Green and efficient Danube fleet

"Towards modernisation & greening of Danube inland waterborne sector and strengthening its competitiveness"

Output 4.2 – Guidelines for transport & logistics management

Work Package 4 Preparatory actions

Version 1.1

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2 Abbreviations

Abbreviation	Explanation
ADN	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
AIS	Automatic Identification System
B2B	Business-to-Business → exchange of information between business (commercial aspects)
B2G	Business-to-Government
CEF	Connecting Europe Facility
DINA	Digital Inland Waterway Area
DSM	Digital Single Market
DTLF	Digital Transport and Logistics Forum
eFTI	Electronic Freight Transport Information
EHDB	European Hull Database
eIDAS	National electronic identification schemes (eIDAS Regulation ensures that people and businesses can use their own national electronic identification schemes (eIDs) to access public services in other EU countries where eIDs are available)
eIDs	National electronic identification schemes (eIDAS Regulation ensures that people and businesses can use their own national electronic identification schemes (eIDs) to access public services in other EU countries where eIDs are available)
ENCs	Electronic Navigational Charts
ECQDB	(Future) European Crew Qualification Database
ERDMS	European Reference Data Management System
ERI	Electronic Reporting International
ERINOT	Electronic Reporting Notification message to report the voyage in inland navigation. Upon departure of the vessel the skipper will report electronically to the competent waterway authorities through the standard electronic reporting (ERINOT) message. The information is similar to the information

	reported through for instance the VHF and consists of among others the name of the vessel, the cargo and its details, the people on board, the destination and the route the vessel wants to take
ERP	Enterprise Resource Planning
ETA	Estimated Time of Arrival
EU	European Union
GDPR	Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation)
GPS	Global Positioning System
INDanube	Centre for Innovation Transfer in the Danube Region
Inland ECDIS	A system used within the meaning of the current Inland ECDIS Standard for displaying electronic navigational charts for inland waters and associated information, that displays selected information from proprietary electronic navigational charts for inland waters and optionally information from other sensors of the craft
IT	Information technologies
IWT	Inland Waterway Transport
NIS Directive	Directive on security of network and information systems
NtS	Notices to Skippers
PDM	Pro Danube Management
RIS	River Information Services
RIS COMEX	CEF Funded project 2016-2020. www.riscomex.eu
VHF	Very High Frequency (denoting radio waves of a frequency of c. 30–300 MHz and a wavelength of c. 1–10 metres)
VTT	Vessel Tracking and Tracing

3 Introduction

One of the objectives of the GRENDEL project is to improve transport & logistics management processes of fleet operators making use of digitalization and considering available tools and services, including RIS, as well as future requirements derived from modern global logistics. In the framework of GRENDEL, the present guidelines for transport and logistics management were prepared.

As reminder, the Council adopted following conclusions on the digitalisation of transport in January 2018 which underlined the importance of this issue for the European economy and competitiveness:

- Comprehensive and **multimodal digitalisation strategy** for the transport sector
- Importance of the **GDPR** for the transport sector
- **Impact** of automation and digitalisation of transport **on society**
- Continuation of the work of **Digital Transport and Logistics Forum** (DTLF)
- Encourages railway, logistics, maritime and the inland waterway transport sectors to **share data**

3.1 The framework of digitalisation in IWT

Digitalisation in transport and logistics is considered to be an important driver for efficiency and simplification. It could also lower the costs by making better use of resources and existing infrastructures. Moreover, digitalisation creates new opportunities for business and has the potential to change the way cargo and traffic flow will be organised and managed in the future.

The framework of digitalisation in IWT is constituted by the following main elements:

- **River Information Services**
  The RIS Directive[1] establishes a framework for the deployment and use of harmonised, interoperable and open River Information Services (RIS). It requires Member States to develop and implement RIS in an efficient, expandable and interoperable way and to provide interfaces with transport management systems and commercial activities. Member States must provide RIS users with the data necessary for voyage planning, electronic navigational charts for waterways and notices to skippers shall be provided as standardised, coded and downloadable messages. In line with the RIS Directive, the Commission laid down technical guidelines and specifications for RIS through five implementing acts[2].

