

# Dnieper – Danube Corridor Pilot Dataset Alignment to International Standards and Data Models and Documents Implementation Prototypes for Use in Eastern Europe

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Project report

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Disclaimer: this report has been prepared by Mr. Dmytro Iakymenkov and Ms. Galyna Roizina, UNECE consultants. The views in this document are those of the authors and do not necessarily express the position of the UNECE.

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## Project overview

In the context of implementing the Recommendations of the 2019 and 2020 UNECE “Odessa” seminars to support the development of digital multimodal transport corridors, with a view to increasing the harmonization and standardization of data exchange in international transport, trade and logistics to encourage electronic data exchange and thereby to reduce person-to-person contacts during the COVID-19 crisis and in the post-pandemic recovery, using relevant UN/CEFACT standards, was initiated a pilot project. These results include:

- Analysis of data and documents transported via the Dnieper – Danube corridor (as a pilot project);
- Development of electronic document equivalents for Inland Water Transport using the DAVID forms for inland waterways (developed by the EU Strategy for the Danube Region, Priority Areas 1a and 11, in a cooperation that lasted for many years);
- Analysis of the feasibility of using API in this corridor;
- Test for interoperability.

The aim is to foster the harmonization of electronic data sharing using global (UN/CEFACT) standards for transport, trade and logistics, and to prepare standards for e-documents based on the UN/CEFACT semantic standards and reference data models. The focus will be on the development of electronic document equivalents for the documents mentioned above, using UN/CEFACT tools in the countries developing a digital multimodal transport corridor.

## Project Activities and Outputs

### 1. Standardized Dataset

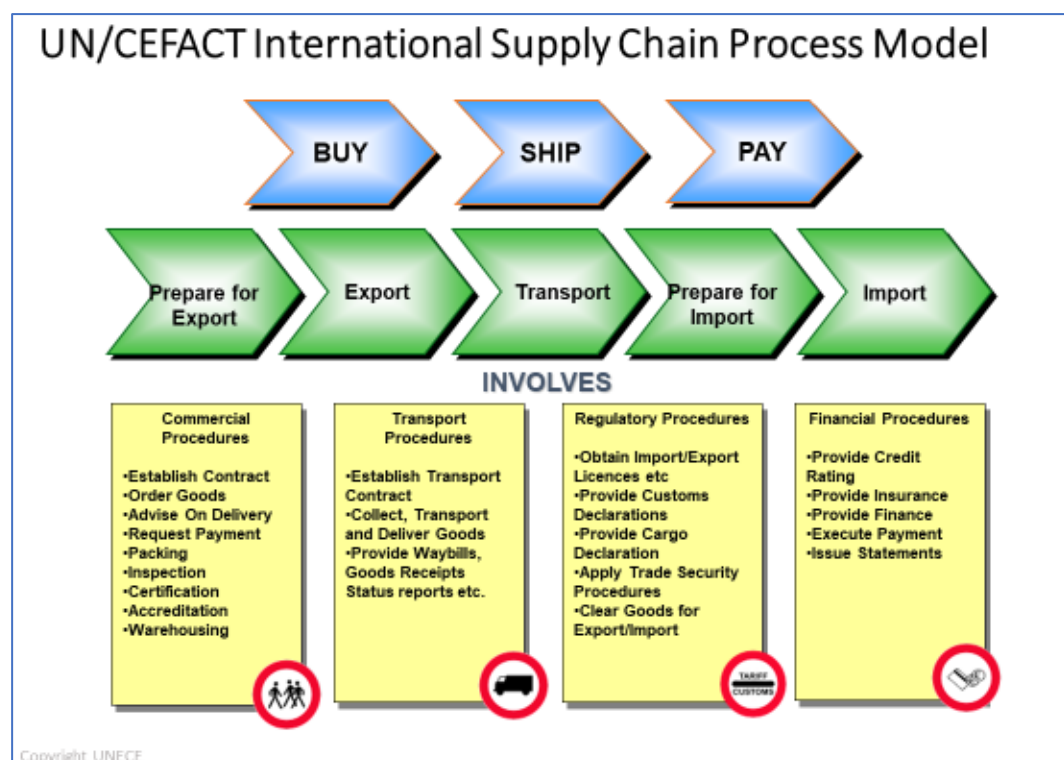
The UNECE facilitated project is focused on standardized dataset aligned to international standards and data models prepared for pilot use in cooperation with Ukraine, notably in the light of a corridor passing through Ukraine for inland water transport, e.g. Dnieper – Danube rivers (passing through Ukraine, Belarus and EU countries – Romania, Austria, Serbia and others).

In the scope of the project, an overall standardized dataset of the documents mentioned in the project overview (particularly – DAVID forms) was created and reported in a technical structure view along with an overall XML schema following the UN/CEFACT schema rules. The overall standard dataset of the documents supports contextualization by means of restriction of international standards.

Document were reviewed against actual business documents examples, that are in use on transport corridor, and there were found some issues, that should be solved to support possibility of real-life use.

The overall dataset is a reuse the UN/CEFACT Multi-Modal Transport Reference Data Model (MMT-RDM) D19A for individual transport related documents but still based on the wider Buy/Ship/Pay (BSP) Reference Data Model scope to cover general international supply chain processes (Figure 1).

*Figure 1: The UN/CEFACT International Supply Chain Model (Buy-Ship-Pay, BSP)*



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Source : UN/CEFACT Recommendation No. 18,

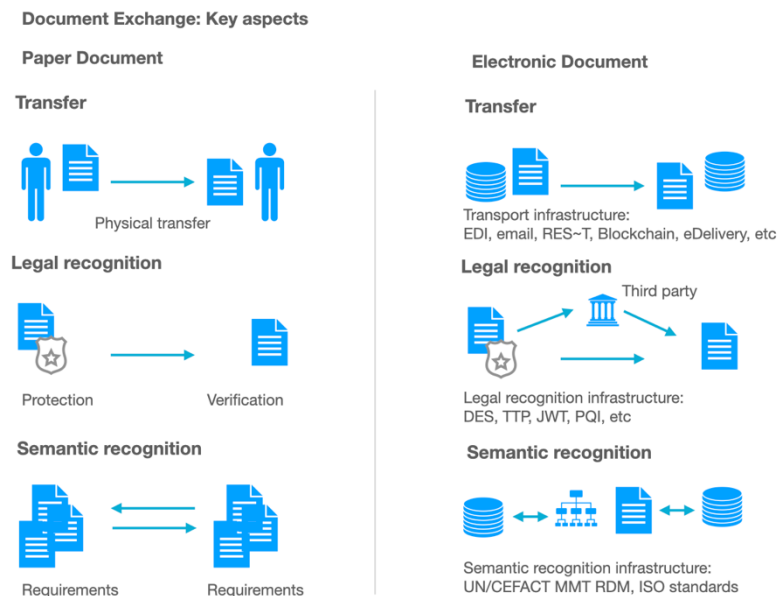
[https://unece.org/fileadmin/DAM/cefact/recommendations/rec18/Rec18\\_pub\\_2002\\_ecetr271.pdf](https://unece.org/fileadmin/DAM/cefact/recommendations/rec18/Rec18_pub_2002_ecetr271.pdf)

Document exchange can generally be represented in terms of three main aspects: document delivery (or transmission), legal recognition of the document and semantic understanding of the document's content.

