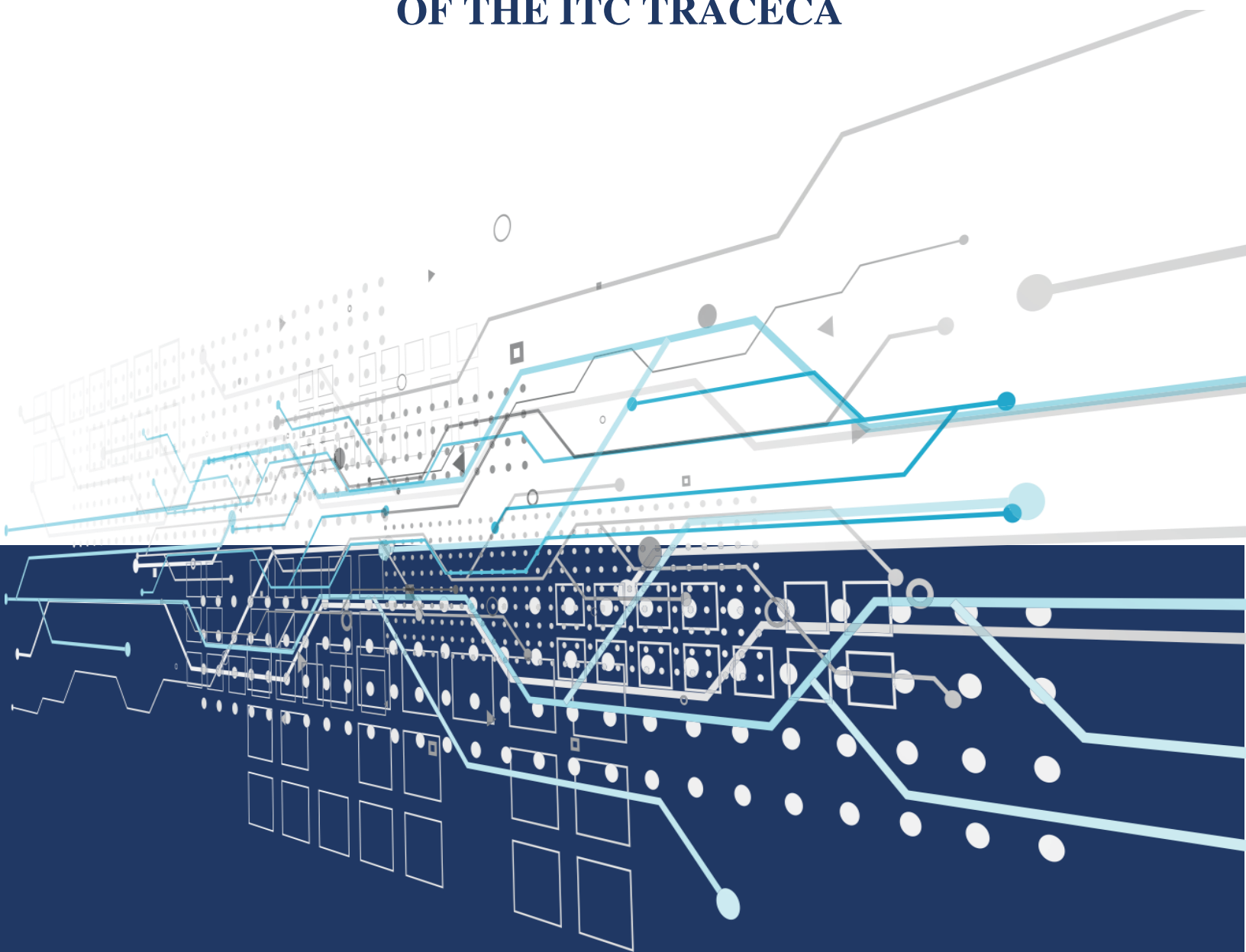




DIGITAL CONCEPT OF THE ITC TRACECA



CONTENT

1.	Introduction	3
2.	Role of international cooperation in the development of digitalization in transport	4
	Legal aspects within regional and international unions and organizations (EU, EAEU, international organizations-UN, IRU, CIT, FIATA, GUAM, etc., including initiatives - eFBL, eTIR, eCMR, eFTI, GLV-CIM/SMGS, UN CEFACCT Reference Data Models, etc.)	
3.	Digitalization of the TRACECA corridor	24
	Prerequisites for digitalization	
	Objectives, tasks	
	TRACECA initiatives and projects subject to digitalization (TRACECA permits, intelligent route map, information support, etc.)	
4.	TRACECA Information System	34
	Purpose of the information system	
	Information system architecture and implementation stages	
	Basic requirements for the information system	
	Mobile application	
	Information security requirements	
	Personal account and user interface requirements	
	Terms and implementation plan	
5.	Recommendations and terms of digitalization of the corridor	42
6.	Conclusion	45

INTRODUCTION

With the development of information technologies, there is an ever deeper introduction of digitalization into all sectors of the economy. The transport industry has not become an exception and over the past decade has demonstrated positive dynamics of digitalization of transport processes and documents.

Countries with a significantly high level of application of information technologies in the field of transport differ with a relatively high level of efficiency of participants in the transportation process, which generally leads to changes in the life of the population and economy.

In order to ensure a stable transport connection between the TRACECA countries and the creation of a digital corridor that meets modern requirements, it is important to focus on the introduction of electronic transport documents, information systems and solutions that simplify the transportation process.

International experience shows that developed and a number of developing countries have actively started using information technologies in cargo transportation. At the same time, a number of countries have scaled the applied solutions from the national level to the regional one, which has created prerequisites for the development of international digital logistics projects.

Therefore, this Concept is aimed at reviewing international experience in the development of digitalization in transport, forming a vision for creation of the TRACECA digital ecosystem, including issues of creating an information system, and recommendations aimed at introducing information technologies in the TRACECA countries.

Coordinated actions on the part of the authorized bodies of the MLA member states will increase the competitiveness of the corridor and get the maximum benefit from digitalization.

2. ROLE OF INTERNATIONAL COOPERATION IN THE DEVELOPMENT OF DIGITALIZATION IN TRANSPORT

LEGAL ASPECTS WITHIN REGIONAL AND INTERNATIONAL UNIONS AND ORGANIZATIONS

(EU, EAEU, international organizations-UN, IRU, CIT, FIATA, GUAM, etc., including initiatives - eFBL, eTIR, eCMR, eFTI, GLV-CIM/SMGS, UN CEFAC Reference Data Models, etc.)

At the international level, there are digital solutions that are aimed at digitalizing the transport industry. In view of this fact, this section provides a brief overview of the main initiatives (information systems and electronic transport documents) implemented within the framework of international unions and organizations.

UN (UN/CEFACT, UN/EDIFACT, eTIR, eCMR)

Participants in international trade noted widespread problems caused by the incompatibility of e-business applications in terms of information transmission formats. To this end, work has been carried out within the framework of the UN aimed at regulating and standardizing EDI (Electronic data interchange). This implies the transmission of structured digital information between organizations based on the regulations and formats of transmitted messages defined by standards and conventions.

The main task of EDI is to provide a standardized exchange of transactional and other digital information, to provide opportunities for programmatic interaction of computer systems of various segments and organizations. EDI is one of the earliest technologies in e-commerce, which began to be implemented in the early 1970s.

The United Nations Economic Commission for Europe (UNECE) founded the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) in 1996, a subsidiary intergovernmental body that serves as the main body of the ECOSOC in the field of standardization of e – commerce and the development of recommendations for the simplification of international trade.

It is this body that has developed and supports such a system of electronic data exchange standards as UN/EDIFACT - United Nations rules for Electronic Data

Interchange for Administration, Commerce and Transport¹, which sets programming standards for data exchange in international commerce (syntax rules, message types, etc.). This standard is the only international standard in management, commerce and transport, and is predominant outside of North America and on the territory of the Customs Union countries.

To solve the problem of compatibility of e-business applications already mentioned above, a more flexible and interoperable way of standardizing business semantics is required. It is for these purposes that UN/CEFACT has developed a Reference Data Model (RDM).

The RDMs developed by UN/CEFACT are based on the UN/CEFACT standardized business semantics and can be used in various segments of electronic business operations. Thus, *"the RDM is a consolidated list of standardized data formats and processes for use in a particular business domain, which are globally understandable exchangeable between parties using common standard data exchange structures."*

One of the main components of the RDM is the United Nations Core Component Library (UN/CCL), which is a semantic library of business information, a data model that is consistent, verified and published by UN/CEFACT.

The UN/CCL uses the Core Component Technical Specification of the United Nations (CCTS), which ensures its consistency and interoperability with other systems. The RDM, based on the UN/CCL, can include data exchange requirements for international trade, procurement, insurance, customs and other regulatory authorities by summarizing best practices in both trade facilitation and electronic business operations.

The RDM ensures the compatibility of business information. This compatibility of business information is ensured both in the unidirectional presentation of business information, and in the two-way interaction of application programs using information exchange tools using the Internet and the Web protocol, as well as traditional electronic data interchange (EDI) systems. Ideally, in the RDM, business information is presented in a form required for both human reading and machine processing.

¹ <https://unece.org/trade/uncefact/unedifact/part-4-rules-electronic-data-interchange-administration-commerce-and-transport>

The advantages of the UN/CEFACT Reference Data Model include reduction of costs, support for a Single Window system, a common database of code lists and standardized data, support for the "Master Sample principle" and universal syntactic compatibility. The latter, in particular, means that electronic data exchange can be produced using various syntax implementation tools, such as UN/ EDIFACT, Extensible Mark-up Language (XML) or others. In general, the RDM is a key tool in the development of modern application programs that need to exchange data with other application programs.

A pilot application was carried out between Belarus and Serbia with regard to standards related to export operations using maritime and rail transport. The results showed that the harmonization of the semantics of documents and data sets is an important component of the workflow in general and the electronic workflow in particular. Given the development of electronic document management, the key issue is the automation of understanding the content of the document. The approach proposed by UN/CEFACT to bring all trade and transport documents involved in the supply chain to a single reference model for multimodal transport seems to be the most promising. The issue of legal recognition is important and requires attention in the cross-border and multimodal exchange of information.

eTIR

On May 25, 2021, amendments to the main text of the Customs Convention on the International Transport of Goods under Cover of TIR Carnets of 1975 (TIR Convention), namely Annex 11 to the mentioned Convention, which creates the legal basis for the introduction of the so-called eTIR procedure, entered into force. This project has been implemented by the member countries of the TIR Convention and the UN Economic Commission for Europe since 2003 and implies the complete digitalization of all procedures related to border crossing when transporting goods in bodies/containers by road based on the system of customs guarantees created by the TIR Convention. These changes have entered into force for all 77 countries participating in the TIR Convention.