[1] Directive 2005/44/EC of the European Parliament and of the Council of 7 September 2005 on harmonised river information services (RIS) on inland waterways in the Community

[2] Commission Regulation (EC) No 414/2007 concerning the technical guidelines for the planning, implementation and operational use of RIS; Commission Implementing Regulation (EU) No 909/2013 on the technical specifications for the electronic chart display and information system for inland navigation (Inland ECDIS); Commission Regulation (EU) No 415/2007 concerning the technical specifications for vessel tracking and tracing systems (as amended by Commission Implementing Regulation (EU) No 689/2012); Commission Regulation (EU) No 164/2010 on the technical specifications for electronic ship reporting in inland navigation (as amended by Commission Implementing Regulation (EU) 2019/1744); Commission Regulation (EC) No 416/2007 concerning the technical specifications for Notices to Skippers (as amended by Commission Implementing Regulation (EU) 2018/2032)

- **Digital Inland Navigation Area (DINA)**
  DINA is a concept which aims to **interconnect information on infrastructure, people, operations, fleet and cargo** in the inland waterway transport sector and to connect this information with other transport modes. This concept will be developed later in the document.

- **Digital Transport and Logistics Forum (DTLF)**
  The DTLF is a group of experts that brings together stakeholders from different transport and logistics communities, from both the private and the public sector, with a view to build a common vision and road map for digital transport and logistics. The DTLF also contributes to identifying needs for measures at EU level and supporting their development and implementation where relevant[3].

- **CEF Building Blocks**
  The CEF Building Blocks are tools consisting of eID, eSignature, eDelivery, eInvoice and eTranslation which aim to ensure interoperability between IT systems and to facilitate the delivery of digital public services across borders, while the relevant rules and regulations (e.g. the eIDAS Regulation and the GDPR) are fully complied with.

3.2 River Information Services

River Information Services have been developed with a view to providing telematics systems in particular Inland AIS in order to enhance safety of traffic and establishing comprehensive information services (inland ENCs, fairway information systems, notices to skippers, etc.) in order to increase efficiency of inland waterway transport. The figure below provides a simplified overview of the current RIS System.

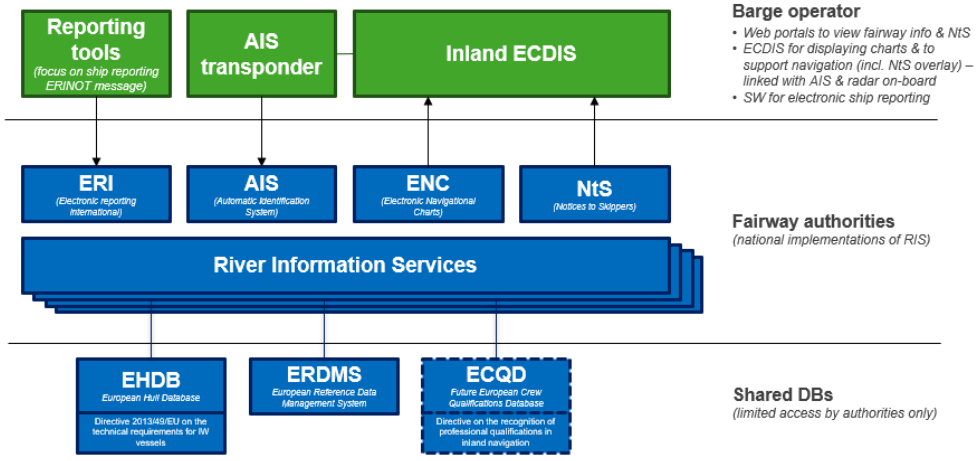


Figure 1: Current RIS System (simplified) – © DINA (amended by INDanube / PDM)

[3] https://www.dtlf.eu/

3.3 Legal and commercial bottlenecks for sharing data

Several legal and commercial bottlenecks are existing in the sharing data. The summary below is based on the findings consolidated in DINA.

Privacy legislation

- European Hull DB (EHDB): underlying regulations **prohibit data sharing with 3rd parties** (only fairway authorities and other actors specified in the service agreement for EHDB).

- Location: skippers & crew living on the vessel → The **position** is not considered personal data (acc. to EU Data Protection Directive 95/46/EG), BUT it can be considered as such when linked to other identifying info about persons on-board.