From the point of view of paper workflow, delivery is realized by the physical transfer of a document from the author to the consumer, legal enforcement is implemented by applying agreed authentication strings to the document, such as forms,

signatures of the parties, seals and other physical means of protection. The semantic understanding of the content of the document is realized through the development, approval and publication of requirements for the design of the content of the document, including forms, conditions, standards, etc. (see Figure 2)

*Figure2: Document Exchange: Key aspects*



In electronic document management these same 3 aspects are implemented by other means, in particular:

- **Delivery** - is implemented by creating a so-called transport infrastructure, which can represent both the simplest solutions, such as email, and more complex EDI systems or REST interfaces, as well as specialized platforms, including Blockchain and e-Delivery
- **Legal recognition** - is implemented through the use of crypto algorithms and electronic digital signatures, as well as mechanisms such as a trusted third party and others
- **Semantic recognition** was often implemented by means that migrated from paper document flow, namely, the use of beams and a highly specialized set of requirements for a specific document or set of documents. At the same time, the very nature of electronic document flow allows the use of new mechanisms of semantic recognition, namely, harmonized data models, on which both the electronic documents themselves and the data sets are built.

The main task of this project is focused precisely on the semantic aspect of electronic document management, that is, on providing the ability to understand the contents of a document or dataset to create a seamless information exchange accompanying the movement of goods and transport, by harmonizing such documents (datasets) with international standards.

## 2. Overview of the individual datasets

*Table 1. Datasets*

Document	Base International Reference Standard
<b>DAVID Arrival /Departure Report</b>	UN/CEFACT Multi Modal Transport Reference Data Model
<b>DAVID Crew List</b>	UN/CEFACT Multi Modal Transport Reference Data Model
<b>DAVID Passenger List</b>	UN/CEFACT Multi Modal Transport Reference Data Model
<b>IMO General Declaration</b>	UN/CEFACT Multi Modal Transport Reference Data Model
<b>IMO Cargo Declaration</b>	UN/CEFACT Multi Modal Transport Reference Data Model
<b>IMO Crew List</b>	UN/CEFACT Multi Modal Transport Reference Data Model
<b>IMO Passengel List</b>	UN/CEFACT Multi Modal Transport Reference Data Model

The individual reports and outputs attached in annexes of this report reflect datasets created per provided paper document used nationally in Ukraine and globally for facilitation of trade along the corridor. These subsets show the usage of paper documents names and terms in alignment with international standards data exchange modeling. In addition, box numbers from paper documents are reflected in the reports where applicable.

The Exchanged Document section for the subsets contains message (document) related electronic signature data, but the electronic signature itself is attached to the message envelope and separate from the message content. The Signatory Authentication information in the Exchanged Document section includes metadata about an authentication for the content (paper or electronic signatures).

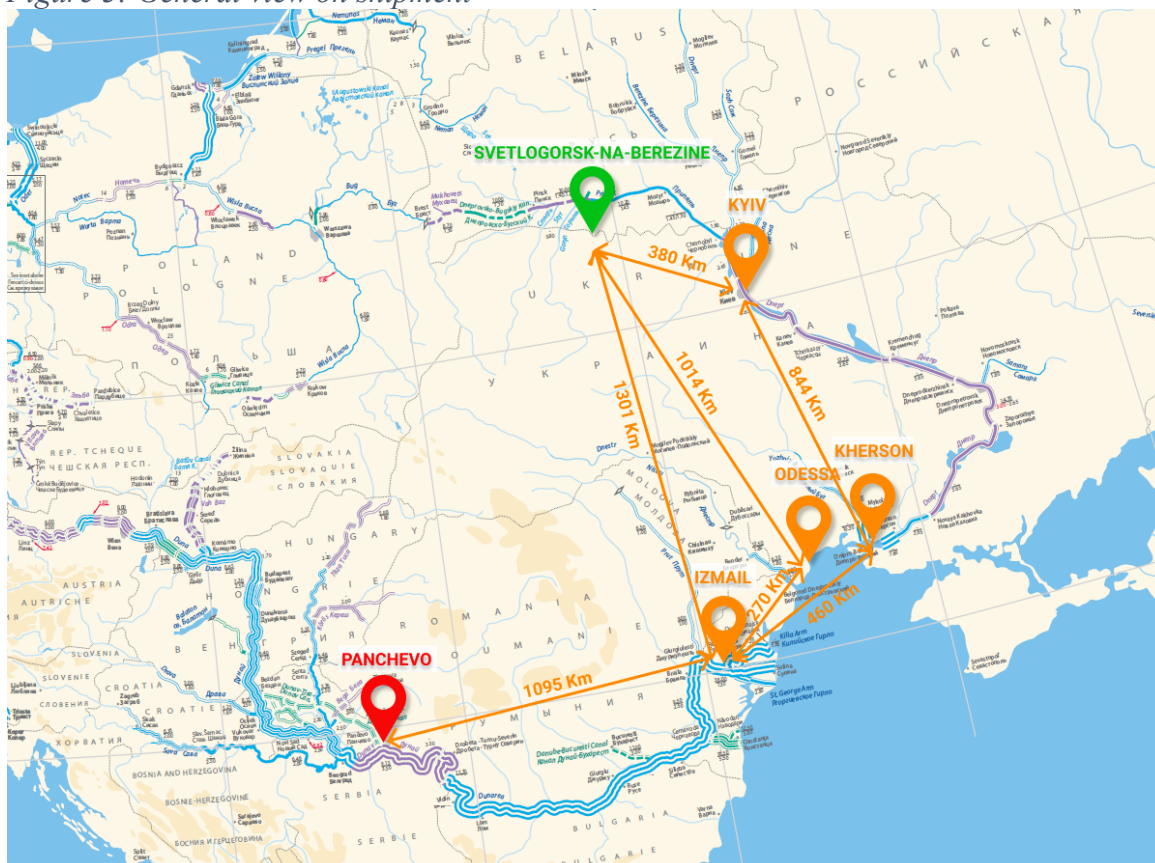
### 3. An analysis of merchandise and information flows for pilot project

#### 3.1. Overall pilot description

Pilot assessment was built around real-world shipment of bleached softwood kraft pulp from Belarus to Serbia through Ukraine. The project involves different modes of transport and was performed in several scenarios. That allowed to asses practical usage of different transport documents and data transformation from one to another during shipment steps.

General view on shipment is shown on the Figure 3.

Figure 3: General view on shipment



The background for the physical pilot project to explore alternative routes from Belarus to EU is the political situation inside the country and consequences arising from it. This led to the fact that direct transportation by rail or road transport became unattractive. As alternative routes there were 3 scenarios taken, all based on inland water transport usage.

