to/from PRC via Irkeshtam; also a collection point for goods coming from the Fergana Valley and from Uzbekistan via Kara-Suu, for onward transport to PRC or to central Kyrgyz Republic. Also arrival of imports (consumer goods, machinery, electronics) largely from PRC and via Uzbekistan/Kazakhstan. - Kara-Suu checkpoint is a key crossing for wholesale/consumer goods from PRC forwarded to/through Uzbekistan markets, and local trade between Osh/Jalal-Abad etc. It is also capable of handling agricultural products, processed goods, retail wares. - Irkeshtam/Erkeshtam (PRC–Kyrgyz Republic) in a period (Jan–Feb 2025) served 1,172 vehicles with ~24,000 tons of goods through Irkeshtam, compared to 3,089 vehicles with ~61,200 tons through Torugart, in the same period. Main trade flows: imports from PRC of consumer goods, electronics, machinery; exports from Kyrgyz Republic to PRC include agricultural products (beans, wool) and possibly other raw or semi-processed products. Transit traffic likely includes goods bound for or from other Central Asian countries. Volume is increasing, and congestion/throughput constraints are a significant issue.
Operator/operating company managing the node/terminal	- Osh International Airport JSC operates this airport. It is a state-owned company managing major airports; the new terminal project is under "Airports of Kyrgyz Republic." - Kara-Suu checkpoint (Kara-Suu/Karasu border post) is managed by Border Service/State Customs/State Committee for National Security (Kyrgyz side) and Customs Committee (Uzbek side). - Irkeshtam/Erkeshtam (PRC–Kyrgyz Republic border checkpoint) is managed by Kyrgyz Government/State Customs Infrastructure state enterprise (customs side), as well as the Border/Customs authority of Kyrgyz Republic. The contractor for modernization works is a state enterprise Kyrgyzkurulush.
IT systems, platforms and technological solutions used in the transport corridor national segments	- National Single Window (SWIS/"Single Window" Center) – Kyrgyz Republic has developed a national single-window solution (software called SWIS/Single Window Information System) to automate permit issuance, harmonize documents, and enable electronic submission of trade documents. The NSW is run by the State Enterprise "Single Window" Center under the Ministry of Economy and is a key platform for export/import/transit formalities at BCPs including Irkeshtam and main regional crossings. - ASYCUDA/e-customs components (or national customs information system compatible with ASYCUDA principles) – Kyrgyz customs operate web-based automated customs processing (electronic declaration, risk-management modules). Kyrgyz Republic participates in CAREC/UN/ADB digital customs modernization workstreams; ASYCUDA is the common UN solution used widely in the region. Kyrgyz Customs also exchange EDI/electronic data with neighboring countries and follows standard EAEU-aligned processes for goods moving into/through the country. - eTIR/digital TIR (electronic TIR guarantees and e-pre-declarations) – Kyrgyz Republic has been connected to digital TIR platforms, enabling cross-border TIR transit to be processed electronically (reduces paperwork and speeds transit along corridors like Osh→Irkeshtam). This is being used experimentally for cross-border truck flows in Central Asia. As of Jan 2025, dedicated TIR windows are in operation (IRU coverage), which helps reduce queue/processing times for TIR-based trucks - Electronic Queue Management System (eQMS) for trucks at BCPs – Kyrgyz border authorities (with EU support) have rolled out an eQMS at some border crossings to manage truck queues, reduce waiting times and optimize border throughput (announced Dec 2024). This is relevant for Irkeshtam and other busy BCPs on Corridor 2.

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Table 20 continued

Digital Passport Components	Data and Description Provided by Stakeholders
	- Interagency Electronic Data Exchange (EDE) – Projects and bilateral initiatives support web-based EDE between Kyrgyz customs and neighboring customs (Uzbekistan, Tajikistan), enabling electronic pre-arrival processing, risk profiling, and reduced dwell time. CAREC initiatives promote harmonization/interoperability of data standards. - CAREC Performance Measurement and Monitoring (CPMM) / Corridor Performance Measurement (CPM) tools – CAREC uses standardized CPM/CPMM tools to monitor travel time, border processing time, and cost across BCPs on Corridor 2. Data is collected (surveys, GPS logs, border logs) and used to diagnose bottlenecks. These tools are used to measure performance at Osh–Irkeshtam and other corridor points. - GPS fleet tracking/telematics (private and public) – trucking companies and freight forwarders commonly use GPS telematics to track convoys and trucks along high-altitude stretches (Sary-Tash→Irkeshtam). Public authorities also rely on GPS data and CPMM sampling for monitoring. Terminal and logistics IT (Osh regional terminals/consolidation centers) - Terminal Operating Systems/Warehouse Management Systems (TOS/WMS) – large logistics operators and consolidation warehouses in Osh (and planned logistics centers on the Osh–Irkeshtam highway) use commercial WMS/TOS to manage container/truck flows, inventory, customs clearance interfaces and e-document exchange. There are projects plans for integration with the Single Window. (ADB/CAREC logistics hubs planning assumes TOS/WMS integration.) - Customs-Terminal Integration/Single-Window APIs – planned BCP modernizations by API links between terminal systems and the national Single Window/customs to allow pre-arrival information submission and clearance (reduces dwell time at Irkeshtam/Kara-Suu). They are to be implemented during BCP modernization projects. Physical inspection and security tech at BCPs - non-intrusive inspection (NII) systems/X-ray scanners, weigh-in-motion (WIM) – modernized BCPs funded by regional projects typically include CCTV, fixed/portable X-ray screening, and WIM lanes for trucks; reports on Kyrgyz BCP modernization mention installation of such equipment in recent upgrades. These systems are integrated into the customs risk-management workflow - CCTV, perimeter and access control systems – used at major BCPs such as Irkeshtam and upgraded checkpoints to support security and traffic monitoring. (Project reports reference camera systems and integrated surveillance.) Communications and backbone (connectivity that underpins IT systems) - National fiber backbone (Public and operator owned) – Kyrgyztelecom and private operators have completed/expanded national fibre links including the Bishkek–Osh–Sary-Tash backbone; - Mobile networks and satellite – cellular coverage (2G/3G/4G) exists along main roads but high-altitude gaps persist; satellite (VSAT) is used as backup at remote BCPs and for link redundancy in logistics operations. CAREC logistics guidance recommends multiple uplinks. - Cross-border fiber/transit routes – international fiber transit commonly follows road corridors (China–Irkeshtam→Osh→Uzbekistan) and via Kazakhstan toward Europe;
List of documents processed: paper and electronic	Basic documents of Kyrgyz Customs regulation for goods passing through Kyrgyz checkpoints: - Contract/Purchase Order - Commercial Invoice - Packing List - Waybill/Transport Document (CMR or similar) - Certificate of Origin - Sanitary/Phyto certificate, as relevant - Certificate of Conformity/Technical/Lab Reports - Driver's Documents (passport, license) - Vehicle Documents (registration, technical passport) - TIR Carnet or transit permits if applicable - Customs Declaration (prepare via UAIS, draft/prototype) - Payment documents/receipts for any duties/fees/permits - Inspection/Border Control Acts where applicable (paper) - If required, quarantine/veterinary certificates etc. Some of these may be digital – For digital PDF versions, electronic certificates/signatures, digital submission via SWIS or UAIS (if relevant), email/portal confirmations are required. But paper originals should be presented where customs/border guards request them.
List of provided digital/information services	On the Kyrgyz Republic's Corridor 2 the following digital solutions are available: electronic customs clearance, eTIR, electronic truck queues, GPS/fleet tracking, WMS/TOS at terminals, and CAREC performance dashboards. At the BCPs, digital inspection results, e-queue booking, and real-time border info are becoming standard.

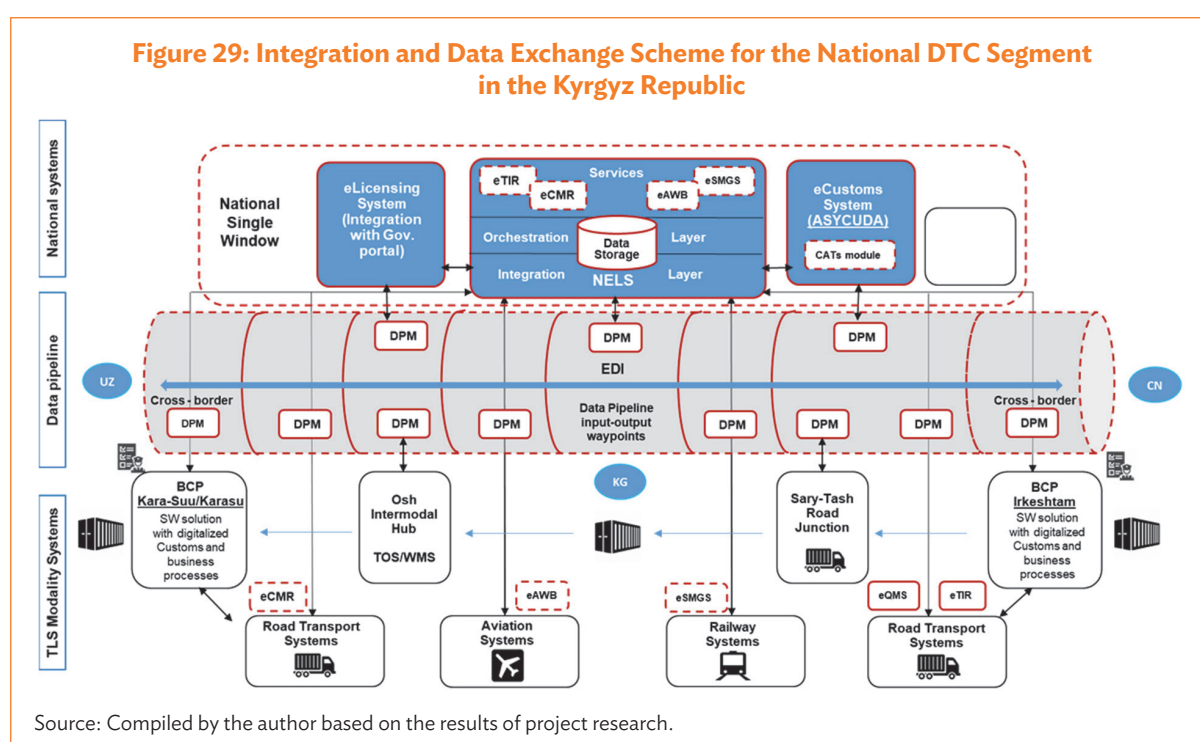
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Table 20 continued

Digital Passport Components	Data and Description Provided by Stakeholders
Plans for modernization and digitalization	Kyrgyz Corridor-2 modernization combines road rehabilitation (Osh–Sary-Tash–Irkeshdam), BCP modernization (Irkeshdam + regional BCPs), rollout of Single Window/e-customs/eTIR and eQMS, installation of NII/WIM/CCTV, and backbone telecom upgrades. Border IT, trade-facilitation and process digitalization - National Single Window (Single-Window Information System) – ongoing development/rollout to integrate permits, certificates and customs declarations; the Single Window is central to digital processing at BCPs (pre-arrival clearance, e-document exchange). - Electronic Customs Declaration/e-Customs modernization and compatibility – automation of declarations, risk-management and EDI exchange with partners, supporting faster release at Irkeshdam and other BCPs. - eTIR and TIR “windows” – Kyrgyz Republic has introduced dedicated TIR windows (including Irkeshdam) and participates in digital TIR pilots to make transit paperless and faster for international trucks. - Electronic Queue Management System (eQMS) – EU/ITC/EU delegation pilots rolled out eQMS (truck slot booking and digital queueing) at pilot BCPs (Kyzyl-Kiya and plans for broader rollout including Irkeshdam and other busy crossings). The eQMS aims to reduce on-site queueing and waiting times. Node-specific modernization plans - Irkeshdam: Modernization works was publicly announced and included facilities and ICT upgrades to support customs and border services. eTIR windows already operational there - Osh (terminal and logistics nodes): Road upgrades (Osh–Gulcha, Osh–Sary-Tash sections) completed or ongoing as part of CAREC/ADB pipeline; logistics center planning (private + public) to consolidate transit flows. - Kara-Suu, Ken-Sai, Uch-Kurgan: Reopening and refurbishment in 2024–25 with basic modernization and pilots for digital queueing/streamlined processing; smaller scale BCP upgrades to support renewed bilateral trade.

Source: Compiled by the author based on the results of project research.

digital infrastructures and services to be used for the digitalization of national segments of transport corridors in Kyrgyz Republic based on national e-Logistics platform (NELS) and data pipeline solutions. The list of recommendations for the digitalization of the CAREC corridor 2 national segment in Kyrgyz Republic includes the following bullet points and is illustrated by the functional scheme in Figure 29.



- a. The Kyrgyz Republic plans to modernize BCPs and link terminal systems with National Single Window (NSW). This process can be streamlined by the application of the CBM approach and integration all BCP digitalization components into electronic single-window solution proposed by CPMM consultants. For that it's recommended to analyze and re-engineer business processes at the national segment BCPs by the development and deployment of their digitalized versions.
- b. The processing and exchange of electronic documents in a digitalized BCP will require the adoption and recognition of their standardized formats. In this case the specialized converters shall be developed and used in the BCP electronic single-window solution for conversion of transport and shipping electronic documents provided by the freight forwarder in the course of customs pre-arrival and clearance procedures into formats required by Kyrgyz Republic regulations.
- c. It's recommended to store data obtained from TLS participants and the generated standardized electronic documents in the NELS Master database to make them available for the authorized access of governmental agencies involved in the control of transit processes in the country. The corresponding governmental IT systems are to be connected with NELS which becomes, along with eCustoms (ASYCUDA) and eLicensing, the third principal system of the integrated national Single Window in the country. ASYCUDA and CATs will be used as the main systems for electronic customs declaration procedures and information exchange between customs authorities of the CAREC corridor 2 participating countries.
- d. Road cargo systems (eTIR, eQMS, TOS/WMS, GPS Fleet Tracking) and other modal transport IT systems in Kyrgyz Republic as well as Osh Intermodal Hub and BCPs – Irkeshtam, Torugart and Kara-Suu shall be connected with NELS via platform integration layer. The data obtained from BCPs and other participants of DTC technological level can be processed at the NELS orchestration layer in order to create the standardized international electronic transport documents to be used in the data pipeline of the DTC national segment. The required service modules for e-SMGS, e-CMR and e-Airway electronic generation and processing of documents may be located either in the NELS service layer or in the modal transport IT systems
- e. It is recommended for Kyrgyz Republic to pilot in the core transport corridors the cross-border exchange of electronic documents with neighboring countries based on data pipeline approach by the development of the specialized modules (DPM) enabling legally significative exchange of electronic documents with Russia, Kazakhstan and Uzbekistan. For that the Trusted Third Party (TTP) approach can be used (adopted in the EAEU counties) and the corresponding updates of the regulatory framework might be required in Kyrgyz Republic to recognize electronic documents, digital signatures and harmonize transport documents with international standards.