- Crews & their qualifications: IWT workers' qualification directive ... *personal data may be processed only for the purposes of implementation, enforcement and evaluation of the directive and exchange of information between the authorities and producing statistics* → **the re-use of data for other purposes or controlled sharing with 3rd parties is not foreseen.**

Commercial sensitivity

- RIS directive ... *"the introduction of RIS should not lead to uncontrolled processing of economically sensitive data relating to market operators"* (e.g. to traffic patterns and individual voyages and calls in terminals. Fairway authorities can collect this data for VTT purposes, **but it is not intended to share this data with 3rd parties**.)

Liability

- Based on voyage plans & traffic patterns it is possible for a fairway authority to calculate ETAs or schedule lock operations → However delays may happen and potential providers of such services want to limit liability or are reluctant to share such data at all.

Commercial agreements

- Customer-supplier specific agreements require **certain level of confidentiality** regarding details of the **cargo carried** and the **specific customer** served.

4 Digital Inland Waterway Area

The "Digital Inland Waterway Area - Towards a Digital Inland Waterway Area and Digital Multimodal Nodes" study was finalised in October 2017[4]. The study helps to frame the discussion on the digitalisation of the inland waterways transport sector. DINA is a concept which aims to **interconnect information on infrastructure, people, operations, fleet and cargo** in the inland waterway transport sector and to connect this information with other transport modes. DINA identified three areas where digitalisation is critically important for IWT:

1. The improvement of navigation and management of traffic: this is necessary to make more efficient use of the capacity of the infrastructure and to reduce fuel costs for vessel operators.
2. The integration with other modes of transport, especially in multimodal hubs: this is necessary to optimise processes in terminals and to allow for improved integration of IWT in supply chains and multi-modal logistics operations, thereby potentially attracting additional customers.
3. A reduction of the administrative burden: reducing the number of business-to-government declarations (thereby saving costs & improving efficiency) and making law-enforcement more efficient and effective.

In the following figure, a simplified overview of the actors involved in the digitalisation of IWT is given.

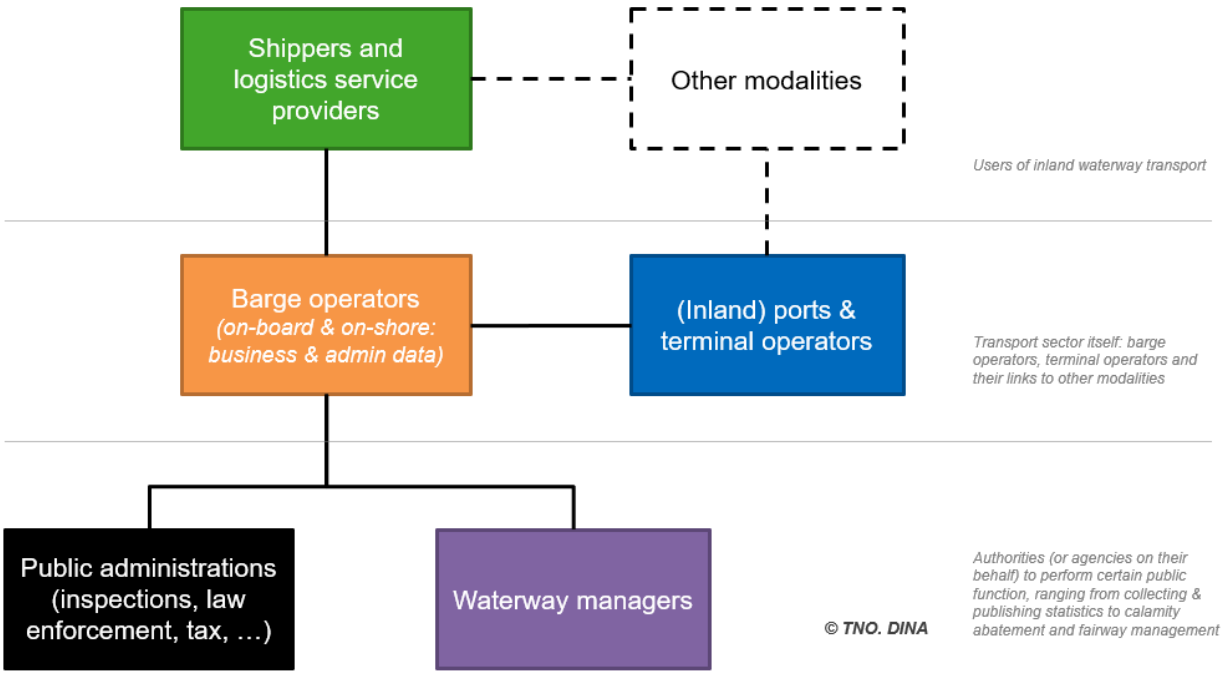


Figure 2: Simplified overview of actors involved in the digitalisation of IWT – © TNO. DINA

[4] https://ec.europa.eu/transport/sites/transport/files/studies/2017-10-dina.pdf

An architecture is proposed that allows for the controlled sharing of this information which can serve as a platform for future developments.