Table 2. Routes particulars

Route and points	Mode of transport	Documents
Route 1		
Belarus -Ukraine (Korosten) - Ukraine (Berezhn) -Ukraine (Kiev river port)	Railway	CIM/SMGS
Ukraine (Kiev river port) - unloading to the warehouse	Warehouse	Warehouse receipt
Ukraine (Kiev river port): loading on a ship	Warehouse	Warehouse receipt Delivery order
Ukraine (Kiev river port) - Ukraine (port of Kherson)	Inland waterways (Dnieper) - barge	Bill of Lading Cargo Declaration General declaration Crew List Departure report
Ukraine (port of Kherson) - Ukraine (port of Izmail)	Sea - tug + barge	
Ukraine (port of Izmail) - Serbia (Pancevo)	Inland waterways (Danube) - barge	
Route 2		
Belarus - Ukraine (port of	Railway – Viking	CIM/SMGS



<b>Odessa)</b>	container train	
<b>Ukraine (port of Odessa): unloading to the warehouse</b>	Warehouse	Warehouse receipt
<b>Ukraine (port of Odessa): loading on a ship</b>	Warehouse	Warehouse receipt Delivery order
<b>Ukraine (port of Odessa) - Ukraine (port of Izmail)</b>	Sea - tug + barge	Bill of Lading Cargo Declaration General declaration Crew List Departure report
<b>Ukraine (port of Izmail) -Serbia (Pancevo)</b>	Inland waterways (Danube) - barge	
<b>Route 3</b>		
<b>Belarus - Ukraine (port of Izmail)</b>	Railway	CIM/SMGS
<b>Ukraine (port of Izmail): unloading to the warehouse</b>	Warehouse	Warehouse receipt
<b>Ukraine (port of Izmail): loading on a ship</b>	Warehouse	Warehouse receipt Delivery order
<b>Ukraine (port of Izmail) -Serbia (Pancevo)</b>	Inland waterways (Danube) - barge	Bill of Lading Cargo Declaration General declaration Crew List Departure report

The Dnieper river segment of the route is part of the Black Sea – Baltic Sea transport corridor and waterway project “E-40”

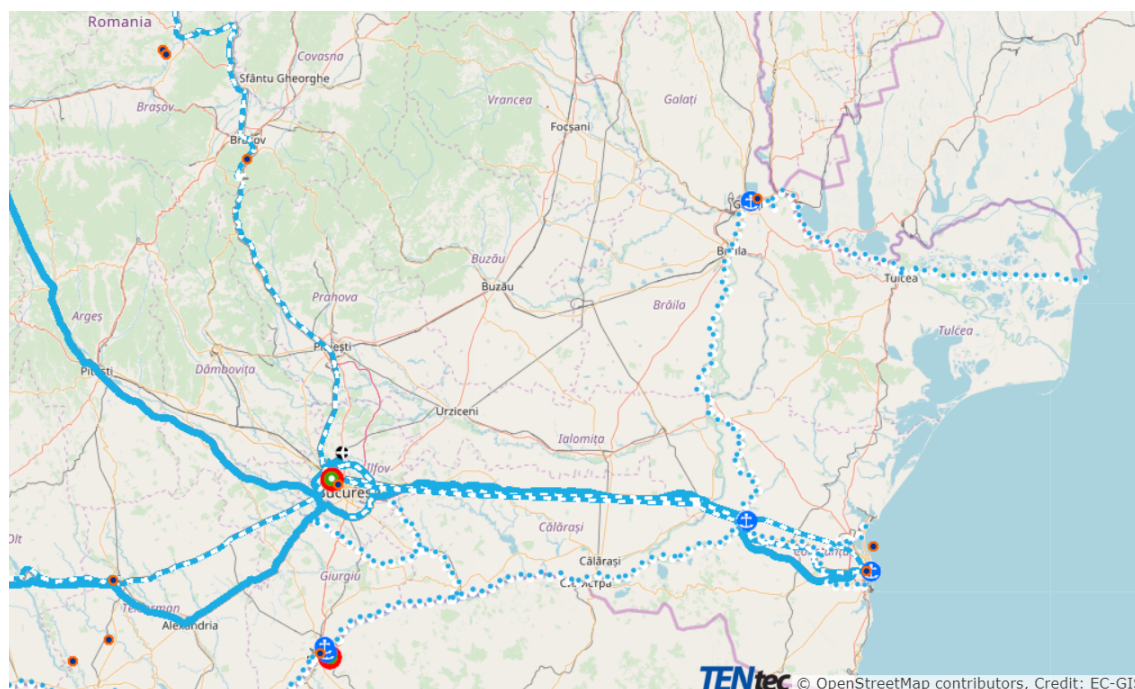
*Figure 4: The Dnieper river segment of the route*





The Danube river segment of the route is part of Rhine-Danube transport corridor.

Figure 5: The Danube river segment of the route



As was shown in the Table 1, to complete an assessment, other elements of transport corridors were used, particularly, the railway transportation from Belarus to Ukraine, including Viking container train, that is going from Lithuania to Ukraine through Belarus.

### 3.2. Documents used per modes of transport

Documents in the scope of project are described in the Table 3.

Table 3. Document per mode of transport

Modes of transport			
Inland Water Transport			Rail
	DAVID	Real Documents (Ukraine)	
<b>General Declaration (FAL form 1)</b>	Arrival and departure report	General Declaration	CIM/SMGS
<b>Cargo Declaration (FAL form 2)</b>	-	Cargo Declaration	
<b>Ship's Stores Declaration (FAL form 3)</b>	-	Ship's stores declaration	
<b>Crew's Effects Declaration (FAL form 4)</b>	-	Crew's Effects Declaration	
<b>Crew List (FAL form 5)</b>	Crew List	Crew List	
<b>Passenger List (FAL form 6)</b>	Passenger List	Passenger List	

<b>Dangerous Goods (FAL form 7)</b>	-	-	
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### 3.3. Considerations of the assessment

Obstacles caused by political events made the usual routes for transporting goods in the European direction uncompetitive. This prompted the search for alternative routes. The route proposed in the framework of this study is based on the use of inland waterway transport to one degree or another.

Advantages of the approach:

- Environmental friendliness of inland water transport
- Possibility of transportation of large consignment parties
- Safety of cargo during transportation
- Economic aspects
- The possibility of combining various types of transport (railway/auto/container/inland water transport)

Risks:

- Impact of weather conditions (storm, fog, ice) decrease in delivery speed
- Natural phenomena of a decrease in the water level in the Dnieper and Danube rivers

As a conclusion, implementation of three transportation scenarios in the framework of one project has showed the competitiveness of the transport corridor Black Sea - Baltic Sea (on the section Belarus -Ukraine).

### 3.4. DAVID forms for inland water transport

As a part of EU Strategy for the Danube Region Priority Area 1a (EUSDR PA1a) which aim is to improve mobility and multimodality on inland waterways of the Danube river, the working group WG6 (Administrative processes) has proposed the harmonization project for facilitating vessel control procedures.

By comparing the control procedures in the Danube region, it has become the evident that harmonization is important to decrease variations in control procedures along the Danube. With the aim to tackle this issue, the joint Working Group of PA1a (Inland Waterways) and PA11 (Security) developed a set of so-called Danube Navigation Standard Forms (DAVID). Using the expertise of stakeholders from the shipping sector and control authorities, the data fields of three often used forms (arrival and departure reports, crew lists and passenger lists) were harmonized in an international effort.