In particular, the TIR Convention has been supplemented with the term "eTIR procedure", which is defined as "a TIR procedure carried out through electronic data exchange, which is the functional equivalent of a TIR Carnet". Also, according to the new amendments to the TIR Convention, from now on a customs guarantee can be issued not only through a TIR Carnet, but also through the eTIR procedure. The

new Annex 11 also introduces such a term as the " eTIR international system " - a system of information and communication technologies created to enable the exchange of electronic information between participants involved in the TIR procedure.

According to the new alternative procedure for obtaining customs guarantees, the carrier/ holder requests an electronic guarantee from guarantee associations through the eTIR international system. If the request is approved, the carrier receives not a classic TIR Carnet, but a unique electronic number, and the guarantee associations register the issued guarantee in the eTIR international system. Further, the carrier electronically sends a standard preliminary notification about the movement of goods to the customs authorities of the country of departure, which includes the unique electronic number received by it.

Upon arrival at the customs office of departure and submission of the cargo for inspection, the carrier performs customs clearance on the basis of a pre-sent advance notice. At the same time, the customs control of the country of departure verifies the authenticity of a unique electronic number through the eTIR international system. If the cargo passes inspection, further procedures are carried out not by filling in and manipulating the TIR Carnet, but completely in the eTIR electronic system. Thus, the customs authority enters data on the results of the inspection, seal numbers and customs clearance data into the electronic system, where they can be viewed by the customs authorities of the countries of the cargo transportation route, as well as guarantee associations.

Upon arrival at the next customs office on the way, the procedure is repeated. The last customs office in the country of unloading enters a message into the system about ending the TIR procedure.

An important component of the legal basis of the eTIR system is the agreement of the parties on its administration, which is carried out by the United Nations Economic Commission for Europe. The parties also agreed to connect their customs systems to the eTIR international system using the eTIR characteristics. At the same time, the eTIR characteristics are defined in Annex 11 as "conceptual, functional and technical specifications". The eTIR characteristics are approved by the

Administrative Committee of the TIR Convention and are a set of XML schemas, computer codes, etc. The specified technical specifications are publicly available².

The first pilot project of cargo transportation under eTIR (using alternative digital platforms and procedures) was carried out in 2016 with the involvement of customs services, insurance associations and carriers from two countries – Iran and Turkey at 4 customs points (2 in Turkey and 2 in Iran), which were technically ready to work with eTIR. The first stage of the eTIR pilot project between Turkey and Iran has shown successful results and the readiness of interested parties to continue participating in the project. After the successful completion of the first phase, the second phase of the eTIR pilot project between Turkey and Iran was implemented between August 2016 and the end of February 2017. As part of the second stage, the following innovations were applied:

- Participation of more customs offices (19): 8 in Iran and 11 in Turkey;
- Participation of 6 TIR Carnet holders (3 from Iran and 3 from Turkey)
- Admission of several places of loading and unloading (up to 4).
- Declaration may be amended.
- Additional functionality is available, such as remote payment of e-Guarantees, etc.

Later, similar pilot projects were implemented between Azerbaijan and Iran (2019), Georgia and Turkey (2018-2019), Kazakhstan and Uzbekistan (2020-2021), as well as Tajikistan, Uzbekistan and Kazakhstan (2021). It is important to note the leading role of the TRACECA member states in the eTIR piloting.

eCMR

The Additional Protocol to the Convention on the Contract for the International Carriage of Goods by Road of 1956, also known as CMR, concerning the Electronic Consignment Note (eCMR) was signed in February 2008, and entered into force on June 5, 2011. To date, the Protocol has 29 participating countries³.

As it is known, the CMR Convention provides for the creation of a consignment note, which is used mainly for the purposes of a commercial contract of carriage (intercorporate commercial operations) and is often used by law enforcement and customs authorities to verify data on goods and information about the shipper/consignee/carrier for customs clearance in cross-border trade or additional

² <https://unece.org/etir-specifications>

³ https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XI-B-11-b&chapter=11&clang=en

information in various situations. The Additional Protocol also allowed the use of a paperless version of the consignment note between its participants. The Protocol defines an electronic consignment note as *a consignment note issued by the carrier, the sender, or any other person interested in the execution of the contract of carriage by electronic means of communication.*

The Parties to the Protocol also agree that any other communications regarding the execution of the contract of carriage can also be carried out by electronic means of communication and that the electronic consignment note, subject to compliance with the requirements of the Protocol, has the same legal force as the CMR paper consignment note. The means of authentication of electronic invoices, according to the Protocol, are electronic signatures of the parties to the contract of carriage.

In 2017, within the framework of the project of the United Nations Center for Trade Facilitation and Electronic Business, in order to standardize the computer applications used by the parties to the contract of carriage, a specification of business operations requirements, the structure of the key components of the electronic consignment note and a standard for messages in XML format was developed.⁴

The first practical use of the electronic consignment note e-CMR took place during the transportation of fruit from Spain to France in January 2017 and was implemented by ViaService. Today, private companies continue to use this solution for transportation within the EU, but this solution is not integrated with the customs information system and is not used for transportation to/from the EU.

At the same time, an application test based on the solution of Systems Integration Solutions, LLC was also carried out on the territory of Estonia, Lithuania, Latvia and Poland. A distinctive feature of this pilot application is the implementation of transportation to/from the EU territory. Currently, the possibility of applying this solution in interested countries is being considered.

EU (eFTI, AEOLIX, EU4DIGITAL)

eFTI

⁴http://staging2.unece.org/net4all.ch/fileadmin/DAM/cefact/cf_plenary/2018_plenary/ECE_TRADE_C_CEFAC2018_14R.pdf

The EU Regulation 2020/1056 "On electronic freight transport information"⁵, adopted on July 15, 2020 and entered into force, is designed to regulate and achieve uniformity in the EU in the field of digitalization of document flow in cargo transportation. According to the Regulation, its goal is to promote the digitalization of freight transport and logistics, reduce administrative costs, increase the executive capabilities of competent state bodies and, in general, increase the efficiency and sustainability of the transport sector.

The Regulation defines the concept of eFTI ("electronic freight transport information") as *"a set of data elements transmitted by electronic means of communication for the purpose of exchanging regulatory information between interested commercial operators and between interested commercial operators and competent state authorities"*.

In its turn, "regulatory information" is defined as information related to the transportation of goods within the EU, including transit, which the cargo transportation operator is obliged to provide to the competent state authorities in accordance with the regulatory acts listed in the Regulation (including, for example, the ADR certificate). The Regulation also introduces a number of other terms, such as "eFTI platform" (*"a solution based on information and communication technologies, such as an operating system or database used for eFTI processing purposes"*), "eFTI service", "eFTI service provider", etc.

The EU Regulation 2020/1056, firstly, establishes the conditions on the basis of which the competent authorities will be obliged to accept the regulatory information provided by cargo transportation operators in electronic form, and secondly, it establishes the rules for the provision of eFTI services. In particular, the Regulation approves regulatory requirements for the functionality of eFTI platforms and for eFTI service providers. This mainly concerns the security of personal data and trade secrets, security issues of stored data and providing access only to authorized persons, and more.

In order to confirm the compliance of the functionality of eFTI platforms and the eFTI service provider with the established requirements, the Regulation introduces the concept of "conformity assessment bodies", which will be responsible for the certification of eFTI platforms and eFTI service providers. Each EU member state will be required to publicly publish a list of conformity assessment bodies, eFTI-certified platforms and eFTI-certified service providers. Accordingly, the cargo

⁵ <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32020R1056>

transportation operator will be obliged to provide electronic information by the competent state authority exclusively through eFTI-certified platforms and eFTI-certified service providers. In turn, if this condition is met, state bodies will be obliged to accept this information and not require additional documents in paper format.

Special attention should be paid to the requirement established by Article 8 of the Regulation for the European Commission to adopt additional acts ensuring the implementation of Regulations, which, among others, will have to establish common technical characteristics and specifications for eFTI platforms in order to ensure their compatibility. By August 21, 2024, eFTI will become a mandatory instrument on the territory of the EU.

AEOLIX

In 2016-2019, AEOLIX pilot project was implemented with the financial support of the EU (EU Research and Innovation Programme - Horizon 2020). The objective of this project was to develop a platform for connecting logistics information systems with different characteristics, both within one company and between companies, for the immediate exchange of information in real time for making decisions related to logistics. To implement the project, a consortium was created with the participation of large logistics and IT companies, transport infrastructure facilities, representatives of commercial associations and academic circles. In particular, the consortium members were T-Systems, ATOS, the International Road Transport Union, the port of Hamburg and the Thessaloniki Chamber of Commerce.

AEOLIX is a developed architecture of a distributed open system for the exchange of information between key participants in logistics operations, which allows for more widespread use and influence of such information in the value chain. In addition, the AEOLIX platform hosted the services of a set of tools (toolkit) that allow users to receive and share information or use their operational logistics data in various ways regarding, for example, CO₂ monitoring, electronic consignment notes (eCMR), estimated time of arrival of goods, necessary information about dangerous goods, etc. 12 "live logistics laboratories" were selected for the project, each with a particular specifics of transport operations - for example, the intermodal operations management laboratory was located in the port of Hamburg, a laboratory for optimizing the customs procedures management in Trieste, the "smart port" project in the port of Bordeaux, etc.

As a result of the project, a platform was developed that allows a limited number of users with a certain degree of technical equipment to exchange information through a connectivity engine developed within the framework of the project, which provides syntactic compatibility of incoming information.

EU4DIGITAL

Harmonizing digital markets is one of the key outcomes of the EU policy to deliver tangible results to citizens in the Eastern Partnership. The EU support in this area is provided through the EU4Digital Initiative, which brings together priority actions and programs on the ground.

The EU4Digital initiative was formally launched by the European Commission at the 2016 Eastern Partnership Ministerial Meeting on the Digital Community, during which six regional EU4Digital networks were created to work on priority themes.

EU4Digital aims to expand the European Union's Digital Single Market to the EU's Eastern Partner Countries, develop the potential of the digital economy and society to ensure economic growth, create more jobs, improve people's lives and help businesses. Through this initiative, the EU is supporting the reduction of roaming tariffs, the development of high-speed broadband to stimulate the economy and expand e-services, coordinated cybersecurity and harmonization of digital structures in society, in areas ranging from logistics to healthcare, skills development and job creation in the digital industry.

The centerpiece of the EU4Digital initiative is the three-year EU-funded program “EU4Digital: Supporting the Digital Economy and Society in the Eastern Partnership” (2019-2022), or the EU4Digital Program, which promotes key areas of the digital economy and society in line with EU norms and practices and transfers EU support within the digital agenda in the region. The program provides support in six key policy areas: telecommunications regulations, trust and safety, e-commerce, ICT innovation, e-health, and e-skills.