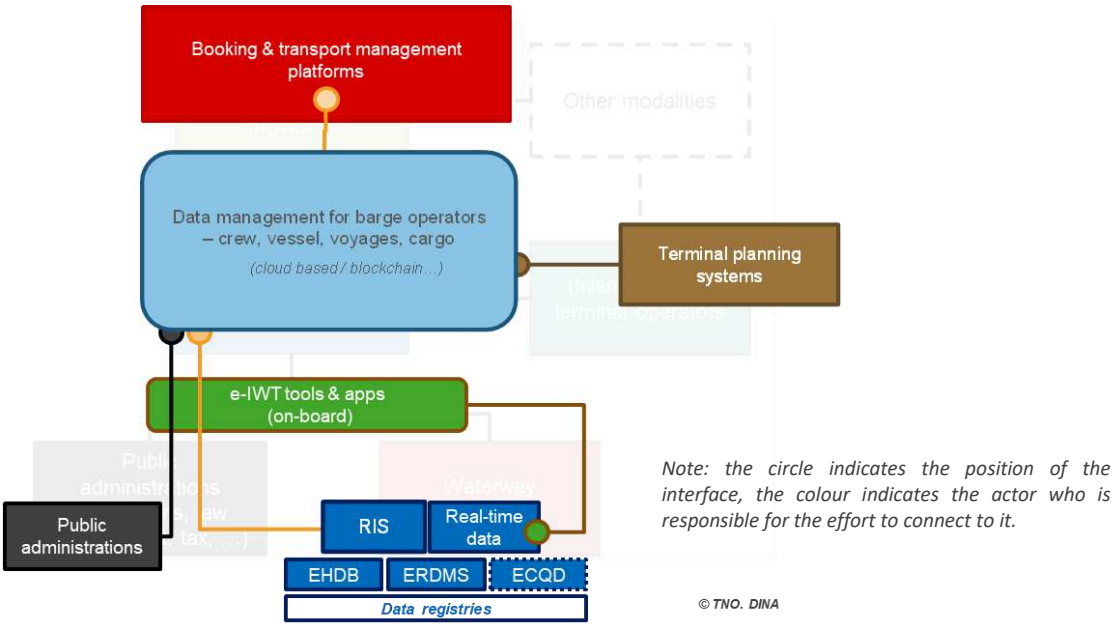


Figure 3: DINA architecture (1) – © TNO. DINA

- **An extension of RIS**: providing additional (real-time) data between infrastructure managers and barge operators, making it more interoperable and useable for barge operators using new on-board e-IWT tools and applications

- **Data platform(s) for barge operators**: allowing them to control their own data and operations. This should allow barge operators to share data in a controlled way with other stakeholders such as public authorities (for reporting purposes), (inland) ports and terminals

- **Integration with booking and transport management platforms of shippers and logistics service providers**. This should provide better visibility and better integration of IWT in the full logistics chain covering multiple modalities