169. The cross-border and other elements of digital infrastructures in the national segment of CAREC corridor 2 in Kyrgyz Republic are to be interconnected in the DTC data pipeline and use DPMs as information “input waypoints” or “output waypoints”. As such the unified trusted DTC information space can be built along the national segment of CAREC corridor 2 in Kyrgyz Republic. The data related to the particular cargo transit shipment and all evolved electronic documents or their modifications can be stored in the NELS master database to be available only by means of authorized and authenticated access. This functional approach will help preserve the digital sovereignty and data protection in the Kyrgyz Republic TLS. The development of CKU railway segment of CAREC corridor 2 is expected to significantly reduce transport costs and delivery times by the initial adoption of digital technologies at border crossings and the seamless cross-border information exchange solutions.

D. Turkmenistan

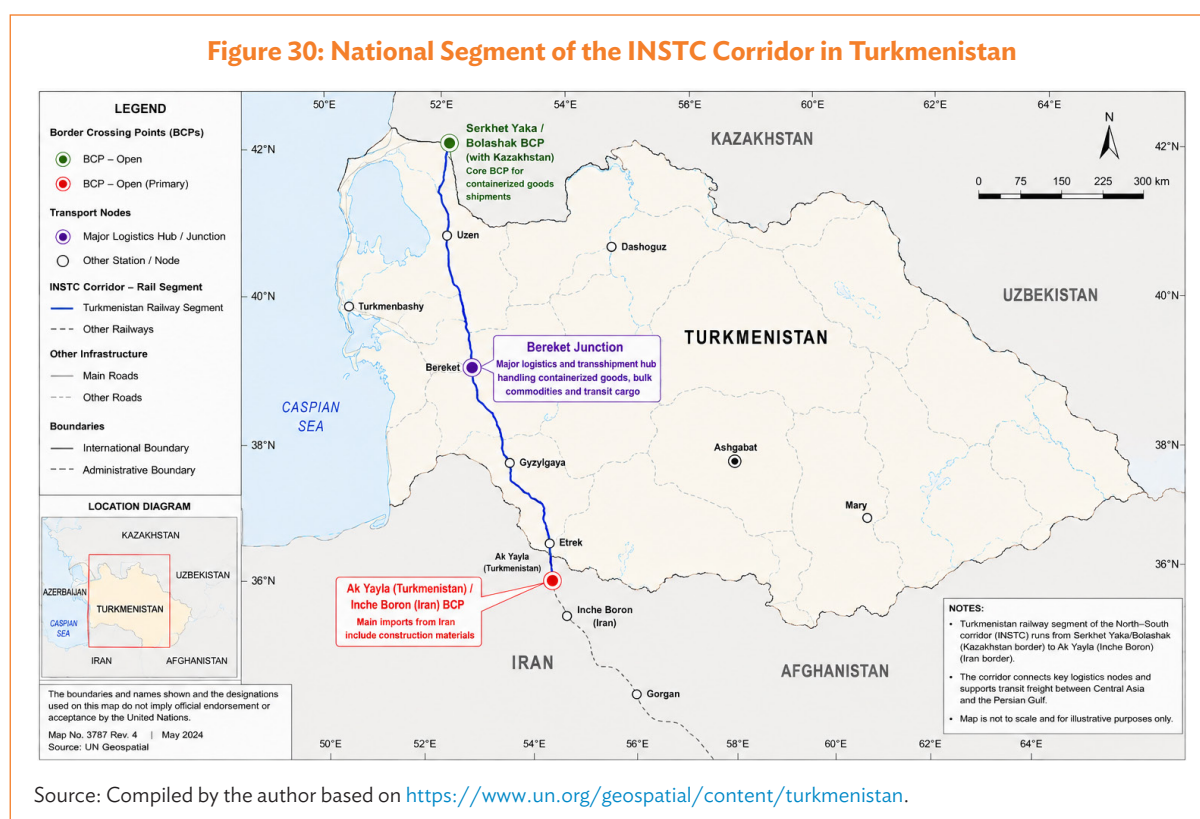
170. In the course of selection and recommendations development for the digitalization of the core transport corridor national segment in Turkmenistan the following facts were taken into consideration. Turkmenistan is a core participant of the following major interregional transport corridors:

- The Trans-Caspian International Transport Route (TITR, Middle Corridor, TRACECA), connecting PRC, Kazakhstan, the Caspian Sea, Azerbaijan, Georgia, Turkey, and further
- The eastern branch of North-South International Transport Corridor (Kazakhstan-Turkmenistan-Iran), a railway line providing the shortest corridor from northwestern Europe to the Persian Gulf;
- The Lapis Lazuli Corridor (Afghanistan-Turkmenistan-Azerbaijan-Georgia-Turkey), a multimodal corridor linking Central and South Asia with Europe via the Caspian Sea;
- The China-Kyrgyzstan-Uzbekistan-Turkmenistan-Iran Corridor, a promising additional branch of the Middle Corridor with rail and multimodal segments between PRC and Europe;
- The Trans-Afghan Corridor (North-South), connecting Central Asian countries with South Asia via Afghanistan.

The operating Eastern segment of the International North-South Transport Corridor (INSTC) traversing Turkmenistan was selected as the digitalization case in this country following recommendations of project stakeholders and the national consultant because of the following reasons:

- Eastern INSTC segment provides the shortest railway access from the Northern Europe and Asia to Persian Gulf and Indian Ocean ports thus reducing distance and time for cargo from Kazakhstan/Russia/Central Asia to India and the Middle East.
- This route can serve significant cargo flows and targets with a coordinated roadmap among neighbors. In 2024 the roadmap for the Eastern route targeted 10 million tons of cargo by 2027 and 20 million tons by 2030, creating predictable investment and demand. For Turkmenistan, this means assured transit and infrastructure revenues.
- Unlike the Caspian route with ferry transshipments, the Eastern North-South route is a continuous rail axis without mandatory sea transloading at the Caspian, making scale-up simpler.

The scheme of INSTC national segment in Turkmenistan is shown in Figure 30.



Source: Compiled by the author based on <https://www.un.org/geospatial/content/turkmenistan>.

Recent data indicate that in 2023, North–South corridor handled 18 million tons of cargo, with 28% of this volume transported via the eastern (Turkmen) route. This underscores the growing importance of Turkmenistan as the important regional transit hub in CAREC region. The Turkmenistan railway segment of the North–South corridor runs from the Serkhet Yaka–Bolashak border crossing with Kazakhstan to the Ak Yayla–Inche Boron crossing at the border with Iran. The list of major BCP and transport nodes of this segment include:

- Serkhet Yaka/Bolashak, core BCP primarily serving shipments of containerized goods.
- Bereket Junction, functions as a major logistics and transshipment hub, handling a wide range of transit cargo, including containerized goods, bulk commodities, and goods for further distribution within Turkmenistan or onward to neighboring countries;
- Ak Yayla/Inche Boron with main imports from Iran include construction materials.

171. The data collected for the Digital Passport and recommendations for the digitalization of the North–South corridor national segment in Turkmenistan are presented in Table 21.

Table 21: Digital Passport for the National Segment of the North–South Corridor in Turkmenistan

Digital Passport Components	Data and Description Provided by Stakeholder
Transport and communication connectivity with other nodes/terminals and BCPs	The eastern segment of the North–South transport corridor in Turkmenistan is well integrated with other key nodes, terminals, and border crossing points (BCPs): Kazakhstan Border: The corridor connects with Kazakhstan at the Serkhet Yaka – Bolashak border crossing, facilitating direct rail and road links to the Kazakh transport network and further to Russia. Iran Border: On the southern end, the corridor links with Iran at the Ak Yayla – Inche Boron border crossing, providing access to the Iranian rail system and ports on the Persian Gulf. • Key Terminals: The Bereket railway junction is a major logistics hub, connecting the North–South corridor with the Trans–Caspian railway and other domestic routes. • Port Connectivity: While the eastern segment itself is primarily rail-focused, Turkmenistan’s transport system is also connected to the International Sea Port of Turkmenbashi on the Caspian Sea, enabling multimodal (rail-sea) operations via the Trans–Caspian route. • Digital Connectivity: at national level the Optical Line constructed along the railway and it belongs to the Ministry of Railway of Turkmenistan • Other BCPs: The corridor is linked to additional border crossing points with Uzbekistan and Afghanistan through the national rail network, supporting broader regional connectivity.
Main cargo flows served by each node/BCP	• Serkhet Yaka–Bolashak (Kazakhstan border): imports from Kazakhstan are grain and flour. Exports from Turkmenistan to Kazakhstan primarily consist of other containerized goods. • Ak Yayla–Inche Boron (Iran border): imports from Iran include construction materials, cement, and other goods. Exports from Turkmenistan to Iran are mainly fertilizers, chemicals, and soda. • Bereket Junction: Functions as a major logistics and transshipment hub, handling a wide range of transit cargo, including containerized goods, bulk commodities, and goods for further distribution within Turkmenistan or onward to neighboring countries.
Operator/operating company managing the node/terminal	• Ministry of Railways of Turkmenistan – state-owned national railway company of Turkmenistan. It is responsible for the operation, management, and maintenance of all railway infrastructure, including the North–South corridor, border crossing points (Serkhet Yaka, Ak Yayla), and major terminals such as Bereket Junction. • All railway operations, including cargo handling, scheduling, and infrastructure development along this corridor, are under the direct control of the Ministry of Railways of Turkmenistan.
IT systems, platforms and technological solutions used in the transport corridor national segments	• eCustoms (ASYCUDA World – Customs Management System) with BCP Digital Customs Procedures software under development. • Electronic certification/licensing system • Other Technological Solutions: There is ongoing work to introduce digital technologies at BCPs to reduce processing times and improve efficiency. This includes electronic data interchange (EDI), digital signatures, and pilot projects for paperless trade, but full-scale deployment is still in progress.

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Table 21 continued

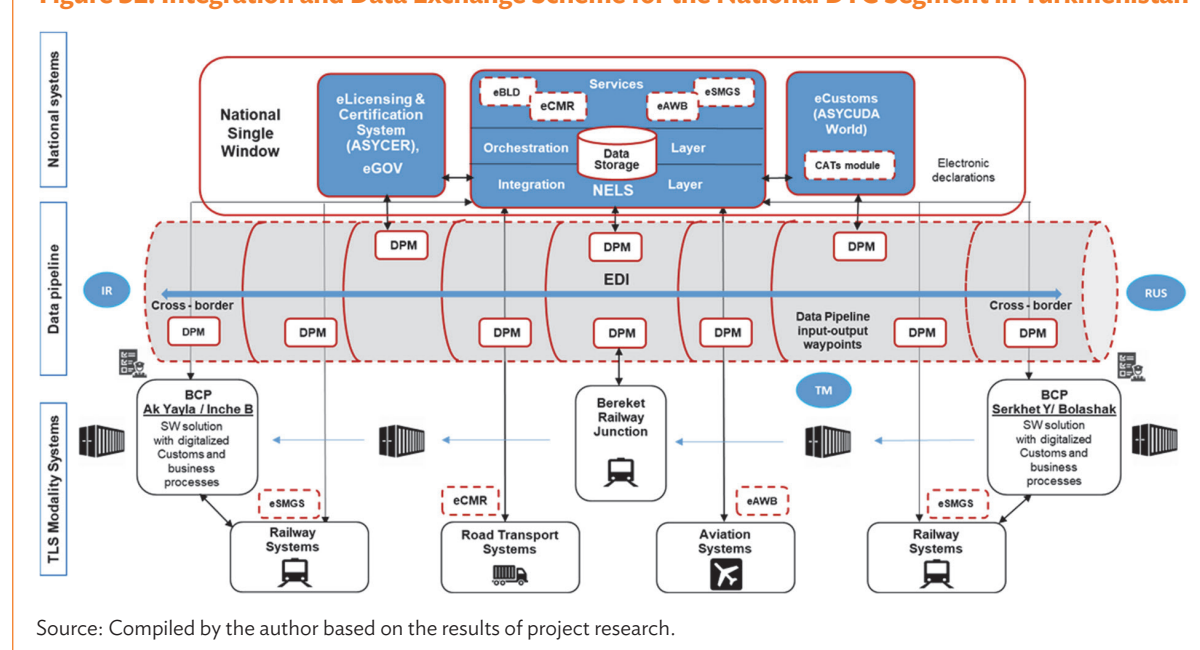
Digital Passport Components	Data and Description Provided by Stakeholder
List of documents processed: paper and electronic – their usage in the technological process	- Paper Documents (currently predominant): - Railway waybill (consignment note) - Cargo manifest - Commercial invoice - Packing list - Certificate of origin - Customs declaration (import/export/transit) - Phytosanitary and veterinary certificates (for relevant goods) - Permits and licenses (for specific cargo types) - Insurance documents - Electronic Documents (limited, just at the national level, or in pilot) : - Electronic customs declaration (some procedures) - Pre-arrival information (electronically submitted for selected shipments) - Digital copies of supporting documents (uploaded to eCustoms or pilot Single Window platforms) - Electronic railway waybill (not yet widely used, under consideration) - Application in the Technological Process: - Upon cargo arrival, paper documents are presented for verification, customs clearance, and border control. - Where available, electronic documents are submitted in advance or at arrival, expediting certain steps (mainly for customs). - Customs and border agencies use both paper and electronic records for inspection, risk assessment, and release of goods. - For most operations, paper documents remain the legal basis and are required for physical checks and signatures. - The transition to electronic documentation is ongoing, with full paperless processing not yet achieved; parallel use of both document formats is common.
List of provided digital/information services	- eCustoms and Single Window Operations (in development/pilot phase): - Electronic submission and processing of customs declarations; - Risk management modules; - Electronic pre-arrival information (limited use); - Integrated tariff management and statistics; - Centralized electronic submission of trade documents (planned); - Tracking of application status for licenses, certificates, and permits (planned); - Electronic payment of fees (planned); - Interoperability with customs and other government agencies (planned); - Electronic Certification Systems (pilot/sectoral): - ASYCER: Electronic phytosanitary certificates (pilot phase); - Digital conformity certificates (under development);
Plans for modernization and digitalization	- Expansion and full Implementation of the National Single Window: Turkmenistan is developing a National Single Window for export–import operations, aiming to integrate all relevant government agencies and enable traders to submit documents and data electronically through a unified platform. Full-scale implementation is planned in phases, with ongoing pilot activities. - Wider Use of ASYCUDA World: The State Customs Service plans to expand the use of the ASYCUDA World system for electronic customs declarations, risk management, and pre-arrival processing, including further integration with other national and international systems. - Cross-Border Electronic Data Exchange: There are plans to launch pilot projects for cross-border electronic exchange of trade and transport documents with neighboring countries, in line with international agreements and the Framework Agreement on Facilitation of Cross-border Paperless Trade – currently these projects are in the preparatory stage. - Digitalization of Certificates and Permits: Sectoral systems such as ASYCER (for electronic phytosanitary certificates) & digital conformity certificates are being piloted, with the goal of expanding to other types of licenses and permits. - Upgrading Border and Terminal Infrastructure: Modernization of border crossing points and logistics centers includes the introduction of digital customs procedures, one-stop inspection systems, and improved ICT infrastructure. - Legal and Institutional Reforms: Ongoing updates to national legislation to recognize electronic documents and signatures, harmonize with international standards, and support digital trade facilitation. - Capacity Building and Awareness – continued training and awareness-raising for public and private sector stakeholders.

Source: Compiled by the author based on the results of project research.

The collected data confirms that Turkmenistan is progressing well with trade and transport facilitation by the active development of the national Single Window and its core systems eCustoms and eLicensing. The country plans for TLS modernization and digitalization are comprehensive and aligned with international best practices, but most initiatives are still in early and pilot phases, with full implementation expected over the next years. In this respect our recommendations are mainly related to the coordinated development of technological components and services to be used for the digitalization of transport corridors in Turkmenistan by means of NELS platform and data pipeline solutions.