The first pilot project worth 947,000 euros (of which 0.8 million euros is EU funding) was carried out in 2017-2019. It was aimed at increasing the efficiency and effectiveness of the work of customs services operating at the border crossing point Novaya Guta - Novye Yarilovichi (border of Belarus and Ukraine). The project provided for the operation of an automated intelligent video surveillance system

complete with equipment, IT equipment and software. The objectives of the project were to help the beneficiary countries increase the level of legal trade, tourism and, as a result, tax revenues, as well as increase the level of security at the Belarusian-Ukrainian border.

The second project, worth 5.65 million euros, was fully funded by the EU and implemented in the Republic of Armenia in 2017-2020. The project aimed to develop e-government by increasing the efficiency of public services and creating a common interaction platform to provide a One Stop Shop for all public services. In addition to the “single window” approach, the project was also focused on providing simplified and standardized secure communication between all organizations of the Armenian state administration. IT companies from Romania (World Professional Services S.R.L.), Belarus (Novacom) and Armenia (IUNetworks LLC and Softline International) were involved in the project.

The third project was carried out in 2017-2019. in the Republic of Moldova and cost 1 million euros. The project was aimed at the implementation of the concept of a "single window" in relation to goods imported into Moldova, exported from it and transported in transit through Moldova, as well as the legal and technical preparation of Moldova to accede to the "Convention on Common Transit" and "Convention on Simplification of Formalities in Trade in Goods” (including a new computerized transit system).

EAEU

Such direction of development of economic processes as digitalization is also actively considered and promoted in the EAEU, within which the Working Group on the EAEU Digital Space operates.

On December 26, 2016, the heads of the EAEU member states (Armenia, Belarus, Kazakhstan, Kyrgyzstan, Russia) signed a "Statement on the Digital Agenda", which, in particular, declared the desire to contribute to the development of a regulatory framework to promote the digital economy, public private partnerships in this area, stimulation and support of digital initiatives and projects, and more. In order to develop this direction, the Supreme Eurasian Economic Council on October 11, 2017 adopted a program document - "Decision on the main directions for the implementation of the Digital Agenda of the Eurasian Economic Union until 2025".

This document identifies four main directions for the development of the digital economy:

- 1) Digital transformation of economic sectors (including transport) and cross-industry transformation (digitization of physical assets, development of the data industry, etc.);
- 2) Digital transformation of markets for goods, services, capital and labor (cross-border e-commerce, distance recruitment and employment, etc.);
- 3) Digital transformation of management processes and integration processes;
- 4) Development of digital infrastructure and ensuring the security of digital processes (interoperability; latest generation networks, etc.).

The mechanism for implementing the goals and objectives of the EAEU digital platform involves the organization of expert platforms by the Eurasian Economic Commission, on the basis of which the selection and development of initiatives in which at least 2 EAEU member states are interested. Funding for the implementation of the selected initiatives can be very different, including from the funds of the Eurasian Development Bank.

One such digital initiative is the “EAEU Digital Transport Corridors” initiative. The initiative provides for a range of services and digital infrastructure. The complete system is planned to be formed by 2025. On January 31, 2020, the Eurasian Intergovernmental Council approved an Action Plan for the formation of an ecosystem of digital transport corridors of the Eurasian Economic Union. On November 11, 2020, the same body adopted an order "*On the list of services and digital infrastructure implemented in order to form an ecosystem of digital transport corridors of the Eurasian Economic Union.*" Among the services listed in this document, one can single out a digital map and a database of highways and infrastructure facilities of international transport corridors passing through the territories of the EAEU member states; booking service for roadside infrastructure facilities and queues at the motor vehicle checkpoint; service for remote medical examination of vehicle drivers, including prevention and prevention of coronavirus infection COVID-19; service for the application of an electronic international waybill for rail and road transport; service for the use of an electronic waybill and an electronic protocol of weight and size control, etc. The introduction of these services is envisaged in 2021-2022.

WORLD CUSTOMS ORGANIZATION (WCO)

In 2018, the WCO issued The World Customs Organization's IT Guide for Executives. This document contains information on the strategic management process related to the use of information and communication technologies (ICT) in customs. The general idea of the Guide is to help Customs administrations, in particular at the senior management level, deal with IT issues in a comprehensive manner. The guide is divided into four chapters on “Strategic Planning and ICT”, “Strategic Aspects of ICT”, “ICT Project Management”, and “Management of ICT”.

The Guide outlines a vision for digital customs, encompassing the Digital Customs Maturity Model and the role of digital customs in supporting the implementation of the World Trade Organization (WTO) Trade Facilitation Agreement (TFA). The digital customs maturity model assumes that not all countries have the same level of ICT development, resources and national priorities. Accordingly, the proposed model provides for a phased approach to the use of ICT. Also, Chapter 2 of this Guide contains a list of tools developed by the WCO that support the development of digital customs and emphasizes the need to comply with international standards developed by the WCO as well. Standards are divided into technical and non-technical. Non-technical standards include the requirement to comply with the provisions of the International Convention on the Simplification and Harmonization of Customs Procedures (Kyoto Convention) in the 2006 edition, as well as the WCO security framework.

With regard to technical standards, the document emphasizes the need to ensure interoperability between all participants in the customs process and, accordingly, suggests using the WCO data model as a unified approach. This approach will ensure the use of a common programming language for collecting, exchanging and processing data and, accordingly, semantic compatibility.

The WCO Data Model is a set of carefully aggregated data requirements that are complementary and are regularly updated to meet the procedural and legal needs of cross-border regulatory bodies such as customs that control exports, imports and transit operations. The model complies with other international standards such as the United Nations Trade Data Elements Directory (UNTDDED).

The WCO data model includes not only datasets for various customs procedures, but also information required by other government agencies regulating international trade. The WCO Data Model supports the implementation of a Single Window as it allows information to be communicated to all government agencies in a unique way of organizing regulatory information. This tool is already 10 years old and is increasingly being used by WCO members.

The WCO Information Management Subcommittee (IMSC) is responsible for maintaining the WCO Data Model to keep it up to date in response to changing or new requirements in the customs and trade environment.

The users of the WCO Data Model are cross-border regulatory bodies, including the customs administrations of the WCO member countries, industry and trade representatives, international organizations involved in trade facilitation and data standards. Broader implementation of the WCO Data Model will benefit trade by reducing documentation costs and time spent on regulatory compliance.

The WCO Data Model contains the following information:

- Information exchange context: Business process models
- Content of information exchange: Data sets and code lists
- Structures of information exchange: Information models
- Technical solutions for information exchange: UN / EDIFACT and XML message design.

The WCO Data Model is managed by the Data Model Project Team (DMPT), which is open to all interested parties who can contact open source for more information. The DMPT, which reports to the IMSC, has established transparent procedures and a method by which changes, deletions and / or additions to the WCO Data Model are requested.

Another integrating digital mechanism of the WCO is the Cargo Targeting System (WCO CTS). It is a risk assessment and cargo manifest targeting solution developed directly by the WCO for customs administrations around the world. The CTS WCO has already been successfully implemented by many customs administrations in countries that vary greatly in size, level of economic development and volume of cargo. CTS WCO is committed to delivering software to users. The CTS software was developed and owned by the WCO and is available to WCO Members free of charge.

GUAM

Work on simplifying customs procedures using the latest technologies is also being carried out within the framework of such an organization as GUAM. In 2019, in order to promote such areas of cooperation as the economy, trade and transport between the member countries of this organization (Georgia, Ukraine, Azerbaijan and Moldova), a Protocol of Intent was signed between customs administrations on the use of blockchain technologies when verifying certificates of origin of goods moved across the state borders of the GUAM member states. This document declares that the parties can consider the implementation of software based on blockchain

technologies in order to create an operational, safe and transparent system for verifying certificates of origin of goods transported across the state borders of the GUAM member states.

To promote this project, the parties agreed to create an appropriate working group, which will meet at least twice a year. At the moment, four meetings of this working group have already been held. The working group is actively working to promote a pilot project for verification of certificates of origin, including the introduction of regulatory documents for the use of blockchain technologies.

As a whole, GUAM also plans to implement the GUAM-NET digital transport platform, which will combine electronic waybills for rail, water and road transport, as well as unite participants in multimodal containerized cargo transportation into one platform.

INTERNATIONAL FEDERATION OF FORWARDING ASSOCIATION (eFBL)
Since early 2021, the International Federation of Freight Forwarders Association (FIATA) has launched the proof of concept of electronic FIATA Bill of Lading (eFBL). This concept implies two components: 1) the ability to generate FIATA documents, primarily the FIATA bill of lading, in electronic form and 2) the creation of an electronic profile for all FIATA members.

The main issue in this case is still the semantic compatibility of technical parameters and characteristics of devices of potential eFBL users. FIATA uses a standard based on UN / CEFAC semantics that is publicly available. Subject to semantic compatibility, FIATA members will be able to generate electronic documents on their electronic profile in the unified FIATA system undergoing verification.

In case of passing the verification, FIATA generates a unique QR-code, which is affixed to the document and certifies the data contained in the document. These documents can be sent to the counterparty or uploaded to the FIATA system. Reading the QR code will allow the counterparty to verify the authenticity of the document.

The proof of concept is scheduled for the first half of 2021. In case of successful implementation of the project, FIATA expects to proceed with the full implementation of this instrument.

ORGANIZATION OF BLACK SEA ECONOMIC COOPERATION (BSEC)

Currently, within the framework of the BSEC, work is being carried out on digitalizing the BSEC permits used in the implementation of international cargo

transportation by road⁶. To promote the idea of digitalizing the BSEC permit system, upon the proposal of the Ministry of Transport and Infrastructure of Turkey, e-PERMIT pilot project was launched with the participation of Moldova and Ukraine with the participation of the customs authorities of the countries. As a result of the pilot project, a plan for the implementation of electronic permits will be adopted.

Alongside, work is being carried out within the BSEC on the issuance of visas in electronic form within the framework of specialized working groups. Taking into account the experience of some countries in issuing electronic visas to drivers of cargo vehicles, it is also important to pay attention to this issue.

CIM/SMGS ELECTRONIC CONSIGNMENT NOTE

Annex B (CIM) to the 1980 Convention on International Carriage by Rail (COTIF Convention) in Article 6 specifies that *“the consignment note, including its duplicate, may also be drawn up in the form of an electronic record of data that can be converted into legible written characters. The methods used to register and process the data must be functionally equivalent, in particular with regard to the probative value of the consignment note represented by this data”*.

Article 13 of the Agreement on International Goods Transport by Rail (SMGS) allows the carriage of goods using the CIM / SMGS consignment note and refers to Appendix 6 to the SMGS, which contains a sample CIM / SMGS consignment note and rules for its filling and application. Article 15 of the SMGS directly states that *“the consignment note can be drawn up in the form of an electronic consignment note. An electronic consignment note functions as a paper waybill and is a set of data in electronic form, identical to the data set on a paper waybill”*.