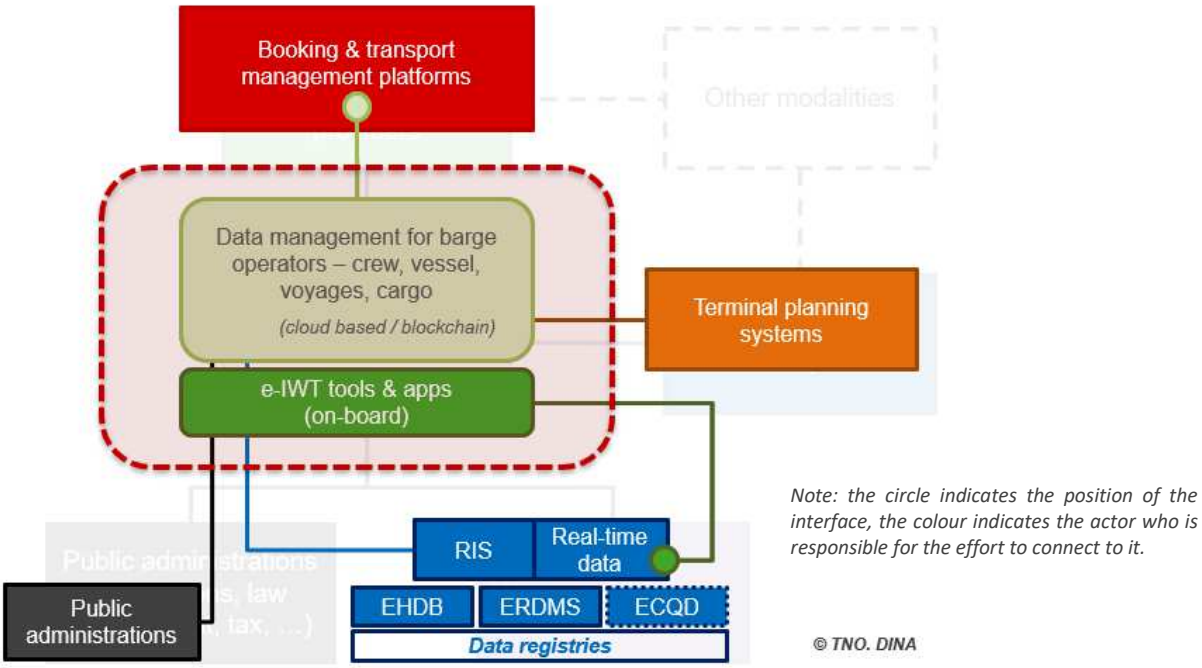


Figure 4: DINA architecture (2) – © TNO. DINA

- **A data platform for barge operators**: allowing theme to control their own data and operations. This should allow barge operators to share data in a controlled way with other stakeholders such as public authorities (for reporting purposes), (inland) ports and terminals

5 Data and processes analysis

The figure below illustrates the different sources of data available which are described in the figure below.

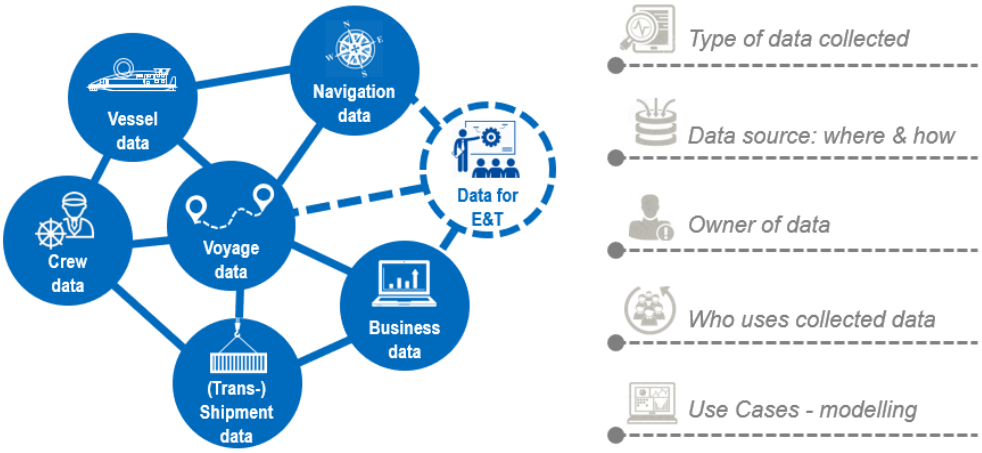


Figure 5: Data and processes analysis – Starting point

5.1 Vessel related data

The vessel related data are listed below per category.

Logbook

- Logbook with data entered daily or immediately when happen
- Oil control book
- *Attestation steam boilers, other pressure vessels*
- *Attestation for liquefied gas installations, etc.*

Documentation

- Inland navigation vessel certificate
- Installation and performance certificate for navigational radar installations and rate-of-turn indicators, for Inland AIS equipment and for tachographs in inland navigation
- Ship Station Licence (radio communication frequency)
- The Guide concerning the radiotelephone service on Inland Waterways

Reporting

To navigation authorities

- (mandatory on Rhine) Electronic reporting for container transport – for controlling purpose
- (mandatory on Rhine) Electronic reporting for tank ships – for controlling purpose

To port authorities

- Electronic reporting towards ports – for port fees, use of port facilities, info about "greening labels" for incentives provided by ports if the vessel is green etc.