In 2018, the Working Group reached an agreement on the final first set of so-called Danube Navigation Standard Forms (DAVID):

- DAVID Arrival & Departure Report
- DAVID Crew List
- DAVID Passenger List

The DAVID forms shall replace respective national forms required during controls at Schengen external borders. Replacing the previously used forms with the harmonized DAVID forms is a national responsibility and involves administrative adjustments on a national level. Hungary, Croatia, Serbia, Bulgaria and Ukraine have already introduced the DAVID forms on a national level in 2020.

In parallel to these efforts, the Working Group concentrates on the digitalization of the harmonized set of DAVID forms to diminish administrative barriers, making Danube shipping even more attractive for existing and potential new customers.

WG6 in coordination with the member states has implemented first approach for creating the DAVID forms in inside their IT solution (RIS) with possibility for export to PDF document.

In the frame of the RIS COMEX project (co-financed in the Connecting Europe Facility) the comprehensive digitalization of border control forms, including the DAVID forms is planned to make it possible to send all required control forms to the relevant control authorities directly from the Common Electronic Reporting System (short: “CES”), following the “single data entry” and “report only once” principle.

Such activities make the harmonization of the new DAVID forms with the UN/CEFACT Multimodal Transport Reference Data Model (MMT RDM) is extremely important. As were shown in current assessment, inland waterways transportations are often the part of multimodal or combined shipment process and seamless flow of data elements between documents of different model of transport (including the IWT) is the key for facilitating procedures and rising the efficiency of each mode of transport.

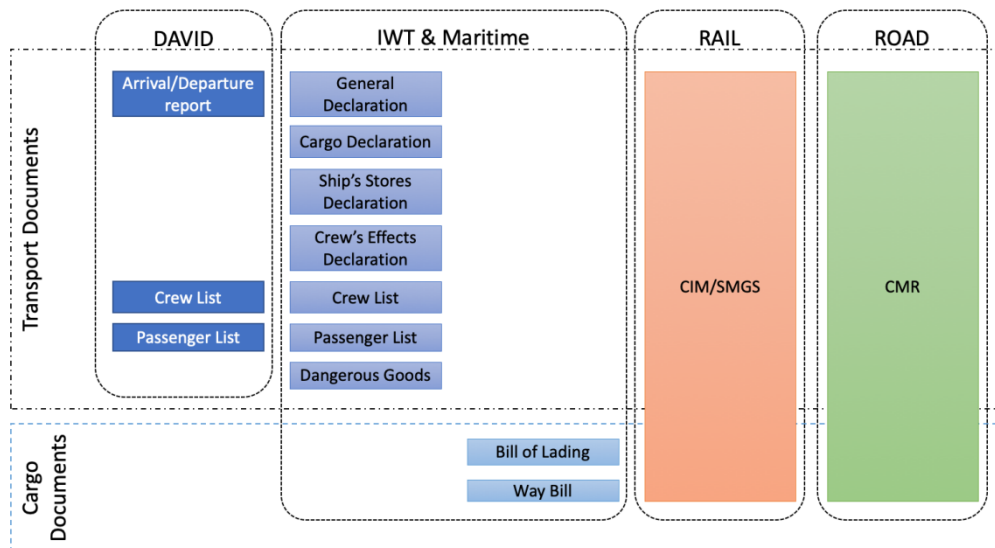
### 3.5. Correlations between DAVID forms and other transport and cargo documents

In real shipment conditions there are lot of documents accompanying transportation, both for transport and for cargo.

DAVID forms can be well mapped to IMO FAL forms 1 (General declaration), 5 (Crew List) and 6 (Passenger List), which are widely used as for maritime, so for inland navigation.

Also, the information about used transport equipment (vessel, particularly) can be mapped to documents of other modes of transport, but only on the semantic modeling level, because not using the DAVID form as a multimodal document. Thus, the mean of transport and transport particulars should be changed while changing the modality.

*Figure 6: Documents of different modes of transport*



More details about mapping particular documents to MMT RDM and data conversion between documents will be presented in the next chapters.

## 4. Description of datasets mapping results

### 4.1. IWT documents used in Ukrainian shoulder

- a) Mapping was performed using real business case documents:
  - General Declaration

- Crew List
  - Crew's Effects Declaration
  - Cargo Declaration
  - Ship's stores declaration
- b) The original documents, used for the mapping, are shown in Annex I.
- General Declaration
  - Crew List
  - Crew's Effects Declaration
  - Cargo Declaration
  - Ship's stores declaration
- c) Results of the mapping are shown in Annex II.
- d) General considerations

The documents used for transportation by inland waterways on the Ukrainian shoulder correspond in their form to similar documents used for maritime transportation. This, among other things, made it possible to carry out the passage by sea from the estuary of the Dnieper to the estuary of the Danube using the same set of documents.

For comparison, the profile MMT RDM IMO FAL was used. As a result, it can be noted that the documents included in the project scope were well matched and the structure of the documents follows the data model (and vice versa).

As a general consideration, the need to maintain the integrity and relevance of international code lists at the state level, in particular – UN/LOCODE from the point of view of river ports of Ukraine, can be noted.

#### 4.2. DAVID forms

- a) Mapping was performed using real business case documents and the paper documents of the DAVID forms, that are officially approved:
- Arrival and departure report
  - Crew List
  - Passenger list
- b) The forms of the documents used for the mapping are shown in Annex I.
- Arrival and departure report
  - Crew List
  - Passenger list
- c) Results of the mapping are shown in Annex II.
- d) General considerations

DAVID forms largely correspond to commonly used maritime documents used for similar tasks, in particular, FAL 1, 5 and 6 forms (General Declaration, Crew List and Passenger List). Thus, the MMT RDM IMO FAL profile was also used for comparison. Similar to the previous set of documents, it can be noted that the DAVID forms were well matched with the data model.

At the same time, there are several details that could not be matched. This applies, in particular, to information on the re-registration of the vessel, which is not indicated in the maritime documents: the previous names of the vessel, the previous countries of registration(nationality) of the vessel. In connection with some specificity of river transportation, it is recommended to consider the feasibility of expanding the MMT RDM

profile for DAVID forms with appropriate attributes. Also, there is the ENI number for vessel identification, that is absent in IMO FAL documents.

There is also a need to update the code list of river ports in LOCODE.

## 5. Examples of documents implemented

Documents, used for the assessment, were implemented in electronic form (XML), based on the mapping, performed on the previous step and UN/CEFACT guidelines for XML naming and design rules.

Examples of the documents are provided in Annex III.