172. The list of recommendations for the digitalization of North–South corridor national segment in Turkmenistan includes the following bullet points and is illustrated by the functional scheme in Figure 31.

Figure 31: Integration and Data Exchange Scheme for the National DTC Segment in Turkmenistan



- Turkmenistan plan to deploy digital technologies at BCPs including Digital Customs Procedures software under development, digital signatures and electronic data interchange (EDI) can be effectively streamlined by the application of the CBM approach and integration all BCP digitalization components into single-window solution. For that it's recommended to analyze and re-engineer business processes at the national segment BCPs by the development and deployment of their digitalized versions.
- The processing and exchange of electronic documents in digitalized BCP will require the adoption and recognition of their standardized formats. In this case the specialized converters shall be developed and used in the BCP single-window solution for conversion of transport and shipping electronic documents provided by the freight forwarder in the course of customs pre-arrival and clearance procedures into formats required by Turkmenistan regulations.
- It's recommended to store the data obtained from TLS participants and generated standardized electronic documents in the NELS Master database to make them available for the authorized access of governmental agencies involved in the control of transit processes in the country. The corresponding governmental IT systems are to be connected with NELS which becomes, along with eCustoms (ASYCUDA World) and eLicensing (ASYCER based), the third principal system of the integrated national trade Single Window in the country. ASYCUDA system and CATs module will be used as the main modules for electronic customs declaration procedures and information exchange between customs authorities of the North–South corridor countries in the CAREC region.

- d. Railway and other modal transport IT systems in Turkmenistan, Bolashak and Ak Yayla BCPs, Bereket railway junction as well as the International Sea Port of Turkmenbashi shall be connected with NELS via platform integration layer. The data obtained from BCPs and other participants of DTC technological level can be processed at the NELS orchestration layer in order to create the standardized international electronic transport documents to be used in the data pipeline of the DTC national segment. The required service modules for e-SMGS, e-CMR, e-Airway Bill and e-Bill of Lading electronic documents generation and processing may be located either in the NELS service layer or in the modal transport IT systems
- e. In the Turkmenistan pilot project for cross-border exchange of electronic documents with neighboring countries in the North–South transport corridor it's recommended to use the data pipeline approach by the development of the specialized modules (DPM) enabling legally significant exchange of electronic documents with Russia and Iran. For that the corresponding updates of the regulatory framework in Turkmenistan are required to recognize electronic documents, digital signatures and harmonize transport documents with international standards.

173. The cross-border and other elements of digital infrastructures in the national segment of North–South corridor in Turkmenistan are to be interconnected in the DTC data pipeline and use DPMs as information “input waypoints” or “output waypoints”. As such the unified trusted DTC information space can be built along the national segment of North–South corridor in Turkmenistan. The data related to the particular cargo transit shipment and all evolved electronic documents or their modifications can be stored in the NELS master database to be available only by means of authorized and authenticated access. This functional approach will help preserve the digital sovereignty and data protection in the Turkmenistan TLS. The North–South corridor development is expected to significantly reduce transport costs and delivery times by the adoption of digital technologies at border crossings and the harmonization of customs procedures.

E. Uzbekistan

174. In the course of selection and recommendations development for the digitalization of the core transport corridor national segment in Uzbekistan the following facts were taken into consideration. Uzbekistan is a core participant of the following major interregional transport corridors:

- The Central Asian branches of Trans-Caspian International Transport Route (TITR, Middle Corridor), connecting PRC, Kazakhstan, Uzbekistan, the Caspian Sea, Azerbaijan, Georgia and Turkey which are referred to as CASCA+. ⁸⁷ These branches correspond to CAREC Corridor 2 sub-corridors 2a and 2b, which connect East Asia to the Caucasus via Uzbekistan–Kazakhstan–Azerbaijan (through Aktau–Baku), or via Uzbekistan–Turkmenistan–Azerbaijan (through Turkmenbashi–Baku);
- The China–Kyrgyzstan–Uzbekistan–Turkmenistan–Iran Corridor, a prospective branch of the Middle Corridor with rail and multimodal segments under construction phase in Kyrgyz Republic;
- CIS branches of the North–South transport corridor connecting CIS countries with Afghanistan, Pakistan and South-East Asia.

The operating segments of CASCA+ corridor traversing Uzbekistan were selected as the digitalization case in this country following recommendations of project stakeholders and the national consultant because of the following reasons:

- CASCA+ national segment of CAREC 2 transport corridor in CAREC countries play the important role in serving East–West cargo transit flows, high volume of containerized goods from PRC and East Asia transits Uzbekistan on their way to Europe or the Caucasus.
- Uzbekistan's national segment of CASCA+ corridor is a critical link that synergizes with several broader Eurasian and CAREC region corridors and passes the largest multimodal transport nodes Uzbekistan–Bukhara, Navoi and Tashkent

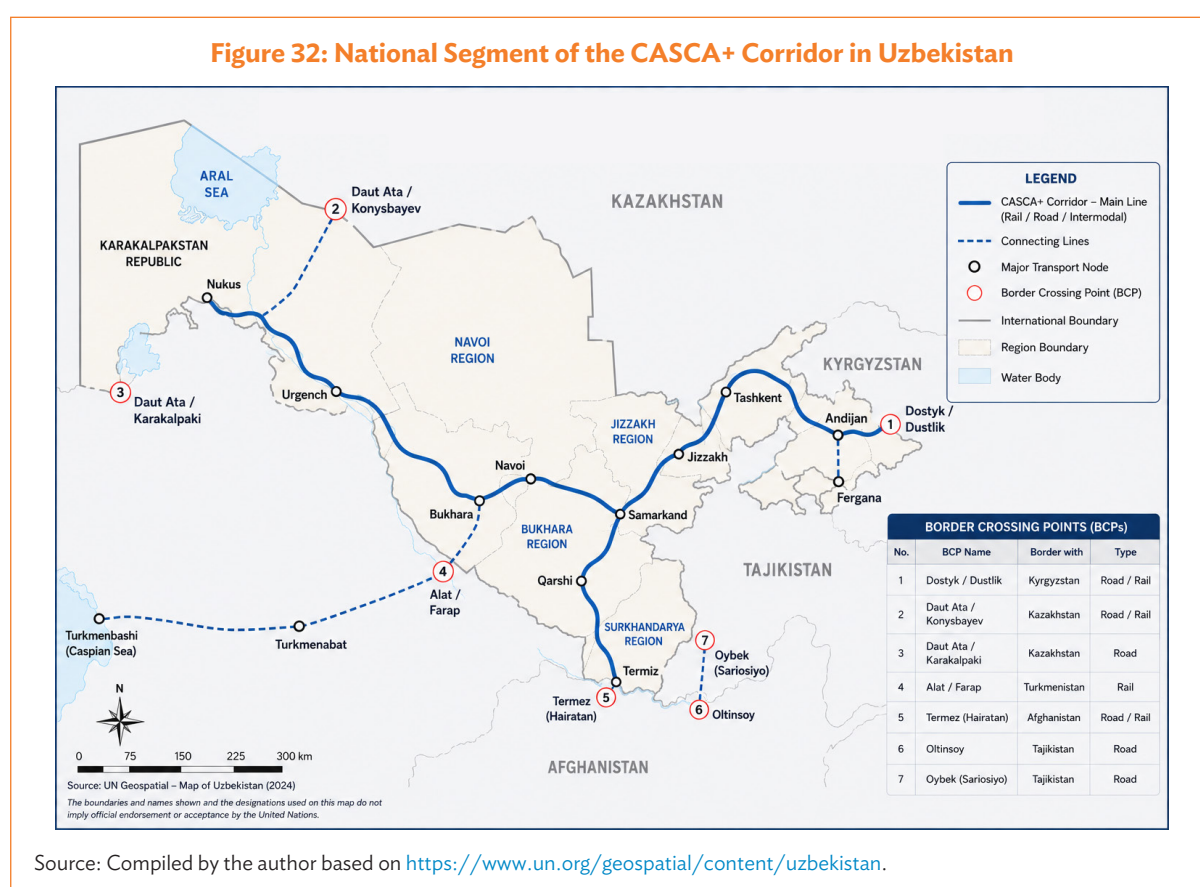
⁸⁷ <https://index1520.com/en/news/strany-tsentralnoy-azii-stroyat-novye-transportnye-koridory-i-menyayut-logistiku/>.

- Uzbekistan has got an ambitious goal to complement and connect its CASCA+ branches with China–Kyrgyzstan–Uzbekistan (CKU) corridor and the North–South corridor branches to stimulate the regional integration and trade facilitation between Eurasian countries

The list of major BCP and transport nodes of CASCA+ corridor segments include:

- Dostyk/Dustlik, the entry BCP from Osh (Kyrgyz Republic) to Andijan (Uzbekistan);
- Alat/Farap, the railway BCP for exit from Bukhara region (Uzbekistan) to Turkmenabat (Turkmenistan) and further to Caspian port Turkmenbashi;
- Daut Ata/Konysbayev and Daut-Ata/Karakalpaki, intermodal BCP for exit from Karakalpakstan (Uzbekistan) to Beyneu (Kazakhstan);

The scheme of CASCA+ corridor national segment is shown in Figure 32.



175. The data collected for the Digital Passport and recommendations for digitalization of the national segment of the CASCA+ corridor in Uzbekistan is presented in Table 22.

The collected data indicate that Uzbekistan has successfully deployed and piloted different technological solutions for TLS digitalization, including the first stage of its national E-logistics platform. The country has recently adopted the new and ambitious concept for TLS development until 2030 with practical plans for transport corridors national segments digitalization aligned with the best international practices. Besides, Uzbekistan took the proactive position and initiated multilateral projects for the unified digital solutions for transport corridors integration and interoperability of their national segments. In this respect our recommendations are mainly related to the coordinated development of technological components and services to be used for the digitalization of transport corridors in Uzbekistan and neighboring countries by means of integrated E-logistika platform and data pipeline solutions.

Table 22: Digital Passport for the National Segment of the Middle Corridor in Uzbekistan

Digital Passport Components	Data and Description Provided by Stakeholders
Transport and communication connectivity with other nodes/terminals and BCPs	Uzbekistan's transport and communication segments are connected with neighboring countries' transport networks. There are direct 1520 mm gauge rail connections from Uzbekistan to Kazakhstan and Turkmenistan, and planned links to Kyrgyz Republic and Afghanistan. On roads, international highways in Uzbekistan tie into the CAREC network (Corridors 2, 3, 6) and TRACECA routes. The main transport nodes are considered to be: • Tashkent – the capital is a primary hub where CAREC Corridor 2 intersects other routes. It hosts the largest cargo terminal and numerous warehouses which handles diverse cargo – consumer goods and machinery for import, cotton textiles and fertilizers for export • Navoi is emerging as a strategic multimodal hub which features the Navoi International Logistics Center (dry port) adjacent to the Navoi Airport (a cargo hub) and lies at the junction of rail lines to both Bukhara (southwest) and Uchkuduk/Nukus (northwest). Major flows include mineral resources, chemicals and fertilizers • Bukhara – is located near the Turkmen border, it's a key node where corridor traffic can either continue northwest or turn south. It has significant warehousing and an important rail station (Kagan) for marshaling trains. Bukhara contributes oil and gas products and cotton fiber to the corridor cargo flows • Nukus/Kungrad – is the primary transport hub which consolidate containerized freight from central Uzbekistan for the final leg to the Kazakh border. The new logistics center in Nukus facilitates container loading and customs checks for cargo heading to Aktau port. • Digital Connectivity: Fiber-optic networks, GSM/4G coverage at major nodes. • Interoperability: Limited integration with Kazakhstan digital systems (e.g., track-and-trace).
Main cargo flows served by each node/BCP	• Dostyk/Dustlik: Containerized consumer goods, electronics, machinery from PRC to Europe and vice versa. • Daut-Ata/Karakalpaki: transshipment, customs pre-clearance, and warehousing. • Alat/Farap: Petrochemical products, cotton and container cargo to/from Caucasus and EU.
Operator/operating company managing the node/terminal	• Uzbekistan Temir Yo'llari (UTY) – the national railway company and primary operator of railway infrastructure and services. UTY manages track maintenance, train operations, and major rail terminals along the corridor. Its subsidiaries handle freight forwarding (e.g. Uztemiryo'lkonteyner for container transport) and logistics services at dry ports. UTY coordinates closely with Kazakhstan's KTZ and Turkmen Railways for cross-border train movements and wagon exchange • Logistics Operators: A mix of state-owned and private logistics companies provide transport and terminal services. On rail, UTY's affiliate Uzbekistan Railways Logistics and international freight forwarders (e.g. DB Schenker, DHL Global Forwarding) arrange container block trains and wagon supply • Terminal Operators: Key terminals are managed by various entities. The Tashkent freight terminal is run by UTY while the Angren Logistics Center was developed as a PPP and involves a private operator. Navoi International Airport Cargo is operated in partnership with foreign firms (previously Korean Air, now UAE's ADL in development).
IT systems, platforms and technological solutions used in the transport corridor national segments	• Customs: Uzbekistan's customs authority (SCC) administers customs controls and procedures at all BCPs and inland terminals. The SCC manages the Single Window system for trade and coordinates inspections, clearance, and risk management at border posts. Since 2020, SCC operates remote e-declaration centers to expedite processing. • At the BCPs themselves, a coordinated management approach is adopted. The government is also moving towards establishing integrated border management solutions with neighboring countries • The western node Nukus/Kungrad serves as a consolidation point for cargo before splitting toward Kazakhstan or Turkmenistan. These nodes are linked digitally via UTY's freight management system and the national Single Window platform, so information travels with the cargo. As a result, physical and digital connectivity within Uzbekistan can serve effectively a continuous multimodal flow from the Kyrgyz border to the Caspian gateways • Multimodal Integration: At Navoi cargo handling integrates air cargo as well. High-value or time-sensitive goods might be flown in and then loaded onto trucks/trains. The logistics process involves a bonded corridor between Navoi Airport and the Navoi Dry Port: goods offloaded from a plane can move under customs bond directly to the dry port warehouse for clearance or for loading to rail. The systems at Navoi coordinate with customs to treat the airport and dry port as a single customs zone electronically, ensuring seamless transfers.