Accordingly, the contract of carriage by rail can be drawn up with an electronic consignment note. If necessary, the electronic consignment note and its additional sheets can be printed on paper. If, in accordance with the SMGS regulations, changes are made to the electronic consignment note, the original data will be retained.

In the absence of regulation regarding uniform standards of semantic interoperability, carriers and customers (senders / recipients) on a contractual basis determine the messages to be exchanged, as well as the type and method of data exchange of the electronic consignment note. Today, this work is being carried out within the framework of the unification of legislation in the field of railway

⁶ http://www.bsec-urta.org/ru/news/395/on_the_road_to_digitalization_of_bsec_permit.html

transportation in the Eurasian space, and the number of countries using the CIM/SMGS consignment note is growing.

Since May 2017, the People's Republic of China has also started using the CIM/SMGS consignment note. At the same time, in practice, 85% of transportations using this consignment note are carried out when transporting goods in containers. Today, this consignment note is available for the member countries of the International Committee for Railway Transport and the Organization for Cooperation between Railways in English, Russian, French, German and Chinese languages. At the same time, work is underway on the pilot application of the electronic CIM / SMGS consignment note by DB Cargo and Russian Railways.

INTERNATIONAL STANDARD FOR ELECTRONIC DOCUMENT FLOW "e-Freight"

The E-Freight project of the International Air Transport Association (hereinafter - IATA) was launched in 2006 as part of the business simplification program. Today, it has become an industry-wide product that is used by carriers, forwarders, air cargo ground handling operators, shippers and recipients, customs authorities and other government agencies.

E-Freight paperless technology includes:

- registration of cargo transportation without issuing a paper consignment note (e-AWB);
- creation and movement of commercial, transport and customs documents - in the form of electronic messages (E-Freight);
- conclusion of bilateral and multilateral agreements in electronic form using an electronic digital signature (EDI-Agreement, Multilateral Agreement).

IATA emphasizes that this business process is not strictly aviation and involves all participants in the transportation. This approach is based on 3 key points:

- involvement of the legislative and executive bodies of states to create an "E-Freight route network" with fully electronic customs procedures and legislative support for paperless transportation support;
- joint work within the cargo supply chain of all interested parties in order to digitize the main transport documents;
- Development of a plan for the digitalization of commercial documentation for goods and documentation for special categories of goods, which today usually accompany cargo transportation.

The advantages that technology, according to the official position of IATA, are very diverse.

First of all, this is saving paper, spending on which on a scale industries are reaching astronomical amounts.

Secondly, it is the acceleration of cargo handling processes due to cancellation of multiple entries of the same data into the systems of participants transportation. Thirdly, a single data entry improves the quality of the transmitted information. Fourth, this is to improve the quality of the tracking service cargo.

BOLERO ELECTRONIC BILL OF LADING (BOLERO eBL)

This platform was developed by the private British company Bolero International. BOLERO - Bill of Lading Electronic Registry Organization - is positioned by developers as a tool that combines legal and technical solutions. In particular, the system includes a bolero rulebook, a bolero title registry, and a bolero messaging platform.

At the legal level, the problem of recognizing the BOLERO electronic bill of lading is solved by voluntarily joining all parties wishing to use the BOLERO system to the set of rules, which, in fact, is a common user agreement and an important component of which is the recognition of an electronic bill of lading as equivalent to an ordinary paper bill of lading.

The BOLERO title registry is an electronic program associated with the BOLERO messaging platform to ensure that the use of the BOLERO electronic bill of lading is carried out in accordance with a set of rules. The title registry contains an entry about the current holder of the electronic bill of lading, which can only be changed by himself. The system ensures that the characteristics of an electronic bill of lading correspond to the characteristics of a paper one, namely: at any given time, only one person can be the holder of an electronic bill of lading; at every moment of time the electronic bill of lading has a holder; the register records who is the holder at the moment. From a legal point of view, an entry in the register is tantamount to the physical possession of a paper bill of lading. Clients of the system exchange messages through a messaging platform using an electronic signature.

Since the system works only between voluntarily joined participants, if it is necessary to transfer the bill of lading to a person who is not a BOLERO member, the electronic bill of lading is replaced by the issuing carrier with a regular paper one. It should be added that this system was approved by the International Group of Mutual Insurance Clubs (IGP&I), and the platform's security system has the international information security standard ISO 27001: 2013.

INFORMATION SYSTEMS / PLATFORMS

LOGINK

National Public Information Platform for Transport & Logistics (LOGINK) is the National public information platform for transport and logistics implemented in the People's Republic of China (PRC)⁷. Its creation was started in 2007 to ensure openness and organize the exchange of logistics data by the Ministry of Transport of the PRC. For 7 years, the PRC has created a national logistics platform LOGINK, designed for users - Chinese enterprises in the field of production, transportation and logistics.

As part of the implementation of LOGINK, on the basis of uniform standards of information interaction, a national system of interaction of logistics systems was created, which allows integrating not only information flows of all railway stations, airports and ports of the PRC, but also the seaports of Japan and Korea. LOGINK unites more than 50 logistics systems on a common information platform, due to that, the implementation time of logistics software in new companies has been reduced from 8 months to 1 week. The system processes about 30 million messages per day and has an impact on small and medium-sized businesses in China.

NACCS

Nippon Automated Cargo and Port Consolidated System (NACCS) is a system used in Japan to speed up the process of cargo clearance when crossing customs points, as well as to eliminate the human factor from this process. Thanks to the electronic form of documents, it is impossible to make a mistake in them, which significantly increases the quality of documentation and reduces the number of returns. The NACCS center transmits the information received to the regulatory authorities, which check it and give confirmation of the passage through the customs point. On the basis of electronic data, confirmations of phytosanitary control services and other departments are received.

NACCS participants are banks that automatically transmit information about customs and excise payments to customs authorities. One of the main advantages of the system implementation is the ability to process all documents on the principle of one window, using computer data processing.

In 80% of cases, the procedure for checking documents was reduced to a few minutes, after which the customs authorities give permission to send or receive cargo. Only 20% of cargoes are checked longer. Cargoes subject to a more thorough check or examination take up about 1-2% of the total volume of cargo shipped, while

⁷ <https://www.kwglobetrade.com/post/logink-china-joins-international-port-community-systems-association>

the customs authorities identify them in advance on the basis of the received electronic documentation.

eDOXONLINE

eDoxOnline is a BOLERO-like platform developed by the Argentinean company GlobalShare that also allows you to automatically generate and manage an electronic bill of lading. This platform uses blockchain technology. The platform checks the activities of everyone who wants to join the system by analyzing business activities, accompanying documents, portfolios, etc. and only after that registration in the system takes place.

The web platform is accessible to all participants through a single page, but the system only displays the information that each participant needs.

The initial data for the electronic bill of lading is created and entered from the destination point and then is sent to the exporter's country of origin, where the exporter coordinates with various participants in the supply chain process, such as shipping agents and shipowners, who log into the system directly to add relevant information from using two-factor authentication.

The final version of an electronic bill of lading can be saved in PDF format, printed and signed. The eDoxOnline website also has a document verification page, where you can view the document if you enter the system-generated verification code and confirm the authenticity of the document by uploading it to the website. This system has also been approved by the International Group of Mutual Insurance Clubs (IGP & I), and the platform's security system has the international information security standard ISO 27001: 2013.

CARGOX

CargoX Ltd is a global company specializing in document transfer solutions using blockchain transactions and ownership verification platform. The platform developed by this company is also similar to the previously considered solutions and allows the transfer of the bill of lading (Smart B / L) in electronic form. Smart B / L is an electronic bill of lading sent through the CargoX platform using blockchain technology (BDT).

Smart B / L can be downloaded as PDF (or any other type of document). It can also be created as a structured data document and then sent or uploaded to the platform. In addition to the bill of lading, other transport or financial documents (invoice, letter of credit, export declarations, etc.) can be uploaded to the platform. The documents are created or uploaded to the platform, signed electronically, and then the ownership

of them is transferred in a secure manner, directly to the intended recipient. Documents can be added, removed, returned or destroyed. There is also a messaging function and the ability to verify the authenticity of a document.

CARGOWISE

Another IT company engaged in the development of supply chain management systems is the American company Cargowise. A distinctive feature of the product developed by this company is its versatility - it includes electronic support for all operations related to freight forwarding (calculation of the possibility of booking optimal routes, the ability to exchange messages with transport infrastructure services); electronic support of customs operations (generation and transmission of import and export declarations using a simple direct data exchange with national customs and government authorities); an electronic warehouse and postal management system, as well as a company management system (accounting, HR management system, etc.).

ACANEA

Akanea TMS Freight Forwarding is an automated transport management system (TMS) for freight forwarding developed by the French IT company AKANEA Développement. This system has a standard set of options and tools for TMS and can work in three modes of transport - road, air and sea transport. The system selects the most effective transportation schemes, allows you to monitor the cargo delivery process 24/7, automates the dispatcher's work and controls the movement of cargo using a GIS service. The platform offers services such as automatic port and airport notification; automated document processing systems (air waybill, bill of lading, cargo manifest) and the ability to print them; printout of IATA markings for air transportation; a system of calculations required for the transportation of goods; management of the schedule of port operations and flights and more. A distinctive positive feature of this system is the use of its own cloud storage. All work takes place in the cloud, this saves financial resources and time for integrating the system with workflows.

A review of international experience demonstrates that the experience of countries that have successfully implemented national digital solutions shows that digitalization has significantly increased the efficiency of transportation. At the same time, a number of digital solutions have also been implemented, which are successfully used in transport when carrying out not only transportation at the national, but also at the international level. It is important to note that the introduction of digital solutions only at the national level will not give an appropriate output if the border states do not implement or apply similar solutions.

Therefore, despite the fact that the TRACECA countries actively participate in the activities of international organizations, coordination of actions in the field of digitalization plays an important role in ensuring the harmonious construction of digital corridor. Along with it, the creation of a regional legal basis for working with electronic data plays a crucial role.

3 DIGITALIZATION OF THE TRACECA CORRIDOR

PREREQUISITES FOR DIGITALIZATION

The level of digitalization is directly related to the percentage of the population of countries that use the Internet. According to the UN International Telecommunication Union, at the end of 2019, about 49% of the world's population remains without Internet access⁸ and the number of people connected to the Internet increased by 2% compared to 2018 (3.7 billion people). In a number of countries

⁸ <https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>

this figure exceeds 90% (*UAE 98%, Qatar 99%, Norway 96%, South Korea 96%, Kuwait 99%, Iceland 99%, Denmark 97%*).

The average percentage of Internet users in the TRACECA member countries is 73.8%. The highest level of users is noted in Kazakhstan (81.8%), Azerbaijan (81.1%), Turkey (73.9%) and Romania (73,6%)⁹. In general, this indicator varies from 67.9% to 81.8%.