## 6. Analysis and results of a test of the interoperability

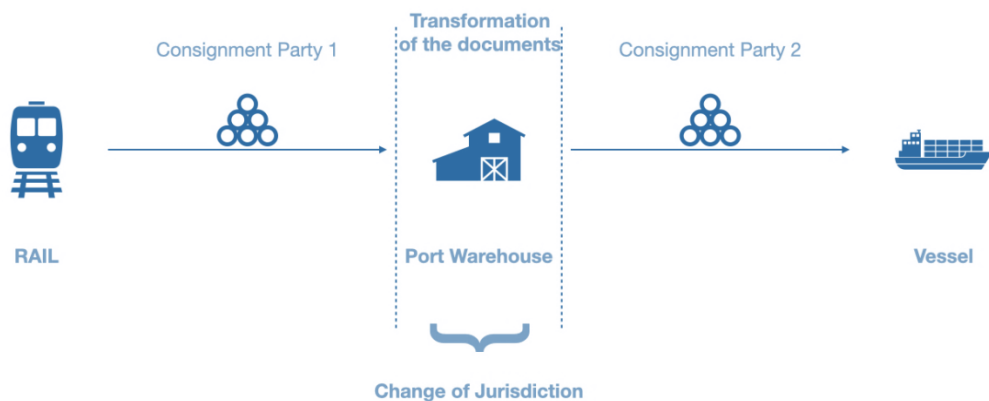
Given the different kinds of documents, used on the multimodal shipment procedure, the interoperability test has several aspects:

- Transformation of transport documents for changing the modality;
- Transformation of cargo documents for changing the modality.

Also, for multimodal and for unimodal shipment procedure there are transformation of both types of documents for changing the legal jurisdiction. For this purpose, efforts of the EU Strategy for the Danube Region Priority Area 1a (EUSDR PA1a) should be mentioned as a good practice for facilitating procedures for vessel documents on the Danube river.

As for the remaining part of the shipment, that is described in the chapter 3.1, no one document was used as multimodal. Moreover, in practice, no direct transformation between modes of transport were used. Instead, the port warehouse is used as an intermediate link between rail and inland water transport (See Figure 4).

*Figure 7: Transformation of the documents*



Such approach lets to change the consignment party size and details. Also, such approach neutralizes the complexity of the task of transformation transport documents for different modes of transport as a cargo document also. As for the transport documents – the modes of transport just not linked one with another. As for the cargo documents (besides possible difference in requirements for different modes of transport) – the consignment party can be significantly changed, for example – using a containers for some segment of shipment and bulk for another.

In the framework of the pilot project there were assessed transformation of the IMO FAL-based documents for inland water transportation to DAVID forms:

- IMO FAL 1 (General Declaration) – DAVID arrival report
- IMO FAL 5 (Crew List) – DAVID Crew List

Given the absence of any passengers on the vessel during the pilot project, there were no possibility to assess a transformation of the IMO FAL 6 (Passenger List) to DAVID Passenger List, but due to common structure of these documents, we can assume the results of such transformation would be very similar.

As the MMT RDM is used as a base for all of these types of document, it is also used for the mapping for the conversion. The results of the test of data conversion are provided in Annex IV.

#### 6.1. IMO FAL 1(General Declaration) – DAVID arrival report

- a) The conversion was performed using real business case documents:
  - General Declaration - Ukraine
  - DAVID Arrival and Departure report – officially approved
- b) The original documents, used in the conversions, are shown in Annex I.
  - General Declaration - Ukraine
  - DAVID Arrival and Departure report – officially approved
- c) The results of the conversions are shown in Annex IV.
- d) General considerations.

The documents compare well with each other due to the general structure. Considering the previous remarks on filling out the DAVID forms in relation to the MMT RDM, the following transformation results should be noted:

- The general structure and use of a single profile of the MMT RDM greatly simplify the transformation
- Using the same lists of codes in both documents allows to automate the transformation process
- There are certain differences in the set of details in both documents, in particular, the DAVID form contains the dimensions of the vessel that are absent in the General Declaration, as well as information about the movement of vessels in the convoy mode.

#### 6.2. IMO FAL 5 (Crew List) – DAVID Crew List

- e) The conversion was performed using real business case documents:
  - Crew List - Ukraine
  - DAVID Crew List – officially approved
- f) The original documents used in the conversions are shown in Annex I.
  - Crew List - Ukraine
  - DAVID Crew List – officially approved
- g) The results of the conversions are shown in Annex IV.
- h) General considerations.

The considerations about structure of the documents are the same. Identified discrepancies in documents:

- Previous names and previous nationality of the vessel
- ENI number of the vessel
- Ports of arrival and departure.



## 7. Report on API usage assessment

The use of API is a common trend today. It is the result of widely spread Internet (or WEB) applications. The need of API is an answer to the question – how to connect different IT systems in open network like Internet. Bilateral connections, widely used in the corporate world, are not effective anymore because of the huge quantity of parties.

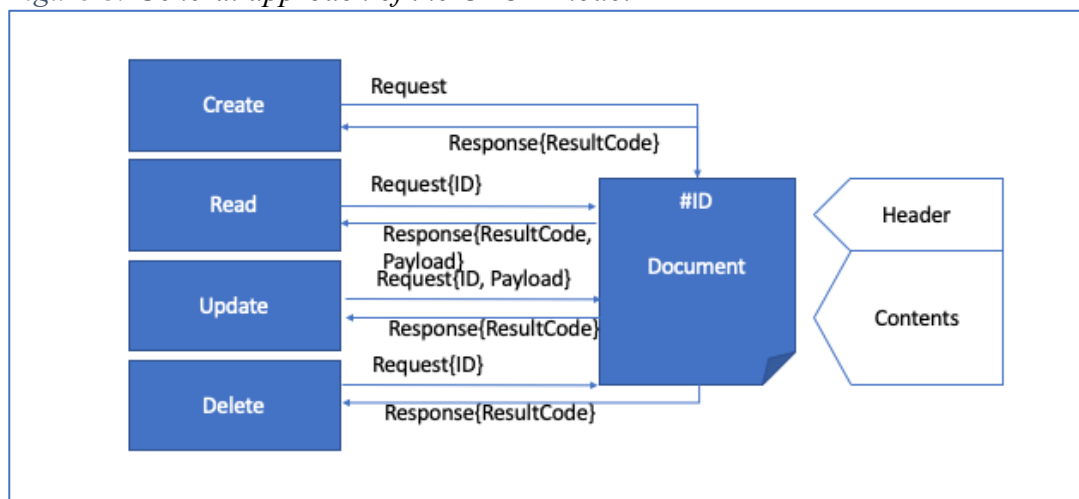
The use of APIs suggests a common rule for interface definition between systems that need to exchange documents or other information. The advantages of using API is that it can offer a standard approach that can be used by multiple parties in open networks.

In the previous stage of the project the REST-based API based on the CRUD model has been proposed. The main point for such approach instead of strait movement to classical API is that most of trade and transport IT solutions is heavy linked to document-based information exchange procedure, and standards for such documents, from on hand, are stable and approved, from the other hand – may be not compatible between industries. This issue can be solved by using CRUD semantic model for API building – the unit of information exchange remains to be document, all operations with document are described by the 4 methods:

- Create – creating new document in the target system
- Read – retrieving or requesting an existing document from the target system
- Update – modifying an existing document in the target system
- Delete – removing an existing document from the target system

In each case all or just some of these methods can be used, depending on the requirements of a certain system and/or regulations. For example, some systems prohibit the deletion of documents. Instead, they can only be marked as inactive.