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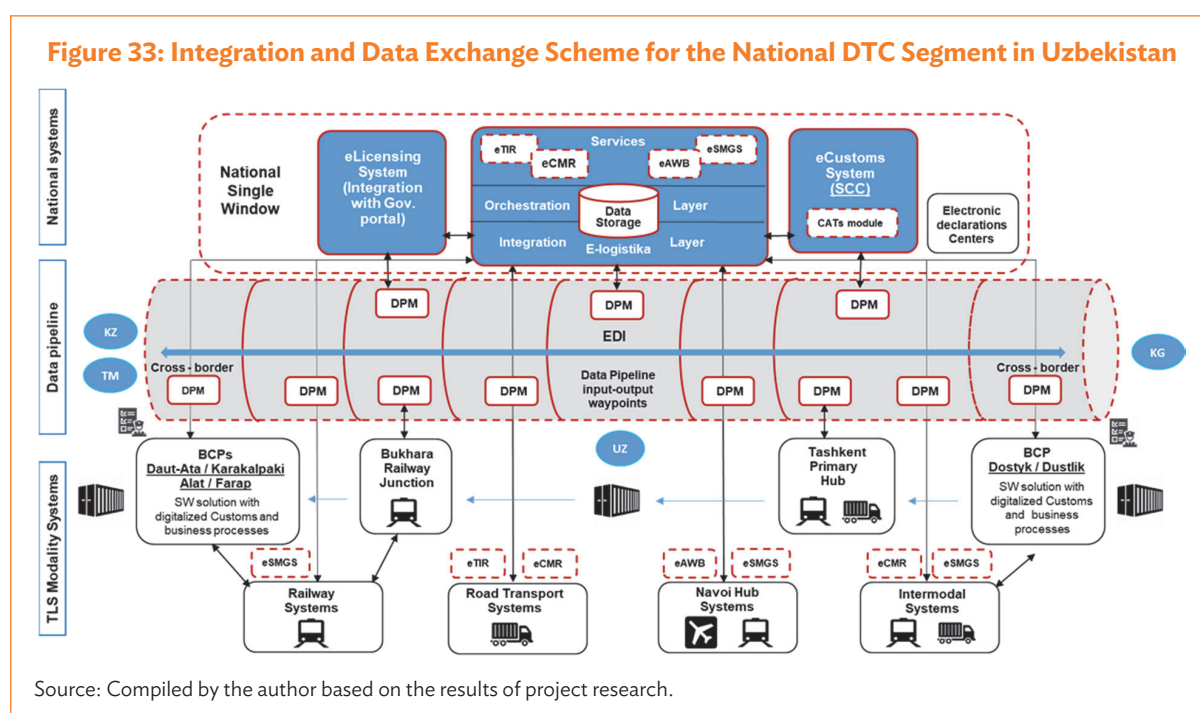
Table 22 continued

Digital Passport Components	Data and Description Provided by Stakeholders
	- Technological solutions: - Barcode/QR scanning of container IDs and waybills speeds up inventory management. - Electronic weight bridges auto-record truck weights and feed data into the customs system to detect undeclared overloads. - Digital communication between nodes: for instance, when a train departs Navoi, the system sends an electronic consist to Bukhara and Turkmenabat ahead of its arrival - Queue Management: At busy BCPs (e.g. Dustlik in peak season), an e-queue system is being piloted where drivers get notified via SMS or app when it's their turn, reducing on-site congestion.
List of documents processed: paper and electronic	- Electronic Documents: - e-SMGS (electronic rail consignment note) - e-CMR (pilot stage) - eTIR (test implementation with UNESCAP) - Customs pre-declaration and transit guarantees - Paper Documents (used alongside digital systems): - Waybills - Bills of lading - Packing lists - Certificates of origin - Manual invoices
List of provided digital/information services	- E-Tracking: Real-time cargo visibility (rail/truck). Real-time cargo tracking (via UTY system) - Pre-clearance for Customs transit - E-queue systems for BCPs - Electronic payments and billing for cargo handling - Data Exchange: Limited API integration with Kazakh systems.
Plans for modernization and digitalization	- Full-scale implementation of e-SMGS for rail cargo across Kazakhstan–China–Azerbaijan route by 2026 - Evolution of E-logistika Platform – the Ministry of Transport is popularizing Integrated National e-Logistics Platform. This platform is to connect various stakeholders – customs, railways, trucking companies, freight forwarders on a single digital portal. It shall act as a “single window” for logistics services and include a multimodal digital booking system linking Uzbekistan Railways, airline cargo, and logistic operators. - Interoperability plans are in place to ensure the smooth integration of CKU segments – it's expected that the CKU railway operation will incorporate unified digital solutions. The OTS has discussed linking the CKU rail to corridors through Iran and Turkey via digital systems. - Synergy with the NSTC corridor – this corridor is considered to become a multimodal network linking South Asia and the Middle East to Russia and Europe via Iran and the Caspian region. Uzbekistan, Turkmenistan, and Iran have forged a trilateral initiative to develop a corridor through Iran that effectively connects CAREC Corridor 2 to the Persian Gulf. The synergy here will be realized by multi-modal linkages and digital coordination – Uzbekistan stands for harmonized electronic documentation with Iran and other countries involved. - Uzbekistan stands also for deeper integration into the Middle Corridor by the joint projects: In 2024 Uzbekistan, Azerbaijan, and Turkey created a trilateral platform to improve transport through the corridor. The concrete outcome was focused on the Samarkand–Baku route with agreements signed to implement digital customs procedures and faster processing for Uzbek goods in transit via Azerbaijan's Port of Alat. This effectively linked Uzbekistan's digital customs system with Azerbaijan's, allowing pre-clearance of Uzbek cargo at Baku and use of Port Alat's infrastructure as the part of an extended transport corridor. - From a multimodal perspective, Uzbekistan plans to pilot Navoi air hub which can funnel Asian airfreight to the Middle Corridor rail if needed (some high-value goods could shift modes). - Uzbekistan is also actively involved in developing unified digital solutions that span transport corridors. For example, linking the CKU railway digitally to corridors through Iran was discussed – meaning a train on CKU could seamlessly continue through to Turkey with data shared from PRC to Turkey. Uzbekistan's accession to e-CMR and eTIR, and promoting the use of those tools in Economic Cooperation Organization and CAREC frameworks, means a truck can drive from Tashkent to Istanbul entirely on e-CMR and eTIR, exchanging data with each country's system on the way. The same goes for rail with e-SMGS expanding.

Source: Compiled by the author based on the results of project research.

176. The list of recommendations for the digitalization of the CASCA+ corridor national segment in Uzbekistan includes the following bullet points and is illustrated by the functional scheme in Figure 33.

- Uzbekistan has started to adopt the CBM approach and consolidation of customs, border guards, quarantine officers and transport inspectors' one-stop activities at BCPs. To establish the complete integrated border management, it's recommended to re-engineer business processes at the national segment BCPs by the development and deployment of their digitalized versions. As result BCP digitalization components can be integrated into a single-window CBM solution which might be deployed in all Uzbekistan BCPs.
- Single-window CBM solution shall be based on processing and exchange of electronic documents in digitalized BCP as well as the adoption and recognition of their standardized formats. The task for adoption of the international standards for TLS electronic documents in the Middle Corridor (according to SPECA Road Map⁸⁸) can be delegated in Uzbekistan to the recommended Working Group on Transport Corridors digitalization (see section 134). As a result of the specialized converters shall be developed and embedded in the digitalized BCP solution for conversion of transport and shipping electronic documents into standardized formats adopted by the Middle Corridor participating countries.
- The data obtained from TLS participants and generated standardized electronic documents shall be stored in the E-logistika Master database to make them available for the authorized access of governmental agencies involved in the control of transit processes in the country. The corresponding governmental IT systems are to be connected with E-logistika which becomes, along with eCustoms and eLicensing components, the third principal system of the integrated national trade Single Window in the country. Uzbekistan eCustoms system, its remote electronic declaration centers and CATs module will be used as the main modules for electronic customs procedures and information exchange between customs authorities of the Middle Corridor countries in the CAREC region.
- All modal transport IT systems in Uzbekistan, Daut-Ata and Alat BCPs as well as the main transport nodes – Tashkent, Navoi, Bukhara, Nukus/Kungrad shall be connected with E-logistika platform via



88 <https://unece.org/speca/speca-digitalization-roadmap>.

its integration layer. The data obtained from BCPs and other participants of DTC technological level can be processed at the E-logistika multimodal orchestration layer in order to create the standardized international electronic transport documents to be used in the data pipeline of the Middle Corridor digitalized national segment. The required service modules for e-SMGS, e-CMR, e-Airway Bill and other electronic documents generation and processing may be located either in the NELS service layer or in the modal transport IT systems

- e. Uzbekistan commitment and activities for the development of unified digital solutions to span national segments of transport corridors in the CAREC countries and beyond can be streamlined by the initiation of the pilot project for cross-border exchange of electronic documents with neighboring countries in the Middle Corridor based on data pipeline approach. For that the specialized solution for the cross-border Data Pipelines Modules (DPM) shall be developed to enable legally significative exchange of electronic documents between countries involved.

177. The cross-border and other elements of digital infrastructures in the national segments of the Middle Corridor in Uzbekistan are to be interconnected in the DTC data pipeline and use DPMs as information “input waypoints” or “output waypoints”. As such the unified trusted DTC information space can be built along the national segments of the core Uzbek transport corridors. The data related to the particular cargo transit shipment and all evolved electronic documents or their modifications can be stored in the E-logistika master database to be available only by means of authorized and authenticated access. Like in other countries this functional approach will help preserve the digital sovereignty and ensure data protection in the Uzbekistan TLS. The integration and digital connectivity of the Uzbekistan segments of the main CAREC transport corridors – CKU, Middle Corridor, North–South and Trans–Afgan corridors can create the strong multiplicative effect and reduce transport costs and delivery times in the main Trans–Eurasian trade routes.

178. The main conclusion of this chapter is that the recommended building blocks of TLS digital infrastructures and technological solutions can be used in a flexible way for the digitalization of national segments of transport corridors in the CAREC countries. To ensure the connectivity and interoperability of these national segments their development shall be based on the proposed main principles of DTC formation. In case CAREC countries decide to join and coordinate their efforts in the development of unified core solutions for NELS platforms and data pipelines for the cross-border information exchange it will save a lot of time and money in the long run of CAREC Transport and Digital strategies implementation. As such the possible areas of the main Technical Assistance activities are expected to be:

- Implementations of NELS feasibility study projects in Kazakhstan, Kyrgyz Republic and Turkmenistan;
- Centralized development of the core building blocks of TLS and transport corridors digital infrastructures (see introduction to the chapter VII).

179. The capacity building activities for the CAREC countries are recommended to base on the latest program developed by UN ESCAP experts for digitalization of the railway and multimodal cargo transportation in the region⁸⁹. The program includes educational modules that reveal opportunities for solving the main tasks and challenges of TLS and transport corridors digitalization in CAREC region. Each module of this program contains a brief introduction to the state of the digitalization areas under consideration, followed by a block of information on modern approaches and the best international practices for solving the corresponding problem of TLS digitalization with practical proposals on educational tools and topics for training.

180. The Regional Action Programme for Sustainable Transport Development in the UNESCAP Region (2022–2026)⁹⁰ pays considerable attention to the issues and tasks of developing programs and effective capacity development tools for a wide range of specialists in the field of digitalization of multimodal transport and transport corridors. In particular, this program emphasizes the need to:

⁸⁹ <https://repository.unescap.org/handle/20.500.12870/7455>.

⁹⁰ <https://digitallibrary.un.org/record/4011322>.

- Facilitate the exchange of best practices in multimodal freight transport and the digitalization of all transport and logistics processes;
- Strengthen the capacity of stakeholders to support the development of multimodal transport corridors and multimodal transport operations, including the development of knowledge products and policy tools;
- Raise awareness among ESCAP members of new technologies, including smart mobility, and highlighting the role of best planning practices in the implementation of relevant technological solutions;
- Expand capacity-building programs for the development and implementation of innovative transport digitalization policies and strategies that facilitate the application of new smart transport technologies;
- Exchange best practices through seminars and workshops on new technologies and the implementation of digital solutions.

Taking into account the above objectives, we considered possible organizational models and forms of implementing potential capacity building programs in CAREC region in the field of digitalization of rail and multimodal transport and transport corridors. Based on practical experience in implementing such programs, the most effective and flexible model for bringing them to target groups of specialists are considered to be master classes and thematic courses organized at specialized universities or educational institutions. This model allows for the formation of target groups of specialists and specialized programs that can be customized to the needs of specific transport modalities and tasks for the digitalization of cargo transportation. In order to avoid a purely academic approach that is not tied to the practical tasks of real TLS digitalization, it is advisable to involve recognized national/regional or international experts who have got practical experience in implementing relevant projects and deployment of digital platforms, systems and services for the TLS digitalization.

181. Besides, specialized capacity-building courses for active knowledge transfer are possible by organizing short-term on-site thematic seminars (lasting from 2 to 5 days). These courses might be organized for dedicated specialists from government organizations or large transport and logistics enterprises/businesses dealing with digitalization issues. At such seminars, the key volume of knowledge on pre-agreed topics of digitalization and modern innovative technologies can be transferred in express mode, with their subsequent consolidation during workshops and discussions of practical cases of interest to the audience.

182. Based on practical experience and feedback from the implementation of in-person capacity building programs at educational institutions and thematic seminars, online courses can be developed to cover a wider range of specialists interested in improving their skills in the field of TLS digitalization, supply chains and transport corridors using distant learning methods. When developing such online courses and organizing their implementation, it is important to avoid a formal approach with disinterested scrolling through program materials and control tasks/questionnaires without feedback from participants. Therefore, to improve their effectiveness, it is advisable to include online question and answer sessions with a curator in such distant courses, as well as to invite participants for videoconferencing in order to consider and discuss specific digitalization challenges which their organizations/companies are facing.

183. Finally, for qualified groups of specialists who have a clear understanding of the areas of knowledge and the range of technological solutions that their government department, organization or company required, specialized trainings/workshops can be organized with a pre-crafted program and a list of tools that these specialists need to master upon completion of the capacity building program.

When using any of the above models, it is very important to maintain and update the capacity building program through new information and expertise received from the regional expert community. In this respect, it's recommended to create the specialized expert network for the digitalization of rail and multimodal transport and DTC in the CAREC countries. A distinctive feature of the proposed network is considered to be the intrinsic component of project development activities and formation of the pool of experienced expert trainers, capable of transferring and disseminating the required digital competencies in the region according to the "Train-the-Trainers" model.

184. In accordance with the ToR the Project Team mainly developed and presented in this chapter recommendations for the digitalization of selected national segments of the core transport corridors in the CAREC countries involved. In response to ADB request this section includes as well the brief description of the main ongoing joint actions for CAREC corridors digitalization and recommendations for additional actions based on results and conclusions of the latest CAREC TSCC and CCC meetings as well as Mid-Term Review of the regional Transport Strategy.

Currently, the following multilateral pilots and projects are being carried out for transport corridors digitalization with the involvement of CAREC countries:

- a. TRACECA corridor digitalization pilots including development of digital prototypes for e-CMR and e-CIM/SMGS consignment note in cooperation with UN ECE, RailData, UN/CEFACT experts and OSJD (more details in sub-chapter H of Annex II). In April 2025 TRACECA Permanent Secretariat held a meeting with CAREC Program and ADB representatives⁹¹ to discuss partnership in the field of transport and logistics as part of the discussion of the CAREC 2 corridor development strategy. During the meeting, both sides considered opportunities to deepen cooperation in key areas, including improving the efficiency of transport corridors, digitalization of logistics processes.
- b. e-CMR pilot initiated by the Organisation of Turkic States (OTS) and supported by the IRU and UNECE experts. The OTS is advancing the implementation of e-CMR and decided to form an ad-hoc Sub-Working Group. This group, including experts from transport ministries, customs administrations, and national transport associations, will focus on the legal assessment and operationalization of e-CMR in the Turkic region with the support of the dedicated group of UNECE experts⁹²
- c. IRU digitalization activities are focused on implementation of eTIR and e-CMR in the CAREC countries. More detailed information on the corresponding pilots and joint project actions in the CAREC region is provided in sub-chapters F and G of Annex II.
- d. UNECE recently published a 2025 progress report on operationalization efforts in the framework of the Coordination Committee for the Trans-Caspian and Almaty–Tehran–Istanbul corridors including digitalization, harmonization and standardization actions for transport documents used along these corridors⁹³. This Coordination Committee agreed on the following joint actions:
 - Continued implementation and scaling of the CIM/SMGS electronic consignment note pilot project, with engagement from stakeholders in Georgia, Azerbaijan, Kazakhstan, Turkey;
 - Planning for a new pilot project focused on standardized port-to-port data exchange along the Trans-Caspian Corridor, based on UN/CEFACT standards;
 - Exploration of the development of a corridor-wide multimodal dataset using the Multimodal Transport Reference Data Model (MMT RDM).