In the ICT Development Index¹⁰ - international rating of the development of information and communication technologies, the TRACECA countries took places between 50 and 109 positions: Bulgaria – 50, Kazakhstan-52, Romania-58, Moldova-59, Azerbaijan-65, Turkey-67, Georgia-74, Armenia -75, Ukraine -79, Iran-81, Uzbekistan-95, Kyrgyzstan-109. At the same time, Turkey and Uzbekistan distinguished themselves by the greatest improvement in positions (Turkey by 5 positions, Uzbekistan by 8 positions). As a whole, according to the index, the corridor countries are "catching up" in the issue of digitalization.

Taking into account the different level of Internet penetration in the TRACECA countries, it is important to work in a coordinated manner on the digitalization of the corridor, since late adoption of measures at the international level may negatively affect and increase the “gap” between the countries.

Recent studies also show that about 5% of drivers' time is related to administrative matters. Thus, digitalization will save this time and increase labour productivity.¹¹ Thus, in most countries, permits for cargo transportation by road for bilateral or transit traffic, as well as entry and exit to/from third countries are issued on paper. In a number of countries, measures have been taken to issue them by submitting electronic declarations, but electronic permit documents are not applied.

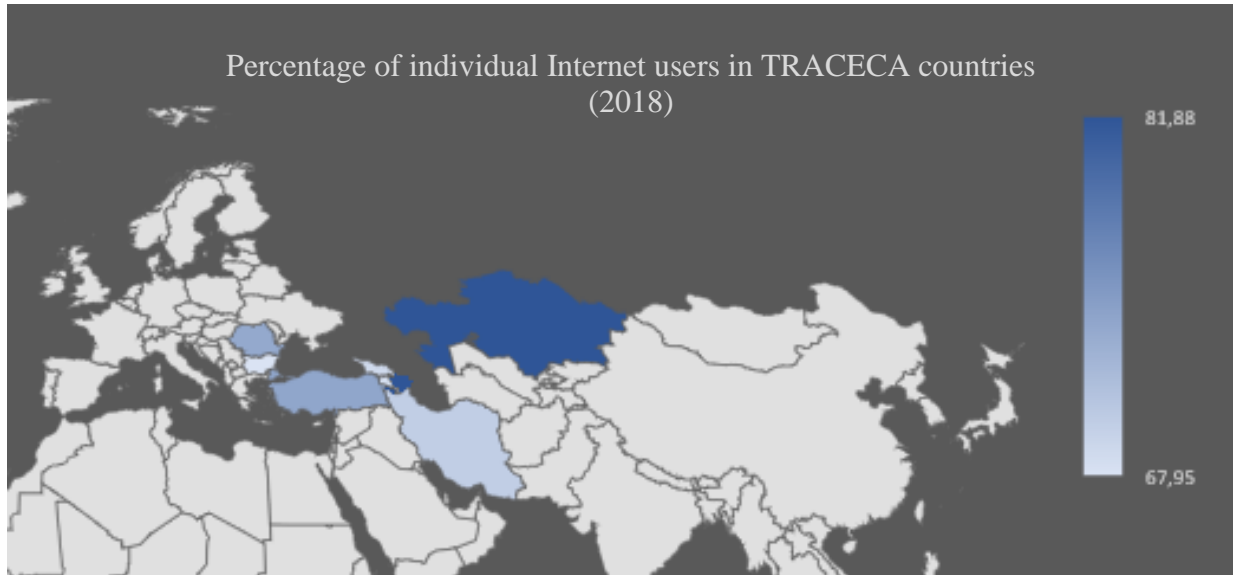
The current situation in 2020 also showed how digitalization affects the simplification of transportation procedures, as well as the safety of participants in the transportation process. Maintenance of business activity in the context of the pandemic was achieved through the use of technologies that have become more rapidly introduced over the past year. The developed countries of the world, within the framework of the meetings of the UN specialized working groups, have repeatedly declared their readiness for a full transition to the electronic format of

⁹ For Kyrgyzstan, Moldova and Tajikistan, there are no data for 2018 and 2019, data on Iran, Ukraine and Uzbekistan are also missing for 2019.

¹⁰ https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2017/MISR2017_Volume1.pdf

¹¹ <https://www.sciencedirect.com/science/article/abs/pii/S0166361514001286?via%3Dihub>

border crossing. Thus, the measures taken at the national level directly affect the digitalization of the transport industry. In this context, international coordination in this direction acts as a catalyst for the efforts undertaken by countries.



Data on Internet users in the TRACECA countries

GOALS, OBJECTIVES

The main goal of the digitalization of the TRACECA corridor is to assist in achieving the goals of the Basic Multilateral Agreement on International Transport for Development of the Europe-Caucasus-Asia Corridor specified in Article 3, namely the development of economic relations, trade and transport links in the regions of Europe, the Black Sea, the Caucasus, the Caspian sea and Asia, facilitating access to the international market for road, air and rail transport, as well as commercial maritime navigation, facilitating international transport of goods, ensuring traffic safety, security of goods and environmental protection, harmonizing transport policies and legal frameworks in the field of transport and creating equal conditions of competition between different modes of transport.

In order to do this, it is necessary to provide the transport industry of the TRACECA member countries with modern digital technologies. This will enhance the competitiveness of the corridor internationally. Therefore, in order to achieve the implementation of the main goal within the framework of this Concept, the following tasks have been formed:

- harmonization of law in order to regulate new relations arising in connection with digitalization;

- accession of the TRACECA countries to international legal instruments and their effective implementation in order to implement digital solutions such as eTIR and eCMR and other instruments to facilitate cross-border transport;
- forming of a unified information system for the integration of participants in the transportation process;
- promoting the information exchange between participants in the market of transport and logistics services;
- creation of conditions for sustainable development of the transport sector of the TRACECA member states;
- integration of TRACECA into global digitalization processes;
- digitalization of TRACECA initiatives and projects;
- increasing the involvement of participants of the transportation process in the digital TRACECA environment;
- development of a smart map indicating the TRACECA routes and related infrastructure facilities;
- assistance in reducing the share of the logical component in the cost of transported goods;
- creation of favourable conditions for increasing competitiveness in terms of delivery of goods;
- increasing the competence of specialists from authorized bodies and organizations of the TRACECA member states regarding the digitalization of transport and logistics activities and assistance in the digitalization of the transport industry;
- promoting the development of digital services at the TRACECA level for faster and more efficient cargo transportation;
- promoting the implementation of solutions to simplify and improve the efficiency of monitoring the transportation of goods, including the data exchange related to cargo transportation by road.

In this regard, in parallel with active participation in the implementation of international initiatives, it is also important for the TRACECA member states to focus on the implementation of digitalization of current projects. Thus, this Concept is not aimed at introducing digital solutions that are directly related to the management, control or monitoring of processes in the field of transport at the national level.

TRACECA INITIATIVES AND PROJECTS SUBJECT TO DIGITALIZATION

TRACECA PERMITS

In order to increase transit and attract additional cargo flows to the TRACECA corridor, the Permanent Secretariat has developed a draft Agreement on a **Single**

Transit Permit TRACECA. As a result of the Working Group meetings held, the text of the Agreement was agreed, which is planned to sign by interested countries.

The TRACECA Single Transit Permit initiative aims to increase the competitiveness of the corridor by digitizing the processes and procedures of obtaining permits, and will also help to reduce the time and cost of the transport process and streamline control procedures by reducing the number of permits. Thus, this Agreement creates conditions for increasing the attractiveness of the route and attracting additional freight traffic by road.

In accordance with paragraph 3 of Article 5 of the Agreement, in order to monitor the route, improve the efficiency of vehicle traffic management and ensure the safety of cargo transportation, road vehicles may be equipped (depending on the readiness of countries and carriers) with certified satellite navigation equipment (so-called “trackers”, on-board devices or GNSS On-Board-Units), which send data on the movement of vehicles to certain local information systems.

These devices are used to collect information about the movement of vehicles, as well as to provide various services related to the data analysis received from GNSS devices. Local information systems that collect data from on-board devices are operated by local operators (public or private). These systems collect data from on-board devices (coordinates, direction of transport, timestamps, etc.) in a data package –so-called reports on the movement of transport. It is assumed that data packages will be periodically transmitted to the TRACECA information system via a standard interface.

It is important to note that all TRACECA countries, without exception, have specialized companies (private or public) on their market that install and operate GNSS on-board devices. In most cases, these are local private enterprises that provide logistics services, cargo management services or transport monitoring. Every country, without exception, has information softwares that collect data from on-board devices and creates reports on the movement.

The above mentioned service, local software products and GNSS on-board devices have been available on the markets of the TRACECA countries for more than 15 years. The main goal is to use the already available local GNSS on-board devices and receive data packages (reports and declarations) from local software means.

If for some reason it is not possible to use GNSS and local information software, then it is assumed that a mobile application will be used. The mobile application will periodically send the following data:

1. Coordinates;
2. Time;
3. Driver's identification number;
4. Device ID.

The TRACECA information system can receive data from the application and process it, and the regulatory authorities of the TRACECA countries will be able to see the declared and actual route.

This option for equipment is provided for the development of an information system (web portal) and additional services for carriers, as well as for the formation of statistics and recording the use of electronic permits.

Thus, the implementation of the Agreement allows the use of information from various navigation devices (periodic transmission of vehicle movement reports via a standard machine-2-machine interface from a local solution that collects data from GNSS devices to the TRACECA information system), in coordination with the operator of navigation equipment or via a mobile application.

In this case, an increase in the monthly maintenance service and the envisaged subscription fee within the framework of the functioning of the telematics module is not provided. Thus, the implementation of paragraph 3 of Article 5 of the Agreement does not imply additional costs for carriers that have already installed satellite navigation equipment.

It should be noted that the implementation of the provisions of the Agreement in relation to installation of navigation equipment is recommended for implementation by interested TRACECA member states as a second stage in the development of the information system. For a more effective result of digitalization, it is recommended in 2025 to ensure the transition to the use of single transit permits using navigation equipment and mobile application.

Taking into account the proposals and comments of the TRACECA countries and the results of the meetings of the Working Group, a draft decision of the TRACECA Intergovernmental Commission on digitalization of the current **TRACECA Multilateral Permits System** was prepared, within the framework of which the TRACECA multilateral permits have been applying in the territories of 6 countries on paper since 2016.

This type of multilateral permit allows carriers to use one permit for transit and bilateral transport, as well as for entry and exit to / from third countries. In order to reduce the costs of implementing the information system, it is recommended to digitize the Multilateral Permits System in parallel with the implementation of a single TRACECA transit permit.