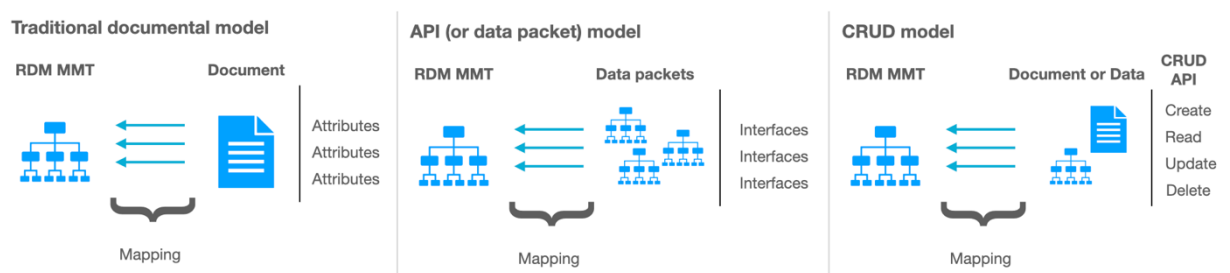
*Figure 8: General approach of the CRUD model*



The great advantage of the API approach is a possibility of shifting the paradigm of document exchange to data packets exchange, that allows to move from providing the document to some Receiver (single window, for example) – push model – to requesting the portions of data directly from the point, where the data is produced – pull model.



Figure 9: The difference in classical documental model, API model and CRUD



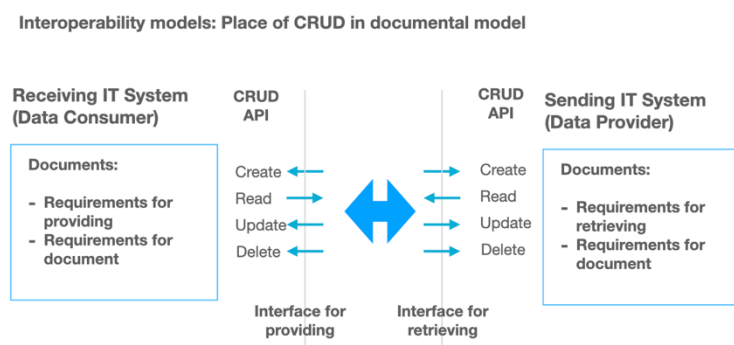
In the documental model the document is the entity of information exchange. The contents of the document are described by attributes (data elements). One document can contain several data sets and can be used by multiple consumers, as described in the principle “Supply once, use many”. Push model of delivery is used – document is provided by data supplier to some “single window” and usually, the event of the document providing is separated from the events, that are described in the document itself.

In the API model data are hidden from external consumers by the programmational interfaces. Such intermediate layer allows to implement an extra functionality, such as access control and data conversion, for example. Pull model is preferable that allows to implement data pipes.

The CRUD model can operate both the documents and data packets, but the biggest advantages it can provide for integration of document-based IT solutions to any other IT solution. The point is that the CRUD API is much simpler then the full API and is absolutely schema-neutral, so any kind of contents can be shared with such approach.

The implementation of the interoperability solution, based on such approach, is shown on the Figure 5.

Figure 10: The implementation of the interoperability solution



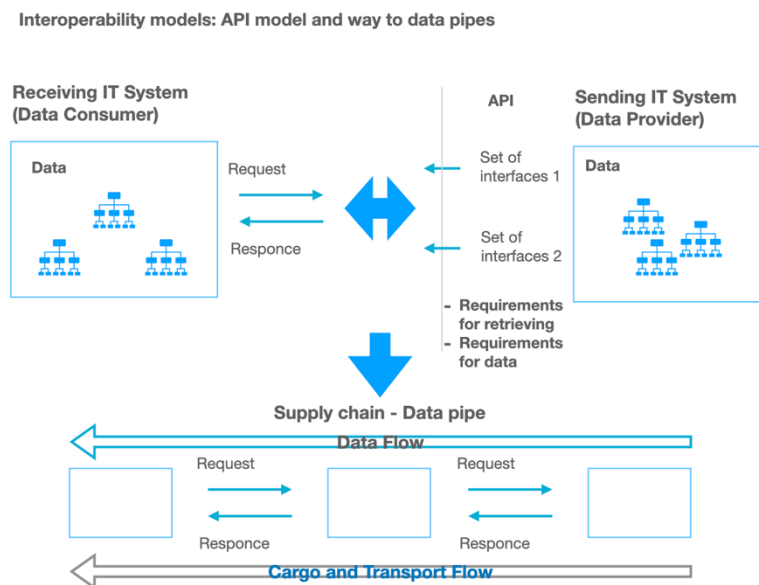
The CRUD API as any other API shadows the complexity and specific of certain implementation and harmonizes requirements for data retrieving and providing. As is shown on the Figure 10, the two point of applying the programmational interfaces exist. One is on the receiver side – is the providing interface and the second one is on the sender side – is the retrieving interface.

The requirements for document itself can be harmonized by the mapping the document to UN/CEFACT MMT RDM, as have been shown in the scope of this project. Inside the API, the results of such harmonization is populated as a document manifest,

that contain XML schema (XSD). Basing on the CRUD model the schema is also the document and can be operated via the same API.

As a next step to the expanding the API and moving to data pipes is the implementation of automated negotiation of such document requirements using the mechanism of the XML transformation (XSLT). Such transformation can be implemented as a schematron by the sending side, that is also required as a document via CRUD API and executed on the receiving side. This can guaranty consistency of the consistence of the converted document and will not break the existing legal recognition schema (if any). Such approach requires publication of extra metadata, particularly – mapping to the RDM entities type (ABIE and BIE) and data types details.

*Figure 11: Interoperability models: API model and way to data pipes*



Further implementation of the interoperability solution with the full API model is shown on the Figure 6. For such approach both systems – the receiving and the sending - should be ready to move to the pull model and to operate data packets instead of the documents. As an advantage – connecting such systems within the supply chain produces the data pipe, that seamless accompanies the cargo and transport flows with the data flow.

## 8. Considerations

- Harmonization of the semantics of documents and datasets is an important component of workflow in a general sense and electronic workflow in particular. Considering the development of electronic document management, the issue of automating the understanding of the content of the document becomes key. 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 appears to be the most promising.
- The issue of legal recognition is important and requires attention in cross-border and multimodal information exchange. Although it is outside the scope of the current project, the mechanisms considered in the study of the applicability of the API can be used, among other things, to resolve this issue.
- When developing new trade and transport documents at the regional and sectoral level, aimed at simplifying procedures at these specific levels, it is advisable to consider the experience and recommendations of UN/CEFACT on harmonizing datasets due to the inevitable inclusion of any regional or sectoral supply chain in global chains and the resulting hence the need for intermodality.
- The API approach in general and the CRUD model particularly can be used as a mechanism for the evolutionary transition from a documentary model to a data pipeline model.
- The CRUD model can also help to solve the problem of the readiness level and utilization of standards by participants in information exchange:
  - API ready
  - e-Document (RDM-compliant) ready – can be supported by CRUD API
  - e-Document (non RDM-compliant) ready – can be supported by CRUD API
  - e-copies of paper documents (PDF and etc) – can be supported by CRUD API
  - Paper documents