In line with the Coordination Committee recommendations for digitalization, harmonization, and standardization of transport documents a simulation exercise was carried out to analyze and enhance data and information flows along multimodal transport corridors. The objective of the exercise was to examine real-world operational procedures for the movement of cargo across multiple countries, with a particular focus on how data and documents are exchanged at different stages of the transport chain. The simulation exercise revealed that while various digitalization efforts are already in place at the national level, there is currently no mechanism for seamless digital data and document exchange across borders. Transport documents still require physical validation, particularly at border crossings and no digital alternatives are recognized by authorities at this stage.

The joint actions for Trans-Caspian International Transport Route (TITR) digitalization are currently developed by the corresponding Working Group of the TITR Association. In 2025 this Group proposed an action plan for standardization and digitalization of the business processes in four countries – Kazakhstan, Azerbaijan, Georgia and Turkey with the development of data pipeline solution for the cross-border information exchange of cargo shipping documents⁹⁴. Our project Team experts were cooperating with TITR digitalization Group

⁹¹ <https://www.transportcorridors.com/12264>.

⁹² <https://unece.org/transport/events/sc1ge22-group-experts-operationalization-ecmr-8th-session>.

⁹³ <https://unece.org/transport/documents/2025/07/working-documents/2025-progress-report-operationalization-efforts>.

⁹⁴ <https://www.transportcorridors.com/11369>.

in the course of data pipeline concept development and Digital Passports data collection for Azerbaijan and Kazakhstan.

In the course of 22nd CAREC TSCC meeting held in June 2025 the results of the Transport Sector Strategy 2030 Midterm Review and CAREC Corridor 2 development study were discussed⁹⁵ and revealed the lack of digitalization and interoperability as one of the main challenges. To improve the situation the strategic objectives were formulated to implement advanced digital systems for optimizing logistics operations, tracking cargo and streamlining customs with short-term interventions for BCP digital solutions (see more details in section 155). The similar conclusions and proposals were made at the CAREC 24th CCC meeting where results of BCP survey were presented by CPMM team with digitalization components and Single Electronic Window approach.

Taking into account of all above results the following recommendations can be made for joint actions of the CAREC countries involved in the study for transport corridors digitalization:

- i. Develop jointly the interoperable core solution for the NELS platform in CAREC countries and pilot it in Uzbekistan and Kyrgyz Republic in the course of CKU corridor digitalization;
- ii. Develop the unified Data Pipeline solution to ensure the seamless cross-border data and eDocuments exchange across the borders of CAREC countries and pilot it between Kazakhstan, Turkmenistan and Azerbaijan in the course of TITR (Middle) corridor digitalization;
- iii. Develop jointly the BCP SW solution for digitalization of business processes at border crossings based on Single Electronic Window approach proposed by CPMM team and pilot it in accordance with CAREC Corridor 2 short-term interventions planned.

All the above recommendations should be discussed and actualized by experts of the Smart Mobility Working Group (SMWG) which is formed in the CAREC countries to promote intelligent transport systems and transport digitalization with the corresponding ADB technical assistance.

⁹⁵ <https://www.carecprogram.org/uploads/1-LS-CAREC-2030-Strategy-Midterm-Review-22nd-TSCC-EN.pdf>.

ANNEX I

LIST OF STAKEHOLDER REPRESENTATIVES INVOLVED IN THE STUDY

A. Azerbaijan

The list of stakeholder representatives involved in the project field study in Azerbaijan is presented in the following table.

#	Stakeholder Organization	Contact Details of Stakeholder Representatives
<i>State agencies/key state-owned players</i>		
1	Ministry of Digital Development and Transport	Matlab Aliyev Transport Policy Department Matlab.Aliyev@mincom.gov.az Irada Khalilzade Digital Transformation Excellence Center Irada.Khalilzade@mincom.gov.az Bahrüz Aghalarov Chief Advisor, International Cooperation Department bahrüz.aghalarov@mincom.gov.az
2	Azerbaijan Land Transport Agency (ALTA)	Anar Mustafa Head of AYNA IS&IT Infrastructure Department Anar.mustafa@ayna.gov.az
3	State Maritime and Port Agency	Naghi Ahmadov Senior Specialist State Maritime and Port Agency naghi.ahmadov@ddla.gov.az
4	Azerbaijan Artificial Intelligence Lab	Suleyman Rahimov Product Owner
5	State Customs Committee	Rauf Guliyev Deputy Head of the General Department for Digital Management rauf.guliyev@customs.gov.az
6	"Azerterminalcomplex" Union	Kenan Ashurlu Director
7	Azerbaijan Railways	Andrey Iskrich Head of the IT department a.iskrich@ady.az
8	Azerbaijan Caspian Shipping Company CJSC	Emin Alizade Deputy Head of the IT Department emin.alizade@asco.az

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Annex I table continued

#	Stakeholder Organization	Contact Details of Stakeholder Representatives
<i>Key private sector players</i>		
9	GHC (Ground Handling) branch of ASG Business Aviation LLC	Vugar Novruzov Head of IT Department vn@asg.az
10	Silk Way Group	Vugar Mammadov Vice-President, Silk Way West Airlines LLC Vugar.Mammadov@silkwaywest.com Fuad Gasimzade Head of the IT Department, Silk Way West Airlines LLC fg@silkwaywest.com
11	SINAM LLC	Islam Ahmadov Business Development Director islam@sinam.net
12	Azsoftware LLC	Ehtiram Guliyev Project Director ehtiram.guliyev@azsoftware.az
13	Absheron Logistics Center	Afgan Feyziyev Deputy Director info@absheronport.az
14	Milli Broker	Orkhan Guliyev Director
15	My Broker	Nihad Agayev Head of Representation Department office@mybroker.az
16	Azexport.az	Aykhan Gadashov Head of the Azexport.az portal aykhan.gadashov@gmail.com

Source: Compiled by the author.

B. Kazakhstan

The list of stakeholder representatives involved in the project field study in Kazakhstan is presented in the following table.

#	Stakeholder Organization	Contact Details of Stakeholder Representatives
<i>State agencies/key state-owned players</i>		
1.	Ministry of Digital Development, Innovation and Aerospace Industry	Madiyev Zhaslan Minister zh.madiyev@mdai.gov.kz
2.	Digital Kazakhstan Group of the Ministry of Digital Development	Konyashkin R.A. Vice-Minister r.konyashkin@mdai.gov.kz Olzhabekov M. Vice-Minister m.olzhabekov@mdai.gov.kz Dmitry Mun Vice-Minister d.mun@mdai.gov.kz Jumabekov A.D. Head of the Apparatus a.dzhumabekov@mdai.gov.kz

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Annex I table continued

#	Stakeholder Organization	Contact Details of Stakeholder Representatives
3.	Ministry of Transport	Kaliakparov Maksat Kairzhanovich Vice-Minister m.kaliakparov@transport.gov.kz Segrasy Omash Head of Department for Digitalization and State Services s.omash@transport.gov.kz Zhaina Assilbekova Chief Expert zhainar.assilbekova@gmail.com
4.	Transport Control Committee	Kuanyshtuly Selim Deputy Chairman of the Committee 8 (7172) 98-35-07
5.	Kazakhstan Customs, State Revenue Committee	Anais Zhandossova Expert of the Transit Division, Customs Control Department
6.	Sovereign Wealth Fund of Kazakhstan “Samruk-Kazyna”	Zhakupov Nurlan Karshagovich
7.	KTZ Express/KTZ Cargo	Damir Kozhakhmetov CEO d.kozhakhmetov@ktze.kz
8.	Aktau International Sea Commercial Port	Maksim Grekov Head of IT Division grekov_m@aktauport.kz
9.	Aviation Administration of Kazakhstan	Aslan Satjanov Executive Director for Flight Safety frontoffice@caa.gov.kz
<i>Key private sector players</i>		
10.	Transtelecom Joint-Stock Company	Yerlan Minavar Chief Innovation Officer Yerlan.minavar@ttc.kz
11.	ATAMEKEN – Association of the National Freight Forwarders	Sabit Amanbayev Director-General director@kao-a.kz
12.	Project Logistics Center	Vasisiliy Korolyov Director-General vkorolev@transal.kz
13.	Business Development Interconnect Group	Boris Rudenko Director-General b.rudenko@bdigroup-kz.com
14.	Shyngar Trans Group	Eraly Autov President y.autov@shyngaz.kz
15.	Kazakhstan Association of Freight Forwarders (KAFF)	Mr. Ilya Segal General Director info@kffanek.kz
16.	National Information Technologies Joint-Stock Company	Bekmanov Daulet Nysankhulovich Secretariat +7 (7172) 701665 BH. 3395, 3246, 4059, 3339
17.	Trans-Asia Logistics	Andrey Didenko Head of the Almaty Office

Source: Compiled by the author.

C. Kyrgyz Republic

The list of stakeholder representatives involved in the project field study in the Kyrgyz Republic is presented in the following table.

#	Stakeholder Organization	Contact Details of Stakeholder Representatives
<i>State agencies/key state-owned players</i>		
1	Ministry of Transport and Communications	Kineshov Temuray Head of Department +996 554 016026 +996 312 314385 mtd@mtd.gov.kg
2	Ministry of Digital Development and Innovative Technologies	Bekjan Rysmendeev Deputy Minister bekjan13@mail.ru Ruslan Asanaliev Head of the Digital Development Sector razvitiemtk@gmail.com Bektursunova Diara Specialist diara.bektursunova@digital.gov.kg
3	Ministry of Economy and Commerce	Sonun Erkinbayeva Adviser +996778950805 mail@mineconom.gov.kg
4	State Customs Service	Beksultan Omorbekov Head of Department of Customs Procedures Person in charge +996 312 511 360 guotd1@customs.gov.kg
5	State Enterprise “Tulpar Single Window”	Ayna Konakbekova Department of Analytics Assistant +996 (312) 90-26-40 +996 (312) 38-02-43 info@trade.kg
6	State Agency “Tunduk”	Nuriya Kutnayeva Director (0312) 98-81-23 office@tunduk.gov.kg
7	Kyrgyz Temir Zholu (KTZh – Kyrgyz Railways)	Medina Ruslanova Logistics Manager +996 999 41 82 06 klient_kjd@railway.aknet.kg Dinara Alygulova +996 (312) 92 73 36 plan-otd@railway.aknet.kg
8	Chamber of Commerce and Industry of the Kyrgyz Republic	Igor Golubev Deputy Chair Olga Fomina Digitalization Department +996779952234 info@cci.kg

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Annex I table continued

#	Stakeholder Organization	Contact Details of Stakeholder Representatives
<i>Key private sector players</i>		
9	Transport Operators' Associations/ Trucking Unions (Kyrgyz Auto Transport Union)	Tamabayeva Nurila Head of the Department of Social Affairs +996 312 66-56-94 transport@mail.ru
10	Kyrgyz Republic Freight Forwarders Association (KRFFA)	Vladimir Nikonov President Svetlana Rekulova Manager +996 312 353636 valmeca@valmeca.ru
11	Association of International Road Carriers of the Kyrgyz Republic (KGZ AIA)	Faizulla Halmurzaev Secretary-General +996 312 315565 13 office@airto-kr.com
12	Logistics company in Bishkek "V Freight" LLC	Guljamal Suleymanova Manager Moldaliyeva Meerim Manager +996 227-56-83-33 group@vf.kg
13	Freight-forwarding company "ЖелДорАзияЦентр"	Vita Kulkova Manager +996 312 351501 +996 312 351530 zdac@mail.ru
14	Freight forwarding company "Viktoria-Art"	Artem Turkin Manager +996 312 353353 viktoria@viktoria-art.ru
15	Transport company "TEK Astrum"	Vladimir Shumakov Director +996220882288 office@tecastrum.com
16	International Consultant	Kubat Umurzakov +996 555 99-11-70 umurzakovcarec@yahoo.com

Source: Compiled by the author.

D. Turkmenistan

The list of stakeholder representatives involved in the project field study in Turkmenistan is presented in the following table.

#	Stakeholder Organization	Contact Details of Stakeholder Representatives
<i>State agencies/key state-owned players</i>		
1	Ministry of Communications of Turkmenistan	Yalkabov Merdan Head of Technical Department +993 (12) 44-93-93 pmu@online.tm www.mincom.gov.tm
2	Ministry of Railways of Turkmenistan	Yuliya Aliyeva Senior Specialist of Planning and Economic Department +99312 390503 Tore Yoldashev Senior Specialist of the North–South Railway Corridor www.railway.gov.tm
3	Ministry of Motor Transport of Turkmenistan	Nurmyrad Annaev Minister awto@sanly.tm www.awtoulag.gov.tm
4	State Service for Maritime and River Transport of Turkmenistan	Annageldi Orazmyradov State Maritime Port “Turkmenbashy” +993 (243) 60793 foreign_dept@tmrl.gov.tm www.tmrl.gov.tm/en/contact
5	State Service “Türkmenhowaýollary” (“Turkmen Airlines”)	Shemshat Berdiyeva Senior Specialist of Planning and Economical Department +993 (12) 378432 aviacom@online.tm turkmenistanairlines.tm
6	State Customs Service of Turkmenistan	Maksat Khudaikulyev Chairman of the State Customs Service +993 (12) 448777 info@customs.gov.tm www.customs.gov.tm
7	Ministry of Finance and Economy	+993 (12) 51-03-53 omeft@online.tm http://www.minfin.gov.tm/
8	Turkmen Post Service	Batyr Velliyev Deputy Director +993 (12) 94-09-29 info@post.gov.tm www.turkmenpost.gov.tm
<i>Key international players</i>		
9	United Nations Development Programme Office in Turkmenistan	Farhad Artykov Digital Projects Expert farhad.artykov@undp.org https://www.undp.org/turkmenistan
10	International Trade Centre	Rustam Alymov National Project Coordinator ralymov@intracen.org https://intracen.org/
11	CAREC Turkmenistan	Durdy Ilamanov Member of the CAREC Secretariat in Turkmenistan dilamanov.consultant@adb.org

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Annex I *table continued*

#	Stakeholder Organization	Contact Details of Stakeholder Representatives
<i>Key private sector players</i>		
12	TULUM Logistics (Turkmenistan)	Atageldi Berdyev General Director +993 (12) 28-60-30 info@tulm.tm tulm.tm
13	DHL Express Turkmenistan	Murad Geldyev Country Director +993 (12) 45-25-25 info.tm@dhl.com dhl.com.tm
14	Turkmen Logistics Association	Serdar Gurbanov President +993 (12) 28-60-32 info@tulag.org.tm www.tulag.org.tm
15	Turkmen Express	Amanmyrat Atayev Director +993 (12) 28-80-90 support@turkmen-express.com turkmen-express.com
16	CDEK Turkmenistan	Charymurad Ovezov Country Director +993 (62) 93-19-79 ashgabat@cdek.tm cdek.tm

Source: Compiled by the author.