INTELLIGENT ROUTE MAP

An intelligent (interactive) map is designed to provide its users with a communication tool that will establish information support about transport links between the TRACECA member states, being an electronic map indicating checkpoints, roads and roadside service facilities, seaports, railway stations. The implementation of the intelligent map will stimulate an increase in traffic by providing the most relevant information online, depending on the user's request.

Based on the experience of already implemented projects, the interactive map in most cases contains the following modules:

1. "Checkpoints" - provides opportunities for displaying checkpoints, including:
 - two-sided and mansided checkpoints;
 - railway, road and sea checkpoints;
 - operating hours of checkpoints;
 - the exact location of checkpoints;
 - a list of necessary documents for crossing the border at each checkpoint.
2. "Road Routes" - displays information about the roads that connect the checkpoints and also form the main international highways within the TRACECA corridor routes (indicating road lanes).
3. "Railway routes with indication of stations" - the railway network is indicated and displayed depending on the user's request, that is, from checkpoint to checkpoint or along a given route along the most optimal route with a choice of proposed alternatives within the TRACECA corridor routes.
4. "Service facilities" - indicating fuel stations, roadside service facilities, hotels, food outlets, shops, etc. It is recommended to envisage this module during the implementation of the second stage upon completion of all works on the formation of the main routes of the TRACECA corridor.

5. "Declaring route" - in certain cases, the operator (carrier) of vehicle will have to declare the planned route of transportation by filling in certain fields on the graphical interface. The intellectual map will show the declared and actual routes of the vehicle, as well as provide visual verification of the route.

As a whole, an interactive map will allow a user to filter data by certain parameters, create an auto-calculation of route selection factors (time, mandatory payments, the number of required documents, etc.), auto-comparison of several routes by parameters (travel time, infrastructure, etc.), the possibility of calculating the attractiveness index of the route, as well as suggesting the route to a new user by popularity. This map will serve not only as an information resource, but also it will become the basis for calculations in the implementation of digitalization of TRACECA permits.

This will enable the digitalization of the TRACECA Guide for Border Crossing adopted at the Thirteenth Annual Meeting of the TRACECA Intergovernmental Commission (IGC).

INFORMATION SUPPORT

In order to create favorable conditions for carriers, it is advisable to provide for the creation of a carrier / driver's personal account in the TRACECA information system with a mobile application, which will provide information on the conditions and parameters of international road transport in the territories of the TRACECA member states, including in the interactive map, but not limited to it.

At the same time, at the initial stage, information support should be implemented related to border crossing procedures and allowing:

1. Facilitate obtaining information on border crossing requirements;
2. Centralize data updating to obtain reliable data;
3. Solve the problem of a large amount of fragmentary and redundant information.

To do this, it is advisable to provide for publishing such information, which will reflect the entire list of necessary documents for transportation along the route chosen by the carrier. The main difference of this digital service should be that all information contained on the TRACECA website regarding the requirements and conditions of transportation will be displayed upon request and its necessity for international transportation of goods. For example, the TRACECA website has a section containing information on the procedures for issuing special permits for heavy and oversized cargo transportation. This information should be reflected in

the driver's handbook when he enters the parameters for the carriage of the corresponding cargo, recognized as indivisible large-sized or heavy.

After the implementation of this functionality, it is also recommended to provide additional services with information about service objects.

OTHER ISSUES

In the framework of the 11th International Seminar on Trade and Transport Facilitation “Digital Transformation of Multimodal Transport Using the UN / CEFACT Reference Data Model”, the Permanent Secretariat noted the ongoing work on digitalization of the corridor. In addition, within the framework of this event, it was noted that the Permanent Secretariat expresses interest in piloting the standards being developed in view of the multimodality of the corridor and the prospects for implementing projects to introduce electronic transport documents. It is important to point out that these standards are applicable to all modes of transport.

The International Maritime Organization is also working on the harmonization of transmitted data in the process of maritime traffic, which also require the active participation of the TRACECA member states with seaports and inland waterways.

The Permanent Secretariat, together with the International Center for Transport Diplomacy and the Intergovernmental Council of Road Administrators, is also working on a draft Global Transit Document (GTrD™). GTrD™ is a unified document issued for cargo in a fully digital form using the blockchain platform for the whole path of international transport performed in containers by different modes of transport (road, rail, sea, inland water).

After a long search and evaluation process, the Tradelens digital platform developed by IBM was chosen for the project implementation, since the TradeLens data model and access control scheme comply with the WCO Security Framework Standards, standards for ensuring security and facilitating global trade, as well as UN/ CEFACT standards and programmes of authorized economic operators.

Thus, the basis of GTrD™ is a digital platform based on blockchain technology, due to which the document exists exclusively in paperless form and means the use, storage, transmission of data about the cargo, its owner, cargo customs value, vehicle, consignee and any other data in electronic form. This project has a great potential for application along the TRACECA corridor routes as a single multimodal document.

Considering the importance of digitalization of TRACECA, it should be noted that today there is no electronic document flow system in the Permanent Secretariat, and

communication is carried out via e-mail. At the same time, the absence of an electronic database of documents complicates not only the work of the Permanent Secretariat, but also the national representative offices located in 13 TRACECA member states.

In order to increase efficiency and productivity, it is advisable to make the transition to electronic document management with the subsequent maintenance of an electronic archive. The archive also requires the digitization of the existing documentation to provide access to the users of the workflow.

Electronic document management systems should ensure the movement of documents from the moment they are created or received until the completion of execution or dispatch, as well as the preparation, execution, approval, control of the execution of documents.

As a result of the introduction of electronic document management, it is expected:

- automation of business processes;
- creation of a single information space;
- increasing the speed of movement of documents;
- increasing the efficiency of work and interaction of employees;
- acceleration of the process of making managerial decisions;
- increasing labour discipline;
- ensuring secure access to information;
- analysis of work with documents, execution of orders;
- reduction of time for performing routine operations;
- reduction of the budget for storage of documents and consumables;
- integration with accounting information systems;

Based on the technology of electronic document management, such applied solutions should be implemented as

- Classic office work;
- Contract management;
- Work with requests and applications;
- Management of meetings and sessions;
- HR processes;
- Document flow;
- Management of performance indicators.

4. TRACECA INFORMATION SYSTEM

In order to implement TRACECA initiatives and digitalize the corridor, it is important to ensure the creation of information system. Given the widespread use of information systems in the most developed regions, it is important to create favorable conditions for the integration of national information systems of the TRACECA countries in the future. This will make it possible to minimize the use of transport and other documents in paper form, thereby increasing the efficiency of international cargo transportation.

The experience of developed countries shows that once created at the national level, the system allows to increase its functionality depending on the development of new technologies. In this regard, the creation of the TRACECA countries' own information system plays a fundamental role in digitalization of the corridor as a whole.

This section provides information on the purpose of the system, its architecture, implementation stages and basic requirements that will be taken into account when creating it.

PURPOSE OF THE SYSTEM

The central information system platform is a centralized solution that performs the following functions:

- obtaining and processing various permits and certificates, aggregating important data into one package.

- management of processes related to permits to perform transportations:

- I. obtaining and processing permits generated by external systems of the TRACECA countries (providing access to data to related parties, process management) - if there is a national system for generating digital permit;

- II. generating permits through the TRACECA information system according to the quota, rules and procedures of TRACECA in case of absence of national systems in the TRACECA countries.

- support of the control and executive functions related to permits by collecting and providing access to information. Processing and displaying information required for enforcement actions for certain users;

- collection of permits, certificates and identification numbers issued and sent by the authorized bodies of the countries in one data package with a unique identification number;

- support of control and verification processes carried out by local control and law enforcement authorities (inspectors), providing other information (vehicle data, route of goods, etc.).

The tasks of the subject area, solved within the framework of the functionality of the system:

- 1) Process management

- i. receiving and processing permits issued by the TRACECA countries to national carriers.

- ii. generating permits,

- 2) Monitoring and control:

- i. the process of assigning (binding) a permit to a carrier.

- ii. the process of assigning (binding) vehicles to the carrier.

- iii. the process of attaching a driver to a carrier.

iv. process when the carrier marks the driver / drivers as the actual driver / drivers of vehicles (Labeling of vehicle drivers).

3) Declaration of the route of vehicles, verification of the declared and actual route;

4) Management of the generation process.

5) Monitoring of data exchange processes between TRACECA member states (data related to inspection and statistics).

6) Monitoring the process of assigning (binding) data.

7) Monitoring of driver binding processes (driver ID number, which is also binded).

8) User account management.

9) Preparation of analytical reports.

10) Support control and inspection processes.

11) formation and management of electronic waybills.

12) The functionality required for the collection and processing of data associated with external systems that:

- i. manage the monitoring infrastructure along the roads (cameras).
- ii. manage infrastructure for weighing vehicles in motion (Weigh-in-Motion sensors).
- iii. collect data from onboard GNSS devices (GNSS OBU).

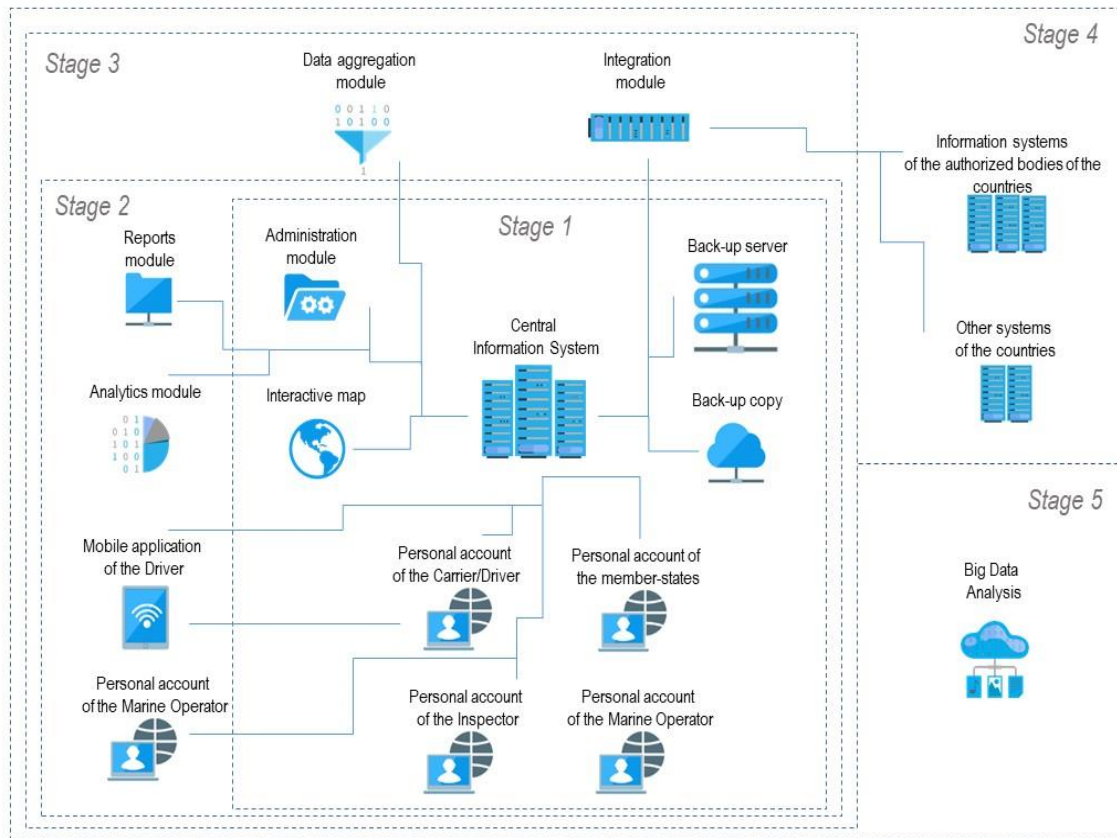
The tasks described in this section will be implemented step by step, depending on the success of each stage separately.