## 9. Recommendations

- Use the Buy-Ship-Pay Reference Data Model (BSP RDM) as the overall base reference data model to cover Business to Business and Business to Government procedures.
- Coordinate the development of the new trade and transport documents at the regional and sectoral level with recommendations of the UN/CEFACT and other international standards and best practices.
- Provide instrument for the creation of schematrons  
Specifying detailed information on attributes for each entity in a document schema can be instrumental for creation of schematrons, and this should automate the compliance check on both sides – on the submitter and recipient sides, and, in this way– provide the next step in minimizing the impact of the subjective factor (the human factor) and facilitate procedures.
- Support efforts of national authorities for keeping the international code lists, used for multimodal transportation, actual and relevant.
- Keep efforts for further assessments on using JSON API approach  
Given the great difference in state of implementation of international standards of electronic documents exchange in different industries and in different countries, usage of JSON API approach can be considered as a solution for harmonization, that can also solve a problem of legally trusted electronic documents due to difference in DES standards.  
Proposed in this report the CRUD model can be used as a soft changes approach for moving from documental to data packets paradigm.  
This approach relates to both technical and organizational aspects and also should be considered from the legal point of view. Due to this, it is important to continue investigation in this area.

## Annexes

### Annex I. Original documents, used for mappings and conversions

#### 1. Real documents (Ukraine)

##### a. General Declaration

(Name of chipping line, Agent, etc.) Наименование судоходной компании <b>Открытое акционерное общество «Белорусское морское пароходство»</b>		<b>GENERAL DECLARATION</b> Генеральная декларация	
		<input checked="" type="checkbox"/> Arrival приход	<input type="checkbox"/> Departure убытие
1.1 Name and type of ship Наименование судна <b>Теплоход «Надежда»</b>	2. Port of arrival/departure Порт прибытия/убытия <b>Киев</b>	3. Date and time of arrival/departure Дата, время прихода/убытия	
4. Flag State of ship Флаг судна <b>Республика Беларусь</b>	5. Name of master Ф.И.О. капитана <b>Кацуба.О.Н</b>	6. Last port of call/Next port of call Прибыл из порта/порт назначения <b>Комарин</b>	
7. Certificate of registry (Port: date; number) Регистрационное удостоверение (порт, дата, номер) <b>Мозырь, 01.03.2019, БРП-486</b>		8. Name and contact details of ship's agent Имя и адрес агента	
9. Gross tonnage Вес брутто <b>483,0</b>	10. Net tonnage Вес нетто		
11. Position of the ship in the port (berth or station) Расположение судна в порту <b>Киевский речной порт</b>			
12. Brief particulars of voyage (previous and subsequent ports of call; underline where remaining cargo will be discharged) Маршрут перевозки (порты захода) <b>Комарин - Киев</b>			
13. Brief description of the cargo Описание груза <b>В балласте</b>			
14. Number of crew (incl. master) Экипаж, человек <b>8</b>	15. Number of passengers Пассажиров, человек	16. Remarks Особые отметки <b>1. Предметов, запрещенных к ввозу на территорию Украины не обнаружено</b> <b>2. Посторонние лица на судне отсутствуют</b>	
Attached documents (indicate number of copies) Прилагаемые документы (указать число копий)			
17. Cargo Declaration Декларация на груз <b>В наличии</b>	18. Ship's Stores Declaration Декларация судовых запасов <b>В наличии</b>		
19. Crew List Список экипажа <b>Судовая роль</b>	20. Passenger List Список пассажиров <b>Судовая роль</b>	21. Date and signature by master, authorized agent or officer Дата и подпись капитана или агента	
22. Crew's Effects Declaration (only on arrival) Декларация экипажа <b>В наличии</b>	23. Maritime Declaration of Health (only on arrival) Морская санитарная декларация <b>В наличии</b>		

For official use



b. Crew List

Республика Беларусь  
Министерство транспорта и коммуникаций  
ОАО «Белорусское морское пароходство»

Судовая роль

1. Название судна Т/х "Надежда" 3. Род и назначение судна Теплоход-Площадка  
2. Порт № регистрации Речной порт Мозырь 4. Собственник судна ОАО «БМП»

№ П/П	Фамилия, имя, отчество	Год рождения	Гражданство	Должность	Должность по диплому и № диплома	№ паспорта	Дата поступления на судно
1	Кацуба Олег		РБ	Капитан - Сменный Механик	Капитан-механик		01.06.2020
2	Шафоренко Иванович		РБ	Механик - Сменный капитан	Капитан-механик	ВТО	01.06.2020
3	Кильчевский Александр	1	РБ	I пом. Кап - I пом. Мех.	Капитан-механик	ВТО	01.06.2020
4	Сазонов Александрович	185	РБ	Моторист	Мех. - 1 пом. кап.	ВТО	01.06.2020
5	Зайцев Сергей	15.0	РБ	Моторист	1 пом. Кап. - 1 пом. Мех.	ВТО	01.06.2020
6	Александр Николаевич	14	РБ	Моторист	2 пом. Кап. - 2 пом. Мех.	ВТО	01.06.2020
7	Кац и	0	РБ	Моторист	3 пом. Кап - 3 пом. мех	ВТО	01.06.2020
8	Котович Николаевич	0	РБ	Моторист	Моторист	ВТО	01.06.2020

Капитан



Кацуба О.Н.

c. Crew's Effects Declaration

(Name of shipping line, Agent, etc.)

Наименование судоходной компании:

Открытое акционерное общество

«Белорусское морское пароходство»

CREW'S EFFECTS DECLARATION

декларация экипажа

1.1 Name and type of ship Наименование судна <b>Теплоход «Надежда»</b>			2. Effects which are dutiable or subject to prohibitions or restrictions Имущество, которое является подлежащим обложению налогом или подлежащим запрещению или ограничениям							7. Signature Подпись
3. Nationality of ship Флаг судна <b>Республика Беларусь</b>			евро	долл. США	бел. руб.	грн зны	рос. руб.	спирт	другие ценности	
4. No номер	5. Family name, given names Ф.И.О.	6. Rank or rating Ранг или должность								
1	Кап. Н	Капитан- см. механик		70		300				
2	Шаф А.И.	Механик – см. капитан	1		10					
3	Кил А.В.	I пом. кап. – I пом. мех								
4	Ка.	моторист								
5	Сезонов	моторист								
6	Зайцев	моторист								
7	Христанович	моторист								
8	Котович	моторист								
Amount of Captain's and crew members valuables (gold, silver, platinum, jewelries, banks travel checks, etc). Personal fire arms and cartridges (ammunition), explosives and narcotics are the stated in point 2 Личные ценности капитана и команды (золото, серебро, драгоценности и т.д.): личное оружие, боеприпасы перечисляются в пункте 2										
21. Date and signature by master, authorized agent or officer Дата и подпись капитана или агента			«26» 10 2020 года О.Н. Катуба МП							