E. Uzbekistan

The list of stakeholder representatives involved in the project field study in Uzbekistan is presented in the following table.

#	Stakeholder Organization	Contact Details of Stakeholder Representatives
<i>State agencies/key state-owned players</i>		
1.	Ministry of Transport	Irgashev G'olib Head of the Minister's Secretariat prognoz@mintrans.uz Hakimov Rashidjon Head of the Strategic Planning, Methodology, Information, and Analytical Management Department r.hakimov@mintrans.uz
2.	Customs Committee	Sabirov Sanjarbek Head of Customs Control and Clearance Department info@customs.uz Juraev Azamat Department of Information and Communication Technology and Cybersecurity Management info@customs.uz
3.	Digital Transport Center	Shoxruz Xodjiyev Director of the Center Shokhruz.khodjiyev@mintrans.uz

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Annex I *table continued*

#	Stakeholder Organization	Contact Details of Stakeholder Representatives
4.	Center for Research on Transport and Logistics Development Issues	Ibragimova Dildora Head of Department for Comprehensive Development of the Transport System d.ibragimova@mintrans.uz
5.	Uzbekistan Temir Yullari JSC	Mahmudjon Tohirov Head of Logistics Department po@uzrailway.uz
6.	Highways Committee	Tursunov Jamshid Chairman of the Committee info@uzavtoyul.uz
7.	Transport Control Inspection	Karimov Jamshid Head of Transport Control Inspection devon@uztn.uz
8.	Air Transport Department	Zhamoliddin Nazarov Head of Air Transport Department j.nazarov@mintrans.uz
9.	Uztemiryul Cargo	Muminov Abdusamat First Deputy Chairman of the Board info@utycargo.uz
Key private sector players		
10.	Ardena	Pavlenko Denis sales@ardena.uz
11.	TransGroup Systems	Askarxodjayeva Galina info@trans-group.org
12.	Transasia	An Yuriy sales@transaisa.uz

Source: Compiled by the author.

ANNEX II

ASSESSMENT OF THE IMPLEMENTATION OF STANDARDIZED ELECTRONIC TLS DOCUMENTS

185. The following additional quantitative methodology was proposed to assess the level of e-document implementation. It is based on an evaluation of data obtained through desk research and the expert opinions of the project stakeholders and national consultants from the selected CAREC countries. The evaluation results are presented in percentage scores on a six-point scale ranging from 0% to 100%.

Each TLS e-document is scored on a scale ranging from “not available” (score of 0%) to “fully available” (score of 100%) for each TLS e-document. A rating of “fully available” (the best indicator) means that the type of e-document assessed has been fully implemented, integrated with the relevant systems and the country receives the maximum score of 100%. A rating of “not available” means that the country does not use the corresponding e-document, no legal basis exists; therefore, the country receives a score of 0%. Scores from 20% to 80% mean that the country is transitioning from the paper version to the electronic version and therefore develops the necessary infrastructure and legal basis for it. Scores for particular e-documents can also be calculated as an average across the group of selected CAREC countries. Scores are assigned according to the following baselines for the different stages of e-document development and implementation:

- 0** – The e-document is not used, and there is no legal basis.
- 20** – A legal act regulates this area (the country has acceded to the relevant convention or international agreement).
- 40** – A paper version of the document is used, an automated management system has been created, some schemas exist, information is exchanged with neighboring countries, the document is integrated into a single-window system.
- 60** – An electronic version has been deployed, or a pilot version is being used and tested.
- 80** – An electronic version has been deployed or pilot version is used and tested in the national e-Logistics system.
- 100** – The electronic version has been deployed and is used in accordance with international standards; it is integrated with relevant international systems, and information is exchanged.

The analyzed results are grouped into several graphs, radars, and charts describing each country’s indicators for the different types of e-documents (determinant), the average for each determinant across the CAREC countries, data for each determinant by country, and the group average on each determinant.

As shown in the following pivot table, the scores of three of the five CAREC countries assessed are above the selected group average of 50.1.

Key Findings on E-Document Evaluation Matrix for the CAREC Countries Assessed

Countries	e-CMR	eTIR	e-Permit	e-CIM/ SMGS	e-Air Waybill	e-Invoice	e-Packing List	Country Average
Azerbaijan	50	70	65	70	40	60	40	56.4
Kazakhstan	20	60	70	70	50	60	50	54.3
Kyrgyz Republic	50	60	60	50	40	60	40	51.4
Turkmenistan	30	50	20	20	30	20	40	30.0
Uzbekistan	60	70	70	60	40	70	40	58.6
Average for the Group	42	62	57	54	40	54	42	50.1

Source: Compiled by the author together with national experts.

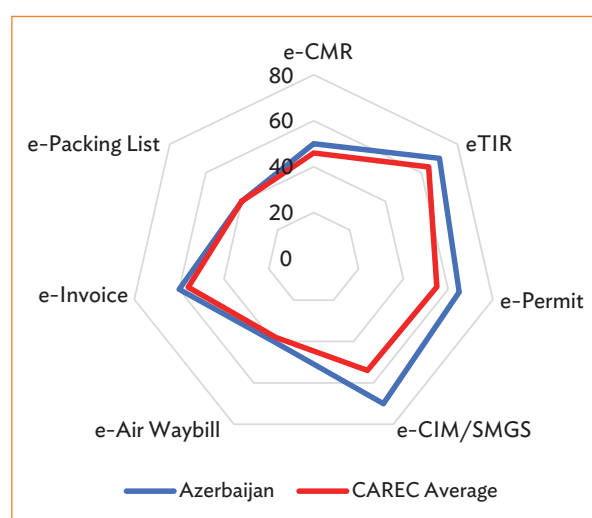
As Uzbekistan and the Kyrgyz Republic are landlocked countries the scores for ‘e-Bill of Lading’ were not assessed for them. The following tables present each country’s scores by type of e-document.

A. Azerbaijan

Grades, in %	0	20	40	60	80	100	Comments
Types of e-documents							
e-CMR		+	+	10			50
eTIR		+	+	+	10		70
e-Permit		+	+	+	5		65
e-CIM/SMGS		+	+	+	10		70
e-Air Waybill		+	+				40
e-Invoice		+	+	+			60
e-Packing List		+	+				40
Total average per country:							56.4

Source: Compiled by the author together with national experts.

Azerbaijan’s position across all determinants:



The assessment results for Azerbaijan can be interpreted as follows:

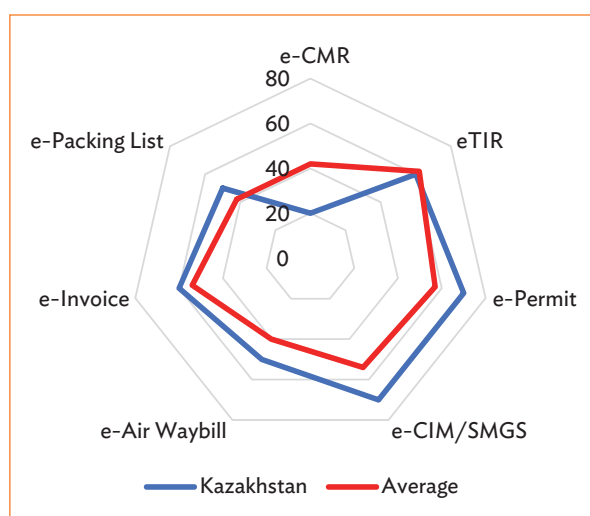
- e-CMR – Azerbaijan has an appropriate legal framework governing the use of this document and has begun developing the relevant application (more details in section G of this Annex);
- eTIR – the electronic document has been developed and deployed, and a pilot version has been tested (more details in section F of this Annex);
- e-Permit – development of the electronic version has been completed, and the version has been tested;
- e-CIM/SMGS – the electronic document has been developed and deployed, and a pilot version has been tested;
- e-Air Waybill – development of the electronic version of this document has begun;
- e-Invoice – the electronic version of the document has been completed, and local tests have been conducted;
- e-Packing List – a legal framework governs the circulation of this document, but only a paper version is used; some data schemas exist, and information is exchanged with neighboring countries.

B. Kazakhstan

Grades, in %	0	20	40	60	80	100	Comments
Types of e-documents							
e-CMR		+					20
eTIR		+	+	+			60
e-Permit		+	+	+			70
e-CIM/SMGS		+	+	+	10		70
e-Air Waybill		+	+				50
e-Invoice		+	+	+			60
e-Packing List		+	+				50
Total average per country:							54.3

Source: Compiled by the author together with national experts.

Kazakhstan's position across all determinants:



The assessment results for Kazakhstan can be interpreted as follows:

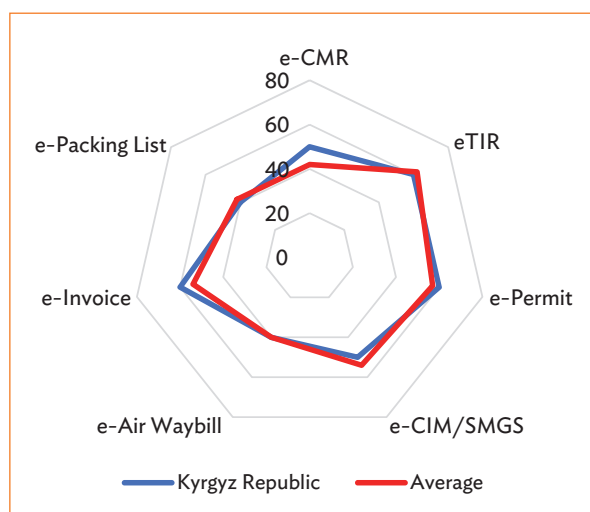
- e-CMR – Kazakhstan has not yet acceded to the e-CMR Protocol, but efforts were undertaken to facilitate this process (more details in section G of this Annex), therefore, its score is 20;
- eTIR – the document is used in paper format as the country has not yet been fully integrated into the international eTIR system, but a pilot project is currently being implemented with Uzbekistan (more details in section F of this Annex);
- e-Permit – it is used on a test basis in trade with Uzbekistan;
- e-CIM/SMGS – the legal basis for e-SMGS in Kazakhstan is well-established, and it is partially implemented in rail transport with the PRC and Russia;
- e-Air Waybill – Since 2021, Kazakhstan has been working on the implementation of the e-Freight system, which aims to fully digitalize of air cargo clearance, including replacing the paper air waybill with an electronic one. Thousands of e-air waybills are processed annually, and 17 airlines and 15 airports are connected;
- e-Invoice – a legal framework governs the circulation of this document, and pilot projects are being implemented with the Kyrgyz Republic. Expansion to all carriers is planned beginning in 2026;
- e-Packing List – a legal framework governs the circulation of this document, but only a paper version is used; some data schemas exist, and information is exchanged with neighboring countries.

C. Kyrgyz Republic

Grades, in %	0	20	40	60	80	100	Comments
Types of e-documents							
e-CMR		+	+				50
eTIR		+	+	+			60
e-Permit		+	+	+			60
e-CIM/SMGS		+	+	+			50
e-Air Waybill		+	+				40
e-Invoice		+	+	+			60
e-Packing List		+	+				40
Total average per country:							51.4

Source: Compiled by the author together with national experts.

Kyrgyz Republic's position across all determinants:



The assessment results for the Kyrgyz Republic can be interpreted as follows:

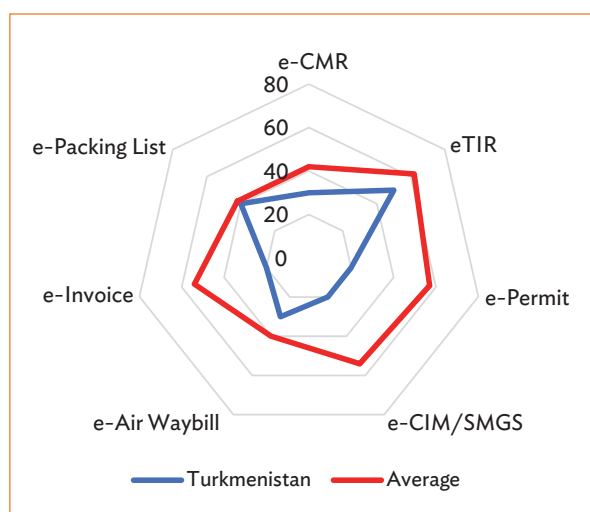
- e-CMR – The Kyrgyz Republic has ratified the e-CMR protocol (more details in section G of this Annex);
- eTIR – the country became part of the IRU-supported TIR-EPD system in 2022 (more details in section F of this Annex);
- e-Permit – the country is implementing the regional system (Asia Permit), aligned with similar platforms in Uzbekistan, Kazakhstan and Tajikistan, as well as through a pilot project with Azerbaijan, to streamline the issuance of electronic cargo permits;
- e-CIM/SMGS – even though it is not yet fully implemented, the country is conducting pilot projects along international rail corridors;
- e-Air Waybill – The Civil Aviation Information System, which also manages air cargo clearance, is linked to IATA and ICAO systems for global compliance;
- e-Invoice – Foreign-trade e-invoicing is facilitated through the government’s Electronic Taxpayer Accounting System;
- e-Packing List – a legal framework governs the circulation of this document, but only a paper version is used; some data schemas exist, and information is exchanged with neighboring countries.

D. Turkmenistan

Grades, in %	0	20	40	60	80	100	Comments
Types of e-documents							
e-CMR		+	10				30
eTIR		+	+	+			50
e-Permit		+					20
e-CIM/SMGS		+					20
e-Air Waybill		+	10				30
e-Invoice		+					20
e-Packing List		+	+				40
Total average per country:							30.0

Source: Compiled by the author together with national experts.

Turkmenistan’s position across all determinants:



The assessment results for Turkmenistan can be interpreted as follows:

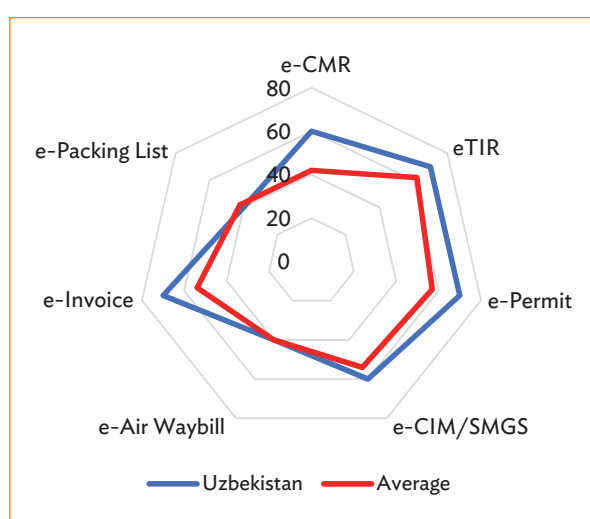
- e-CMR – Turkmenistan has an appropriate legal framework governing the use of this document and has begun developing the relevant application (more details in section G of this Annex);
- eTIR – the electronic document has been developed and deployed, and a pilot version has been tested (more details in section F of this Annex);
- e-Permit – appropriate legal acts have been adopted to regulate the circulation of this document;
- e-CIM/SMGS – the proper legal acts adopted for regulating this document circulation;
- e-Air Waybill – a paper version of the document is used, an automated management system is to be created;
- e-Invoice – there is a legal act regulating this document circulation;
- e-Packing List – a legal framework governs the circulation of this document, but only a paper version is used; some data schemas exist, and information is exchanged with neighboring countries.