SYSTEM ARCHITECTURE AND IMPLEMENTATION STAGES

The architecture of the information system provides for its development in stages, depending on the implementation of its main elements and auxiliary ones.

The main elements of the information system are the Central Information System, a backup server and a backup copy, an intelligent map, an administration module, and personal accounts.

Other modules (analytics, reports, data processing, etc.) and applications (driver's mobile application) will be implemented in subsequent stages. At the same time, it should be noted that the 4th stage will be implemented with the TRACECA member states, which by the time of the project implementation will be ready to integrate with the existing national information systems.



Information system's architecture

In general, the architecture of the information system and its implementation are conventionally divided into 5 stages.

1st STAGE –Basic functionality

- 1) Implementation of the basic functionality for initiating the issuance of permits;
- 2) Implementation of the basic functionality for managing the processes of generating and recording permits in the central platform, according to the quota, rules and processes of TRACECA (for countries that do not have national information systems for generating permits);
- 3) Implementation of the basic functionality for monitoring and management:
 - o process of assigning (binding) a permit to the carrier;

- o process of assigning (binding) vehicles to the carrier;
- o process of assigning the driver to carrier (the driver's ID is assigned to the carrier);
- o process of determining the driver/drivers by the carrier as actual manager/managers of the vehicle before the start of transportation;
- 4) Implementation of functionality for user account management;
- 5) Implementation of electronic permits and development of basic electronic instruction/user manual;
- 6) "Personal account of the TRACECA country" module;
- 7) "Personal account of the Carrier" module;
- 8) "Administration" module;
- 9) "Personal account of the Inspector" module;
- 10) "Personal account of the Driver" module;
- 11) Development of an interactive/intelligent map;
- 12) Introduction of the basic functionality for monitoring the passage of vehicles across the border by marking the passage of the vehicle.

2nd STAGE – Extended functionality.

- 13) Improvement of the functionality described in paragraphs 1-11 of the 1st stage;
- 14) Receiving and processing permits issued by countries to carriers through national information systems (includes a protocol and a description of the interface).
- 15) Implementation of the functionality for declaring the route of vehicles, checking the declared and actual route ("TOPO" module - topographic functionality, functionality for declaring the route and an interactive map);
- 16) Launching a new website;
- 17) Introduction of electronic document management related to the processes of forming permits;
- 18) Implementation of the basic functionality for managing the processes of receiving permits generated by countries in national information systems, processing these permits in the central platform;
- 19) Automation of the current permit system;
- 20) Launch of an analytical platform for statistical data, analytical reports;
- 21) "Generation of reports" module;
- 22) Monitoring of data exchange processes between the TRACECA countries:
 - o Data related to the inspection;
 - o Statistics;
- 23) Implementation of support functions of control and inspection processes;
- 24) "Personal account of the Marine Operator" module;

- 25) Implementation of a mobile application for drivers;
- 26) Development of an interface for registering information about the PCR test/vaccination results and other data related to them.

3rd STAGE - Basic functionality for data aggregation.

- 27) Formation of consignment notes through the central platform, the transfer of data to the systems of customs authorities, including in cases of changing the mode of transport;
- 28) Implementation of functions for the collection and processing of cargo-related data;
- 29) Implementation of functions for the collection and processing of other documents related to the cargo;
- 30) Implementation of functions for data aggregation and generation based on the collected cargo-related data (Aggregated Data Creation module);
- 31) "Integration" module;
- 32) Improvement of the functionality of the "Generation of reports" module.

4th STAGE -Extended functionality for data aggregation.

- 33) Implementation of functions for the collection and processing of data related to:
 - o Infrastructure for monitoring along roads (cameras, etc.);
 - o Infrastructure for weighing vehicles in motion (Weigh-in-Motion sensors);
 - o Data from GNSS on-board devices (GNSS OBU);
- 34) Improvement of support functions of control and inspection process;
- 35) Improvement of the functionality of the "Integration" module;
- 36) Improvement of the functionality of the "Generation of reports" module.

5th STAGE - Big Data.

- 37) Big Data analysis;
- 38) Additional services for carriers, countries, drivers.

Given the completion of all basic works within the first three stages, the main difference of the fourth stage will be the possible integration of the information system with national information systems (for example, weighing systems or other systems used for controlling and monitoring road cargo transport) in coordination with the interested country.

The TRACECA countries are taking active measures to digitize transport at the national level. For example, the Baku International Sea Trade Port has developed its own individualized information system and initiated information exchange with stakeholders, including the Azerbaijan Customs Committee, Azerbaijan Railways,

Aktau port, Turkmenbashi port. At the same time, when performing integration with ports, it was noted that a prerequisite for digitizing a corridor is the availability (in the presence of an installation and maintenance mode) of the digital systems of the main stakeholders.

At the same time, G2G transactions (such as customs clearance of goods, registration of the vessel by the relevant regulatory authorities of the country, etc.) will be further elaborated in the implementation of the information system.

BASIC REQUIREMENTS FOR THE INFORMATION SYSTEM

It is assumed that the information system will meet the following requirements.

- 1) Information security - hardware, software and technical means must ensure confidentiality, integrity, data availability and system continuity;
- 2) Scalability - the system should allow increasing the productivity of resources depending on the number of users, the amount of stored data, the intensity of data exchange, the speed of processing requests and data, the set of provided functions, and methods of providing access. Also, the system should be able to "build up" additional resources without structural changes in the central node of the system;
- 3) Possibility of flexible customization - the system must be able to customize without replacing modules when the external environment and specific user tasks change, the system must have a set of settings and development tools sufficient to reduce the time of its implementation and operation;
- 4) Ease of use - user interfaces should be informative and ensure semantic definiteness, consistency and structuring;
- 5) Maintenance - organizational support of the system should include: technical support for hardware (HW, SW, mobileapp), system software (including timely updating of its versions) and application software, training of operating personnel;
- 6) Teamwork of users' in real time;
- 7) Cross-platform - the system must support the correct display of data on monitors with different resolutions.

Each subsequent version of the information system must allow the use of data and information accumulated within the framework of previous versions in full and without any restrictions.

All users should work with the distribution of access rights.

It is planned that the system will implement an application programming interface (API) for integration with the existing information systems of the TRACECA countries in terms of automatic data exchange related to permits. Based on the

protocol, this will allow the central platform to receive and process permission-related data from local information systems.

The system should operate around the clock in the (7x24) mode with pauses for scheduled maintenance. The client software and technical means of the system administrator must be available for use around the clock in the mode (7x24), except for interruptions of the server part for scheduled maintenance.

In emergency situations, the information system should provide:

- 1) data safety;
- 2) data integrity;
- 3) ability to complete the work of all components of the System without violating the integrity;

Requirements for the safety of information in case of emergency should be determined by the Service Level Agreement (SLA).

The requirements for the safety of information in emergency situations and the functional requirements for the modules will be further determined during the implementation of the project.

MOBILE APPLICATION

A mobile application should solve the following tasks:

- Authorization - must be carried out by entering the Driver's login and the generated password received by e-mail.
- Permits — view the received permits.
- Map - displays the current location of the user. In addition to displaying the user's current location, additional objects will be marked on the map - points of food services (service stations; BCP; inns/hotels; accredited medical centers, etc.).

When clicked on an object, it will display information about the object - name, type of object, distance to the object and etc.

- Notifications. Creation of short informative messages that will be displayed on the map and which will be visible to all users of the mobile application within the specified radius.
- Data transfer. The mobile application in the background will transmit data about the user's current location. Then, based on this data, the user's route is drawn on the global map for the Administrator and / or Inspector.
- News and Notification Center. The "News" module is for informational purposes only: it publishes all messages with the "news" tag sent from the admin panel. The message consists of a picture, a title and a main part. The Notification Center module

is a block for storing notifications that are sent automatically according to the specified parameters or in manual mode.

- My documents - this module will display downloaded files - for example, a certificate on the passage of PCR test, etc.

The mobile application can be supplemented with other functions and tasks in the process of its implementation.

The user interface of the System should be implemented on:

- Russian;
- English.

The System will be able to input, process, store and output information in English and Russian.

INFORMATION SECURITY REQUIREMENTS

Information security should allow the use of mechanisms that automate the mode of restricting access to reading and (or) editing in relation to individual subsystems, individual materials and individual reporting forms.

It is assumed that the application software being developed will provide for the identification and authentication of users, which is designed to verify the authenticity of the user when entering the information system, including the possibility of using a "Digital Fingerprint".

REQUIREMENTS FOR PERSONAL ACCOUNT AND USER INTERFACE

All labels on screen forms, as well as messages issued to the user (except for system messages) must be in Russian and English, depending on the choice of the interface by the user.

Screen forms should be designed taking into account the unification requirements:

- all screen forms of the user interface must be made in a single graphic design, with the same arrangement of the main controls and navigation;
- to indicate similar operations, similar graphic icons, buttons and other control (navigation) elements should be used.
- the external behavior of similar interface elements (reaction to pointing the mouse pointer, switching focus, pressing a button) should be implemented in the same way for elements of the same type;
- when performing complex queries that require a long time to execute, the user should receive a message about the execution of the query;

- all the icons present on the working windows of the modules must necessarily be supplied with inscriptions explaining their purpose and unfolding on the screen when the cursor is placed in the center of the icon;
- when working with modules, the "Help" mode must be provided.
- Ergonomic solutions of the user web interface of the system should be the same for all its modules.

The requirements described in this section are the main requirements for implementing the digitalization of the corridor. More detailed requirements will be elaborated with interested TRACECA countries at the level of the Permanent Secretariat (including issues of elaboration of the implementation model).

5. RECOMMENDATIONS AND TERMS OF THE DIGITALIZATION OF THE TRACECA CORRIDOR

For more than 20 years, developed countries have been paying great attention to the digitalization of economic sectors, including the transport sector. Along with it, the XXI century is characterized by the dynamic development of information technologies and increasingly rapid penetration into the daily life of mankind.