[illegible]

e. Ship's stores declaration

Наименование судоходной компании  
Открытое акционерное общество  
«Белорусское морское пароходство»

ПЕРЕЧЕНЬ СУДОВЫХ ЗАПАСОВ

☒ приход ☐ убытие

1. Наименование судна <b>Теплоход «Надежда»</b>	2. Порт, где сделано заявление <b>Киев</b>	
3. Флаг судна <b>Республика Беларусь</b>	4. Маршрут перевозки <b>Комарин - Киев</b>	
5. Ф.И.О. капитана <b>Кацуба Олег Николаевич</b>	6. Количество членов экипажа <b>7</b>	
7. Наименование	8. Ед.измерения	9. Количество
1. Хлеб	бух.	10
2. Мука	кг.	4
3. Жиры растительные	литр	2,5
4. Жиры животные	кг.	2,5
5. Мясо	кг.	10
6. Рыба	кг.	-
7. Колбаса	кг.	3
8. Яйца	дес.	4
9. Консервы	банки	12
10. Крупы разные	кг.	15
11. Макароны изделия	кг./пачки	8
12. Молочные продукты	литр	1,5
13. Сахар	кг.	10
14. Фрукты	кг.	-
15. Овощи	кг.	4
16. Чай	пачки	2
17. Соль	кг.	4
18. Напитки	литр	-
19. Вода питьевая на борту	литр	15000
20. Диз.топливо на борту	литр	40000
21. Диз.масло на борту	литр	600

«26» 10

2020 года

Капитан

О.Н.Кацуба



## 2. DAVID forms (approved in Ukraine)

### a. Arrival and departure report

#### ЗВІТ ПРО ПРИХІД/ВИХІД ARRIVAL AND DEPARTURE REPORT Danube Navigation Standard Form (DAVID)

		Прихід Arrival	Вихід Departure
1.1 Найменування та тип судна (основного судна), включаючи попередні назви судна (якщо це застосовано) Name and type of ship (main vessel) including previous name(s) of ship - if applicable		1.2 Номер судна / ENI-Європейський номер ідентифікації (основне судно) Ship number/ENI-European Number of Identification (main vessel)	
1.3 MMSI номер - якщо це застосовано MMSI number - if applicable		1.4 Сертифікат судна дійсний до (основне судно) Vessel certificate valid until (main vessel)	
2. Порт приходу/виходу Port of arrival/departure		3. Дата та час приходу/виходу Date and time of arrival/departure	
4. Національна належність судна (країна / район реєстрації), включаючи попередню національну належність судна - якщо застосовано Nationality of ship (country/area of registration) including previous nationality of ship - if applicable	5. Прізвище, ім'я та по батькові капітана Name of master	6. Пункт контролю / пункт перетину кордону Control point/border crossing point	
7. Загальна довжина [м] / Загальна ширина [м] Total length [m]/Total width [m]		8. Прізвище, ім'я по батькові та контактні дані оператора судна Name and contact details of ship operator	
9. Діючий проєкт [м] Actual draught [m]	10. Максимальний тоннаж [т] / Загальна кількість вантажу [т] Maximum tonnage [t]/ Total quantity of cargo [t]		
11. Позиція судна в порту (причал або вокзал) - якщо застосовно Position of the ship in the port (berth or station) - if applicable			
12. Короткі відомості про рейс (попередні та наступні порти, зазначити, де вантаж буде розвантажено) Brief particulars of voyage (previous and subsequent ports, underline where cargo will be discharged)			
13. Короткий опис вантажу Brief description of the cargo			
14. Реєстрація та ідентифікація EORI / економічних операторів - якщо застосовно EORI/Economic Operators' Registration and Identification - if applicable	15. Кількість членів екіпажу Number of crew	18. Примітки Remarks	
16. Режим експлуатації (A1, A2, E) - якщо це застосовано Navigation mode (A1, A2, E) - if applicable	17. Кількість пасажирів - якщо це застосовно Number of passengers - if applicable		
Додані документи - якщо це застосовано (вказати кількість копій) Attached documents - if applicable (indicate number of copies)			



c. Passenger list

СПИСОК ПАСАЖИРІВ  
PASSENGER LIST  
Danube Navigation Standard Form (DAVID)

										Період Arrival			Вихід Departure	Номер сторінки Page Number
1.1 Найменування та тип судна (основного судна), включаючи попередні назви судна (якщо це застосовується) Name and type of ship (main vessel) including previous name(s) of ship - if applicable					1.2 Номер судна / ENI-Європейський номер ідентифікації (основне судно) Ship number/ENI-European Number of Identification (main vessel)					1.3 MMSI номер - якщо це застосовується MMSI number - if applicable				
1.4 Сертифікат судна дійсний до (основне судно) Vessel certificate valid until (main vessel)			2. Порт приходу/виходу Port of arrival/departure		3. Дата та час приходу/виходу Date and time of arrival/departure		4. Національна належність судна (країна / район реєстрації), включаючи попередню національну належність судна - якщо це застосовано Nationality of ship (country/area of registration) including previous nationality of ship - if applicable							
5. Прізвище, ім'я та по батькові Family name, given names		6. Національність Nationality	7. Дата та місце народження Date and place of birth	8. Тип ідентифікаційного чи проїзного документа Type of identity or travel document	9. Серійний номер посвідчення особи чи проїзного документа Serial number of identity or travel document	10. Країна видачі посвідчення особи або проїзний документ Issuing country of identity or travel document	11. Порт посадки Port of embarkation	12. Порт висадки Port of disembarkation	13. Тривалість пасажир чи ні Travel passenger or not	14. Стать особи (так як зазначено) Gender of the person (M/F or N/A)	15. Дані про візу або вид на проживання - якщо це застосовується Data on visa or residence permit - if applicable			
											Тип Type	Серіальний номер Serial number	Країна видачі Issuing country	Термін Expiry date
						16. Дата та підпис капітана, уповноваженого агента чи посадової особи Date and signature by master, authorized agent or officer								

## Annex II. Results of the mapping

### 1. MMT RDM – Real Documents (Ukraine)

- a. General Declaration
- b. Crew List
- c. Crew's Effects Declaration
- d. Cargo Declaration
- e. Ship's stores declaration

MMT IMO FAL Guide\_UNECE-Real Documents(Ukraine).xlsx

### 2. MMT RDM – DAVID Forms (approved in Ukraine)

- a. Arrival and departure report
- b. Crew List

MMT IMO FAL Guide\_UNECE-DavidForms.xlsx

## Annex III. XML documents examples

### MMT RDM – Real Documents (Ukraine):

- a. General Declaration
- b. Crew List
- c. Crew's Effects Declaration
- d. Cargo Declaration
- e. Ship's stores declaration

IMOFAL\_100pD20A-Full.xml

## Annex IV. Results of documents conversions

### 1. Real Document (General Declaration) – DAVID (Arrival and departure report)

MMT IMO FAL Guide\_UNECE-DavidForms + Real Documents(Ukraine)-GD.xlsx

### 2. Real Document (Crew List) - DAVID (Crew List)

MMT IMO FAL Guide\_UNECE-DavidForms + Real Documents(Ukraine)-CrewList.xlsx