E. Uzbekistan

Grades, in %	0	20	40	60	80	100	Comments
Types of e-documents							
e-CMR		+	+	+			60
eTIR		+	+	+	10		70
e-Permit		+	+	+	10		70
e-CIM/SMGS		+	+	+			60
e-Air Waybill		+	+				40
e-Invoice		+	+	+	+		70
e-Packing List		+	+				40
Total average per country:							58.6

Source: Compiled by the author together with national experts.

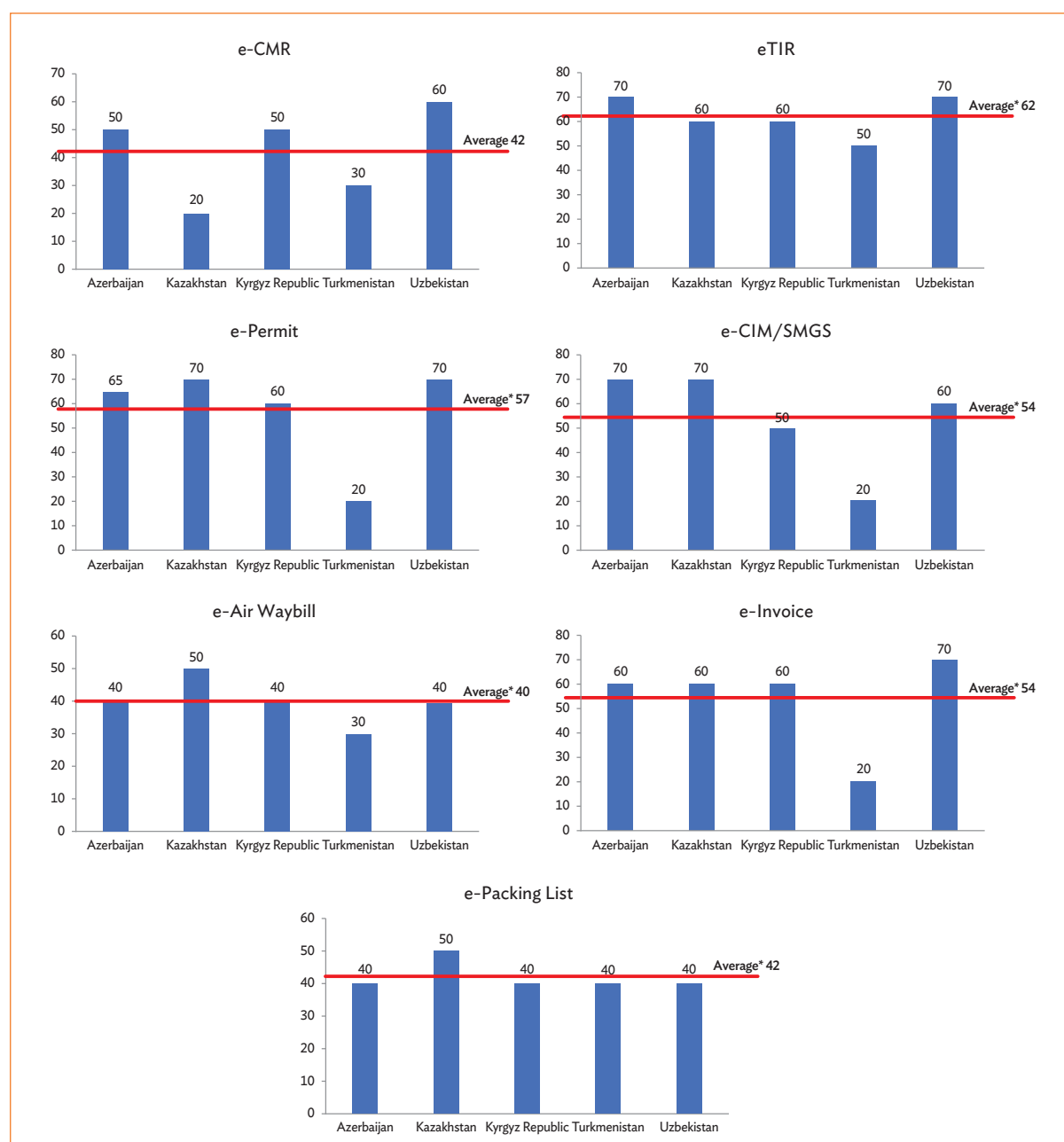
Uzbekistan's position across all determinants:



The assessment results for Uzbekistan can be interpreted as follows:

- e-CMR – Uzbekistan has got the proper legal acts regulating this document circulation and completed development of the relevant application (more details in section G of this Annex);
- eTIR – the development of this document has been completed and deployed, and the national system has been integrated with the international eTIR platform (more details in section F of this Annex);
- e-Permit – development of the electronic version has been completed, and the version has been tested;
- e-CIM/SMGS – the electronic document has been developed and deployed, and a pilot version has been tested;
- e-Air Waybill – development of the electronic version of this document has been completed;
- e-Invoice – the electronic version of the document has been completed, and local tests have been conducted;
- e-Packing List – a legal framework governs the circulation of this document, but only a paper version is used; some data schemas exist, and information is exchanged with neighboring countries.

Visualizations of the assessment results for each determinant across the CAREC countries are provided below:



F. eTIR Implementation Activities in the CAREC Countries Involved

The project team was asked to pay special attention to the implementation of eTIR and e-CMR solutions and services between the CAREC countries involved. Accordingly, the following sections of Annex II review of the regional and national activities in these fields.

186. In 2020, provisions were added to the TIR Convention⁹⁶ providing the legal basis for the paperless operation of the United Nations TIR Convention, the so-called eTIR, thereby establishing a legal framework for a global electronic customs transit system, facilitating trade and the seamless and secure movement of goods across borders. The term “eTIR procedure” means the TIR procedure, implemented by means of electronic exchange of data, providing the functional equivalent to the TIR Carnet. eTIR opens new possibilities for the TIR system, in particular in the area of intermodal transport, for which the current paper procedure has proved cumbersome. As a result, the international eTIR system was developed which is capable of ensuring the secure exchange of data between national customs authorities concerning the international transit of goods, vehicles, and containers in accordance with the TIR Convention. The system allows Customs authorities to manage data on guarantees issued by the guarantee chain to TIR Carnet holders admitted to use the system. Today more than 16 Contracting Parties plus the European Commission have expressed interest in interconnecting with the eTIR international system and several of them have already initiated the interconnection projects.

187. Since the establishment of eTIR, the CAREC countries have been actively exploring and piloting the opportunities offered by this system to harness paperless trade procedures and connectivity as drivers of sustainable development. In 2020, an ESCAP project for eTIR piloting between Kazakhstan and Uzbekistan was launched⁹⁷ to ensure the secure exchange of data about the international transit of goods, vehicles, or containers between national customs systems. The focus was on cross-border connectivity, especially at major land border-crossing points like Yallama–Zhibek Zholy and Gisht–Kuprik–Kazygurt. Similar exploratory pilots were also tested with the Kyrgyz Republic and Tajikistan, although on a smaller scale. This project was intended to facilitate trade and transport among all TIR Contracting Parties, particularly in the ECO region including Azerbaijan, Afghanistan, Iran, Kazakhstan, the Kyrgyz Republic, Pakistan, Tajikistan, Turkey, Turkmenistan, and Uzbekistan. As a result, the first application of an electronic single transit permit for transport (eTIR) took place between Uzbekistan and Azerbaijan in 2023.

188. In 2023 CAREC member countries took part in the TIR Executive Board meeting on the theme: “Transforming the Middle Corridor to an electronic TIR (eTIR) corridor”⁹⁸. Customs authorities and representatives of national associations of TIR countries shared their vision and experience of connecting their customs systems to the international eTIR system, and had the opportunity to share experience with representatives of the private sector and expand business contacts. The meeting also included presentations by customs authorities that have not yet begun to implement the interconnectivity project—Kazakhstan, Kyrgyz Republic, Pakistan, Tajikistan, Turkmenistan and Uzbekistan. As a result, the meeting participants agreed on the next steps to ensure the interconnection of all national customs systems in the region with the eTIR system.

189. In 2024 the UNECE launched the project “Implementation and Operationalization of the eTIR procedure in the Caucasus and Central Asia”⁹⁹ to ensure the secure exchange of data about the international transit of goods, vehicles or containers between national customs systems and to pilot a TIR transport corridor. The TIR Secretariat carried out a number of activities to connect the eTIR international system, developed and hosted by the TIR Secretariat, with the national customs systems of the Contracting Parties to the TIR Convention. To implement the eTIR procedure, it is necessary to develop eTIR transport corridors, starting with the use of the eTIR procedure. Central Asian countries that are Contracting Parties to the TIR Convention are currently the

⁹⁶ <https://etir.org/about-eti>.

⁹⁷ <https://www.digitalizetrade.org/projects/etir-project-and-piloting-between-kazakhstan-and-uzbekistan>.

⁹⁸ <https://traceca-org.org/kg/news/>.

⁹⁹ <https://unece.org/sites/default/files/2024-01/ECE-TRANS-WP30-AC2-2024-Inf08.pdf>.

largest users of TIR Carnets. Some countries in the Caucasus and Central Asia, such as Azerbaijan, Georgia, and Uzbekistan, have already completed an internal connectivity project. The secretariat has initiated an interconnection project with Kazakhstan, the Kyrgyz Republic, and Tajikistan, and in 2024, significant efforts were made to implement linkage projects with other countries, such as Turkmenistan.

190. In 2025, the UNECE Secretariat organized a workshop on the implementation of the eTIR procedure in Central Asia¹⁰⁰. Customs experts from all five countries in Central Asia shared their latest achievements and future plans with regard to the digitalization of transit procedures. The implementation of the eTIR procedure ranks high in the list of means to further streamline transport in the region and beyond. Participants were highly interested in the prerequisites for the implementation of the eTIR procedure, such as ensuring that data in the International TIR Data Bank (ITDB) are provided and kept up to date, in particular on authorized transport operators and customs offices, as well as illustrations of the customs stamps and sealing devices used for the TIR and eTIR procedure. Experts who were unfamiliar with the ITDB application acknowledged, after a live demonstration, how simple and fast it was to input and update data in the ITDB. Finally, participants appreciated the demonstration of the eTIR National Application. Its ease of use, open-source code, free deployment appealed to customs representatives, who understood its potential to rapidly reap the benefits of the eTIR procedure in Central Asia.

191. The Turkic states also signed an eTIR implementation roadmap to enhance border crossings, trade and transport efficiency as well. The signing of the eTIR implementation roadmap by OTS countries will further pave the way for the modernization and digitalization of cargo transit along the Europe-Caucasus-Asia transport corridors and accelerate the implementation of the eTIR procedure. The implementation roadmap establishes a 2025 deadline for full deployment across all OTS countries. The latest OTS Customs meeting¹⁰¹ focused on initiatives to enhance cooperation, digitalization and the development of the Middle Corridor. The meeting concluded with the signing of an eTIR implementation roadmap, setting a 2025 operational deadline for all OTS countries. Hosted by the Azerbaijani State Customs Committee, this meeting brought together customs leaders from OTS countries, the head of Georgia's customs administration and representatives of UNECE and IRU. Participants commended IRU for its efforts to promote and deploy the modern digitalization solutions in the OTS region.

IRU executives noted the global significance of the Middle Corridor, urging stakeholders to leverage existing transport and transit solutions, in particular eTIR. They underlined the importance of improving hard infrastructure and the even greater need for soft solutions, especially when opportunities to expand hard infrastructure are limited. IRU called for simplified customs documentation and smoother operations along the Middle Corridor. Key proposals included advancing TIR digitalization, introducing TIR Green Lanes, and implementing eTIR in partnership with UNECE, IRU, and OTS. Although four OTS countries successfully tested "digitalized" TIR, eTIR implementation remains pending because connecting national customs systems to UNECE remains technically challenging.

192. The following eTIR initiatives and pilots have been undertaken since 2020 by the CAREC countries participating in the project:

- a. The customs authorities of **Azerbaijan** and Iran launched a joint online service known as the eTIR project in 2018 to speed up customs formalities between the two countries. The two countries agreed to introduce a digital version of TIR on routes between these countries. Azerbaijan was also actively implementing the UN's eTIR system, having conducted its first successful eTIR transport operation with Uzbekistan in 2022. This digital transit system streamlines customs procedures and trade by enabling secure, paperless data exchange. A significant step was taken in January 2025 when OTS Customs leaders, including Azerbaijan, signed an action plan setting a target for full eTIR implementation across member states by the end of 2025. Key aspects of eTIR implementation in Azerbaijan are considered to be as follows:
 - finalized its connection to the international eTIR system and successfully completed an eTIR pilot with Uzbekistan in 2022;

¹⁰⁰ <https://etir.org/workshop-implementation-etir-procedure-central-asia-dushanbe-tajikistan>.

¹⁰¹ <https://www.iru.org/news-resources/newsroom/turkic-states-customs-meeting-targets-trade-advancements-etir>.

- Azerbaijan hosted a meeting where OTS members signed an action plan to achieve full eTIR implementation by the end of 2025, reinforcing the commitment to digitalize trade;
 - Azerbaijan's role as a transit hub is enhanced by eTIR, which helps facilitate the movement of goods along the Middle Corridor and other key transport routes;
- b. **Kazakhstan** is actively implementing the eTIR system, having completed successful pilot movements with Uzbekistan in late 2020 within the framework of the Turkic Council and with IRU support. This initiative was part of a broader regional effort, supported by the UNECE and GIZ, to digitalize transit procedures and facilitate trade by replacing physical customs documents with a seamless electronic system. The main goal of this pilot was to streamline border crossings, reduce costs, cut transport times, and enhance the security and transparency of international road transport. Key aspects of eTIR implementation in Kazakhstan are considered to be as follows:
- Kazakhstan was a key participant in early eTIR pilots, particularly with Uzbekistan, which began in late 2020;
 - The primary aim of this project was to move from paper-based processes to an entirely digital system, providing electronic guarantees and pre-declarations to customs authorities;
 - The project involved significant collaboration with international bodies like the UNECE and IRU, as well as national customs authorities and transport associations.
- c. **Turkmenistan** is actively working toward full eTIR implementation by integrating its national customs system with the eTIR international system, supported by international partners like the IRU and GIZ. Steps include the launch of the TIR-EPD digital application in 2022, efforts to connect the national customs management system with TIR data for risk assessment, and participation in regional initiatives to digitalize transport and customs procedures, including potential pilot projects and training programs on eTIR and other digital trade standards. With its chairmanship of the UN Special Programme for the Economies of Central Asia in 2025, Turkmenistan will focus on the implementation of a roadmap for the digitalization of multimodal data and documentation along the Trans-Caspian Transport Corridor. The implementation of eTIR and e-CMR will act as key performance indicators. Key aspects of eTIR implementation in Turkmenistan are considered to be as follows:
- In September 2022, Turkmenistan launched the TIR-EPD application, allowing TIR operators to submit advance cargo information electronically;
 - Turkmenistan is taking steps to connect its national customs system, such as the ASYCUDA platform, with the international eTIR system to digitalize TIR-related transport documents and procedures;
 - The eTIR implementation process is supported by international organizations such as the IRU and the German Agency for International Cooperation (GIZ).
- d. **Uzbekistan** and Azerbaijan successfully conducted the first fully digital eTIR transport operation in the world. In December 2022, the customs administrations of the two countries successfully carried out an eTIR (multimodal) transportation operation performed by an Uzbek carrier on the route from Uzbekistan to Azerbaijan using the eTIR electronic guarantee on the UNECE platform. Earlier, within the framework of the OTS and in cooperation with the IRU, the “digital TIR” project was launched between Kazakhstan and Uzbekistan and extended to the Kyrgyz Republic in March 2022. The success of this project added value to the transport cooperation initiatives underway within the Organization of Turkic States, including the introduction of digital TIR e-Permit, and e-CMR tools, among others. Key aspects of eTIR implementation in Uzbekistan are considered to be as follows:
- Uzbekistan successfully implemented two eTIR pilots with Kazakhstan and Azerbaijan and was the first country to integrate its customs system with the UNECE-hosted international eTIR system via secure API-based communication;
 - Uzbekistan overtook Türkiye and Iran and became the leading country in the region by the number of TIR Carnets issued in 2023 and 2024, reaching 154,000 in the most recent year;
 - Implementation of the eTIR system was included in the Uzbekistan TLS development concept by 2030 as part of the national electronic document management system.