Depending on the development of technologies, the requirements and components of national strategies are constantly changing. For example, if in the early 2000s, mainly developed and developing countries were working on integrating infrastructure with new technologies, large cities everywhere introduced video surveillance, and later smart city systems that were designed to manage traffic flows, including transit highways. A distinctive feature of this stage was the fragmentation of the introduction of technologies on different modes of transport (satellite positioning, introduction of transport maps, tracking and navigation solutions, toll collection systems, weighing systems in motion, etc.).

In order to improve the efficiency of logistics, the next decade was characterized by efforts to combine and integrate information systems into unified national information systems that allowed managing transport infrastructure (integrated solutions for the implementation of intelligent systems). In a number of developed countries, these processes were started back in the 1990s, where the transport infrastructure was developed in step with the times. The most successful information systems in the field of logistics were transformed into regional information solutions that allowed combining and digitizing the infrastructure of the countries closest by the level of development.

The last decade has been characterized by the introduction of innovative solutions into existing digital transport systems, which are aimed at the use of smartphones, sensors and detectors, intelligent transport management systems, unmanned vehicles and other developments at the national level.

Given the current and varying level of development of digitalization in transport in the TRACECA countries, on the example of developed countries it is important to take active measures to introduce digital technologies both at the national and international levels. If the TRACECA countries do not take appropriate measures, the rapid development of new technologies will significantly increase the "gap" in digital development in transport in the future, leaving the countries of the corridor further behind.

In this regard, taking into account the experience and practice of developed and developing countries with a high level of technology implementation into various types of transport, as well as international initiatives implemented under the auspices of international and regional organizations and associations, the main recommendations for the TRACECA countries are given below.

RECOMMENDATIONS ON DIGITALIZATION

Based on international experience and current TRACECA initiatives, TRACECA countries are recommended to:

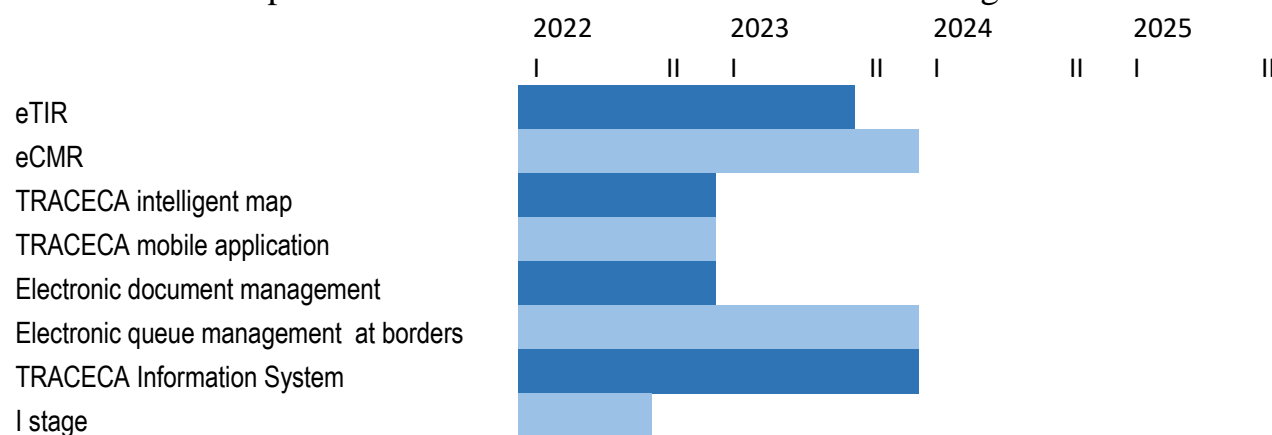
1. take active measures to implement eTIR by making appropriate changes to national customs information systems in accordance with the requirements of the Customs Convention on the International Carriage of Goods under the Cover of TIR Carnets;
2. to continue the work on joining the Additional Protocol to the Convention on the contract for the international carriage of goods by road, as well as the gradual transition to the use of an electronic waybill in the implementation of international carriage of goods by road;
3. continue work on the introduction of electronic queuing systems at road and sea checkpoints;
4. to study international experience in issuing electronic visas for drivers of commercial vehicles, including on the example of the TRACECA member states that have implemented similar solutions;
5. actively participate in discussions and implementation of international projects aimed at digitalization of transportation, including using the UN/CEFACT package of standards and tools for multimodal data transportation and document exchange in TRACECA projects;
6. study the international experience in the implementation of national logistics platforms and take measures to implement national projects that combine logistics facilities and participants in the transportation process;
7. continue work on the adoption of the CIM/SMGS consignment note in all TRACECA member states with a phased transition to the use of its electronic counterpart;
8. to continue to actively participate in the work on the development of the Global Transit Document by interested MLA member states, which in the future can be used as a single multimodal document for the transport of goods in containers;
9. to deepen the interaction of customs authorities to address data exchange issues and avoid duplication of control procedures;

10. to ensure active participation in the digitalization of multilateral permits and single transit permits, as well as in the implementation of the TRACECA information system;
11. to assist in the process of involving private business entities in the implementation of a mobile application for drivers of freight vehicles in terms of posting up-to-date information on service facilities, including roadside service;
12. to introduce an electronic document management system in the Permanent Secretariat;
13. develop proposals on the issues of authentication, signing or certification of documents through a trusted third party in order to ensure the authenticity of electronic documents of the TRACECA countries;
14. Develop proposals for the work of the "trusted third party institution" in order to ensure the mutual recognition of electronic digital signatures;
15. to direct efforts to harmonize the documentation related to the transmission of the necessary information on the arrival, stay and departure of ships in order to systematize the reporting;
16. to assist in the implementation of TRACECA initiatives aimed at creating a digital “ecosystem” of the corridor.

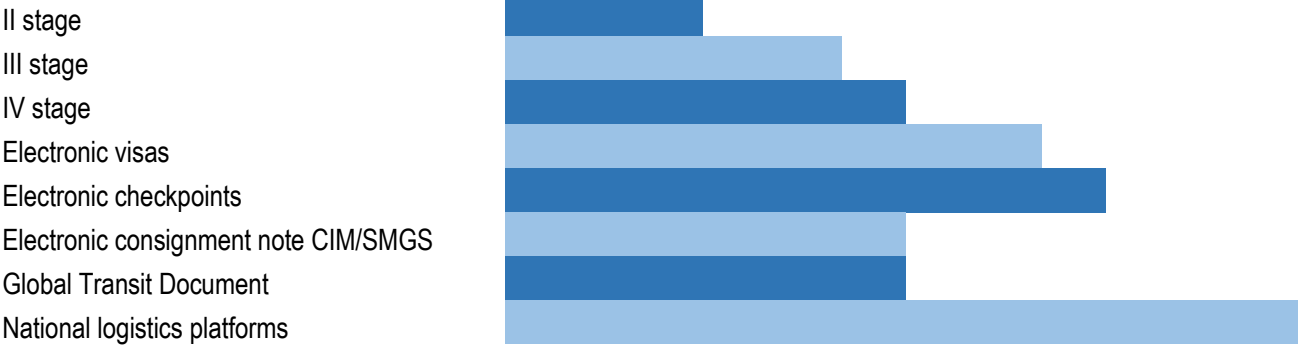
The implementation of above mentioned recommendations on digitalization will be carried out by MLA member states and the Permanent Secretariat, including involvement of international organisations and financial institutions.

TERMS OF IMPLEMENTATION¹²

To ensure timely implementation of the initiatives, it is proposed to take coordinated actions to implement the recommendations by the end of 2025. Indicative time frames for the implementation of the main recommendations are given below.



¹² The TRACECA countries that are the member states of the European Union will implement the recommendations provided for in this Concept within the timeframes determined within the framework of the European Union.



Recommended timing of initiatives and projects

CONCLUSION

Digitalization of the TRACECA corridor will significantly increase the competitiveness of transportation, thereby deepening economic relations, foreign trade and transport links in the regions of Europe, the Black Sea, the Caucasus, the Caspian Sea and Asia.

The implementation of the provisions of this Concept will allow:

- harmonize transport and customs procedures when applying electronic transport documents;
- “level up” the level of application of digital technologies in the TRACECA member states in transport in the implementation of international transportation of goods;
- simplify the procedures for carrying out transportation by digitizing the processes and procedures of transportation;
- create new and diversify existing transport and logistics services along the TRACECA routes;
- form "smart" supply chains;
- provide access to data and information online;
- optimize decision-making procedures;
- improve the quality of services for the transportation of goods, as well as the productivity of the transport industry.

The proposed TRACECA information system will allow countries to create a comprehensive solution and work in a single format, since the application of electronic permits is impossible without the integration of all participants in the transportation process. The fulfillment of the tasks assigned to TRACECA is currently possible only with integrated development, where one of the most important components is the digitalization of the transport industry. Introduction of systems and technologies in the task of digitalization of the TRACECA transport complex will ensure the formation of a complex "Ecosystem".

In the long term, the digitalization of the TRACECA corridor will create preconditions for the further implementation of digital projects within the TRACECA information system, which will have a positive effect on the economies of the TRACECA member states. According to an earlier study, digitalization allows for GDP growth in developing countries from 1.4% to 2.5%¹³, thereby increasing the competitiveness of the region as a whole.

¹³ [file:///C:/Users/B6DEB~1.KUS/AppData/Local/Temp/Digital Transformation and Its Influence on GDP.pdf](file:///C:/Users/B6DEB~1.KUS/AppData/Local/Temp/Digital%20Transformation%20and%20Its%20Influence%20on%20GDP.pdf)

In addition, according to the estimates of the World Economic Forum¹⁴, digitalization can reduce emissions from logistics by 10-12% by 2025, primarily by optimizing the supply chain. Indirectly, the process of introducing information technologies in transport in the TRACECA countries will also create additional jobs in related industries, since, according to the World Bank, digitalization directly affects the labour market¹⁵.

¹⁴ World Economic Forum. Transformation of Industries: Logistics; World Economic Forum: Geneva, Switzerland, 2016

¹⁵ <https://documents1.worldbank.org/curated/en/850581522435806724/pdf/EAEU-Overview-Full-ENG-Final.pdf>

Permanent Secretariat of the IGC TRACECA

Phone: (+99412) 5 98 27 18, (+99412) 4 98 92 34

E-mail : office@ps.traceca-org.org

Website : www.traceca-org.org

Facebook: [IntergovernmentalCommission.TRACECA/](https://www.facebook.com/IntergovernmentalCommission.TRACECA/)

Twitter: [@TRACECA](https://twitter.com/TRACECA)

LinkedIn: [traceca-permanent-secretariat](https://www.linkedin.com/company/traceca-permanent-secretariat)