G. e-CMR Implementation Activities in the CAREC Countries Involved

193. In February 2008, the Additional Protocol to the CMR concerning the electronic consignment note was adopted providing for the electronic management of CMR consignment notes, via ‘e-CMR’. This protocol entered into force in June 2011, and to date 34 countries have acceded, including Azerbaijan, Belarus, Belgium, Bulgaria, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Iran, the Kyrgyz Republic, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Oman, Poland, Portugal, the Republic of Moldova, Romania, the Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, the United Kingdom, and Uzbekistan. In its paper-based format, the CMR consignment note offers many benefits: it harmonizes contractual conditions for goods transported by road and helps facilitate goods transport overall. A global e-CMR solution retains all these benefits while modernizing the system, by removing paperwork and handling costs. This is why IRU supports its members and the wider industry in adopting e-CMR. Because of its digital nature, e-CMR can also be easily integrated with other services used by transport companies, e.g., customs declarations or transport and fleet management services. By moving to an electronic format, the three parties involved in each shipment benefit from greater overall logistics efficiency, resulting in increased economic competitiveness.

In 2017, UN/CEFACT experts developed a business requirements specification, a core-component e-CMR message structure, and an XML message standard¹⁰². The development of e-CMR has laid the foundation for a new de facto standard in cross-border freight transport. During e-CMR implementation, particular attention should be paid to using existing standards.

194. In 2021 IRU held a workshop with governments and businesses from Economic Cooperation Organization (ECO) countries to discuss progress on e-CMR¹⁰³. IRU and its members discussed both accession to and implementation of the e-CMR protocol at the event. Participants highlighted the importance of moving towards full digitalization of transport documents, in particular following the pandemic, and called on authorities and international organizations to work together to implement e-CMR across the ECO region. Many ECO countries have already championed transport digitalization projects in recent years, including successful digital TIR pilot projects. At the workshop, they expressed strong readiness to build on those experiences and drive e-CMR implementation going forward. From 2021 to 2023, the full-scale e-CMR pilot project was implemented between Belarus and the Russian Federation to replace paper CMR documents with legally significant electronic e-CMR documents with the development of a decentralized system of cross-border electronic document management and successful testing of the technological environment for cross-border e-CMR exchange during international cargo transportation by road.

195. From 2021 to 2024, multiple pilot projects were implemented in the EU with the participation of the Benelux countries, France, Spain, Italy, Poland and the Baltic states¹⁰⁴. Under the DIGINNO project, a technological solution—an e-CMR prototype—was developed to allow the service providers to index their active e-CMRs and the control authorities to check the availability of CMR transport documents of the foreign road carriers operating in their territory in a secure and trustworthy manner. The e-CMR prototype was tested on the trade routes between Estonia, Latvia, Lithuania, and Poland. The project countries used real-time freight information to reduce paperwork in the road transport sector and unnecessary delays during roadside checks. With the prototype, it was no longer necessary to stop the vehicle, as the cargo could be checked by just entering the truck and trailer registration number into the system. The prototype was designed to enable a regional shift from paper CMR to e-CMR – an opportunity for both businesses and authorities to gain efficiency and transparency through digitalization. The prototype enabled businesses to manage their supply chain more effectively and simplify communication with public authorities; once the e-CMR document was created, it could be shared electronically with the necessary authorities or business partners. It also improved the quality of freight-process data by integrating activities into a single network of information systems and reducing the risk of recurring errors.

¹⁰² <https://unttc.org/documents/ecmr-standard-package>.

¹⁰³ <https://www.iru.org/news-resources/newsroom/digitalisation-push-eco-countries-ecmr-workshop>.

¹⁰⁴ <https://unece.org/sites/default/files/2021-08/ECE-TRANS-SC1-2021-1e.pdf>.

196. In March 2025, IRU held an event on sustainable and resilient freight connectivity in Central Asia. The event explored ITF's regional study findings and pathways for enhancing freight transport systems. A key focus of the event was the importance of implementing a coordinated and harmonized regional transport policy, rather than relying solely on national strategies. IRU delegates highlighted the importance of TIR-EPD Green Lanes in streamlining connectivity while ensuring transit security, as well as the need to adopt digital tools such as eTIR and e-CMR to boost transparency and efficiency. The next steps for this transition were outlined in the SPECA Roadmap on Digitalizing Multimodal Data and Document Exchange, focusing on the rollout of eTIR and e-CMR. The Organisation of Turkic States adopted an Action Plan for eTIR and e-CMR implementation to further drive this progress.

197. In June 2025, Azerbaijan hosted the third technical meeting on the implementation of the e-CMR pilot project, organized by the Ministry of Digital Development and Transport (MDDT). The event was attended by government officials of Azerbaijan, technical experts, private sector representatives, a delegation from the Republic of Turkey, the partner in the e-CMR pilot project, and UNECE experts. The meeting addressed the progress achieved in implementing the e-CMR roadmap and the preparations for the pilot phase to be carried out between the two countries. Members of the Turkish delegation delivered presentations on current practices in the use of CMR documents, the prospects and advantages of transitioning to the e-CMR system, the national legal framework related to digital transport, and mechanisms for interagency cooperation. At the end of the meeting, the participants agreed to develop a joint action plan for the pilot project.

198. The following e-CMR project initiatives have been undertaken since 2020 by the CAREC countries participating in the project:

- a. **Azerbaijan** acceded to the e-CMR protocol in 2023. In January 2025 UNECE and the Ministry of Digital Development and Transport agreed on a roadmap to implement e-CMR. Together with relevant national authorities of Azerbaijan, UNECE will work to finalize the necessary technical specifications and data standards to operationalize the e-CMR system in Azerbaijan by the end of 2025. In March 2025 the first technical meeting was held to discuss the roadmap to be developed for Azerbaijan's transition to e-CMR. Experts from the UNECE Secretariat and UN/CEFACT, as well as representatives of relevant government agencies, attended the meeting and discussed key milestones and strategies to ensure smooth operation of the system.
- b. **Kazakhstan** became a party to CMR in 1995 and the government is currently completing the final legislative steps required to officially join the international e-CMR convention.
- c. **Turkmenistan** acceded to the e-CMR protocol in 2022. This accession aimed to increase the efficiency and transparency of cargo transportation by replacing paper consignment notes with electronic ones. The IRU played a significant role in supporting this digitalization effort, fostering cooperation between Turkmenistan's authorities and international experts to implement e-CMR and other digital tools like eTIR. The IRU and the UNECE have provided significant support, including technical expertise and workshops, to facilitate the practical implementation of digital waybills and harmonized standards. The commitment to e-CMR is part of a broader effort by Turkmenistan to digitalize its transport sector, with groundwork being laid for integration with other digital systems like eTIR.
- d. **Uzbekistan** acceded to the e-CMR Protocol in 2020. In 2023, Uzbek experts discussed solutions for the e-CMR implementation at the IRU Workshop with a group of TRACECA representatives. TRACECA studied and analyzed international experience in the implementation of the electronic consignment note, held a number of meetings with developers of prototypes used in European countries. The results of the pilot transport operations demonstrate that the implementation of e-CMR requires a more coordinated approach and integration with the information systems of state bodies at the international level. Later in 2023, a TRACECA e-CMR pilot project between Tajikistan and Uzbekistan was conducted, enabling the participants to define the next steps on digitalization of e-CMR in the region with the following preliminary conclusions:

- Existing prototypes cannot be implemented in TRACECA countries without the required adjustments related to customs operations;
- Ways of authentication and electronic signature requirements differ (mutual recognition of electronic signatures has to be regulated).

H. eSMGS Implementation Activities in the CAREC Countries

199. The electronic CIM/SMGS consignment note is a digital version of the common CIM/SMGS consignment note, which serves as a contract of carriage for international rail freight. This digital document standardizes the exchange of data between the CIM rules of the International Union of Railways (UIC) (used in Western Europe) and the SMGS rules of the Organization for Cooperation of Railways (OSJD) (used in Eastern Europe and Central Asia), allowing for more efficient and cost-effective Euro-Asian rail freight by streamlining processes and reducing delays through a common logistics format in the following ways:

- e-CIM/SMGS acts as a single, interoperable document that can be used for both CIM (Western Europe) and SMGS (Eastern Europe and Central Asia) routes, simplifying transitions at border crossings;
- It facilitates the digitalization of logistics operations by providing a common standard for data exchange, which enhances efficiency and lowers costs in international rail transport;
- It uses a defined XML standard (specifically, the Standard Package¹⁰⁵) to ensure consistent data exchange across different countries and systems, eliminating inconsistencies caused by diverse data formats;
- It bridges the gap between CIM and SMGS systems, providing a unified solution for Euro-Asian rail freight.

Electronic consignment notes play a principal role in railway-to-railway electronic information exchange as they contain the information required by the railways involved as well as by control agencies. The common e-CIM/SMGS consignment note was created as a solution to eliminate the exchange of paper consignment notes.

200. The pilot implementation of e-CIM/SMGS in CAREC countries was initiated in 2022 by the TRACECA digitalization team. Based on an MoU among the participating national railways (Azerbaijan, Georgia, Kazakhstan, Turkey and Ukraine) and an agreed action plan the pilot project was implemented in 2023–2024 involving the development and testing of the national electronic CIM/SMGS prototype and the analysis of supporting documents for further digitalization. Following the pilot stage, the parties involved considered a draft multilateral agreement between railways to formally regulate the use of e-CIM/SMGS consignment note and discussed progress and the potential for linking port-to-port data exchange to railways. At meetings held in April and May 2025, project participants discussed the following next steps for integrating national railway IT systems:

- API connection between the IT systems of Georgian and Turkish Railways;
- Testing of a new web service for exchanging multiple e-CIM/SMGS data sets;
- API between the IT systems of Georgian and Ukrainian Railways;
- XML/EDIFACT converter between Azerbaijan and Kazakhstan Railways.

The main practical result of these pilot activities was the development of a testable and scalable prototype for the electronic CIM/SMGS consignment note serving as a practical model, serving as a practical model for future system-wide adoption. During the course of prototype testing countries adapted their systems to export and import e-CIM/SMGS XML files, shared XML files by email; Azerbaijan, Turkey, and Kazakhstan finalized testing. The prototype adheres to UN/CEFACT standards and supports future multimodal transport operations, enabling efficient data sharing in accordance with international standards.

¹⁰⁵ <https://unttc.org/documents/cimsmgs-consignment-note-standard-package>.

201. The latest development activities for e-CIM/SMGS application are related to the digital transformation project of Kazakhstan–Turkmenistan–Iran (KTI) transport corridor¹⁰⁶ discussed at the 19th UNECE capacity-building seminar in March 2025. The seminar aimed at advancing a pilot project to develop and use an electronic version of the SMGS railway consignment note in the countries involved. This pilot project would serve as a foundation for further development of a digital corridor along the KTI railway route, using the semantic standards and Multimodal Transport Reference Data Model (MMT RDM) of UN/CEFACT as a key reference for multimodal interoperability of data and document exchange. After completion of the pilot implementation of the electronic SMGS version, the next stage of the project may include digitalization of data exchange for other key documents, such as invoices, wagon lists, certificates of origin, etc., aligned with UN/CEFACT standards and reference data models to ensure broad interoperability. The electronic cargo information exchange using the UN standards may cover data sharing in later stages among railways and other modes of transport, such as maritime, road, or air transport, and control agencies, such as Customs and single window or port community systems.

Upon completion of the e-SMGS pilot testing and its successful application, the parties agreed to explore possibilities for follow-up projects¹⁰⁷, depending on the interest of the stakeholders:

- a. Digitize other related key shipping documents, such as invoices, wagon lists, certificates of origin, etc., aligned to the UN/CEFACT standards and reference data models to ensure broad interoperability.
- b. Develop solutions for data sharing among railways (e.g., converters between SMGS, UN/EDIFACT IFTMIN messages, CIM/SMGS, CIM, etc.); data sharing between railways and other modes of transport, such as maritime, road, or air transport; data sharing between railway-consignment-note systems and control-agency systems.
- c. Create an enabling legal environment for using the electronic SMGS consignment note aligned to the UN/CEFACT standards.

202. The pilot concept for blockchain-based data pipeline of the electronic shipping documents for the Northern Transport Corridor between PRC and Europe was developed by experts of the DTLP Laboratory of the Azerbaijan Institute of Control Systems¹⁰⁸ in cooperation with GlobalDTC Joint Venture¹⁰⁹. Under this concept, the cross-border information exchange should be structured around points along the cargo route where information is entered into the data pipeline (“input waypoints”) or extracted from the pipeline (“output waypoints”). A typical scenario for cargo transiting through the North corridor countries along the China–Europe Railway Express routes uses five key waypoints:

- Consignment Completion Point (CCP) at the PRC consignor’s warehouse;
- Departure BCP from the country of export (PRC);
- Opening of the EAEU transit declaration at the China–Kazakhstan BCP;
- Processing of the EAEU transit declaration by the customs authorities of Kazakhstan, Russia, and Belarus;
- Closure of the EAEU transit declaration at the Belarus–EU BCP.

For this scenario, a corresponding Data/Document Exchange Scheme was developed in accordance with UN/CEFACT recommendations stipulated in the corresponding White Paper¹¹⁰ describing the role of the Data Pipeline Carrier, which provides a platform/database that facilitates information exchange between multiple supply chain participants. At the concept stage, the project team envisaged that such a platform would have specialized blockchain Data Pipeline Modules (DPMs) that should be installed at the CCP and EAEU member countries to support the cross-border exchange of legally significant electronic shipping documents.

¹⁰⁶ <https://unece.org/trade/events/nineteenth-international-capacity-building-seminar-trade-and-transport-facilitation>.

¹⁰⁷ https://unece.org/sites/default/files/2025-04/Recommendations%20Ashgabat_Eng.pdf.

¹⁰⁸ <https://www.isi.az/en/content/2>.

¹⁰⁹ <https://globaldte.com/>.

¹¹⁰ https://unece.org/sites/default/files/2023-10/WhitePaper_DataPipeline_Eng.pdf.



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