Ship operation data

Inland AIS

- **Ship positions** & co. Purpose: traffic image & planning for authorities. Ownership: ship-owner. Collected: AIS transponder

Technical data

- engine performance, consumption & maintenance, div. monitoring alarms etc. → Purpose: (1) skipper to monitor the current operation; (2) technical department of fleet operator e.g. to optimise maintenance intervals, analyse sailing behaviour & optimise fuel consumption, voyage optimisation – bunkering, etc. Ownership: ship-owner. Use of sensors, IoT, AI, Data Analytics

5.2 Crew related data

The crew related data are listed below per category.

Documentation

- Skipper certificate
- Certificate for navigating using radar
- Radio operator's certificate
- ADN certificate
- Etc.

Service record book

- The service record book enables the boatman to attest his physical and mental fitness, his experience in navigation, and his qualification: section listing journeys undertaken; listing of qualifications obtained...

Ownership: each crew member. Linked to the Logbook (in vessel related data)

Logbook (vessel & crew)

A logbook must be kept in the wheelhouse of every vessel, with the exception of port tugs and pushers, crewless push barges, Administration service boats and recreational craft. Responsibility for the presence of the logbook and the entries it must contain lies with the boatmaster.

- Daily: operating mode, crew, for each crew member sailing and resting times
- Immediately: the time of the start of the first voyage of the day and the time of the end of the last voyage of the day, working times of each crew member, changes during sailing

5.3 (Trans-)Shipment related data

The (Trans-)Shipment related data are listed below per category.

Discharge certificate

- Proof of unloading, cleaning of the ship, taking over of transfer residue, washing water etc.

Loading certificate

- Proof of the obligation of the carrier in inland navigation to deliver the freight to the holder of the loading certificate at the port of destination

Bill of lading

- Proof of the obligation of the carrier in inland navigation to deliver the cargo at the port of destination to the holder of the bill of lading (content in many items identical to the consignment note

Shipping declaration

- A transit declaration (also: dispatch note) is an accompanying document for the cross-border transport of goods

Load / unloading plan

- Overview of loading conditions / stowage plan of inland vessel in preparation for loading / unloading
- Etc.

5.4 Voyage planning data

The voyage planning data are listed below per category.

Notices to Skippers

- Info on maintenance work, temporary navigation limitations, etc.,
- information on ice conditions, water levels & predictions (increased prediction times),
- lock information (operating hours, closures)

Ownership: public available sources e.g. via RIS / NtS

Position data & ETA

- Real-time ship position and estimated time of arrival data (tracking / tracing)
- Collected: AIS / GPS transponder
- Purpose: Optimise vessel planning, interface with ports and other modes of transport

Ownership: ship-owner

Status information to supplies

- Like „Proviant“, supply of parts, fuel supply
- Collected: skipper
- Purpose: optimisation of voyage planning, when / where to bunker, get supplies on board, etc.
- Ownership: ship-owner

5.5 Data relevant to navigation

The data relevant to navigation are listed below per category.

Different systems available for navigational purposes (as data sources)

- Inland AIS
- Radar
- RIS
- Inland ECDIS
- VHF
- Etc.

→ The available equipment generates data which is spread through the public infrastructure, e.g. position data.

→ This data is not suitable for the commercial use.

Data important for navigation

- **Position** (and condition) of own ship and other ships
- Information on the voyage (including water level, draft, currents, distances to e.g. bridges, quay walls, lock gates)
- Traffic information and weather information
- Lock information
- Berth and temporary transhipment points

Assistance systems

On-board systems

- Anemometer: wind speed and wind direction
- Tools / instruments for depth measuring
- Flowmeter
- Turning speedometer

Assistance functions

- Autopilot
- Mooring assistant
- Web guide assistant
- Track keeping system
- Controllers: for propellers, rudders, main & bow thruster, etc.

6 Requirements and logistics processes of representative fleet operators

In order to have the digitalisation providing tangible benefits to the fleet operators and the crew, services (also based on River Information Services) of added value shall be provided. The following tables summarise the respective requirements of some representative fleet operators:

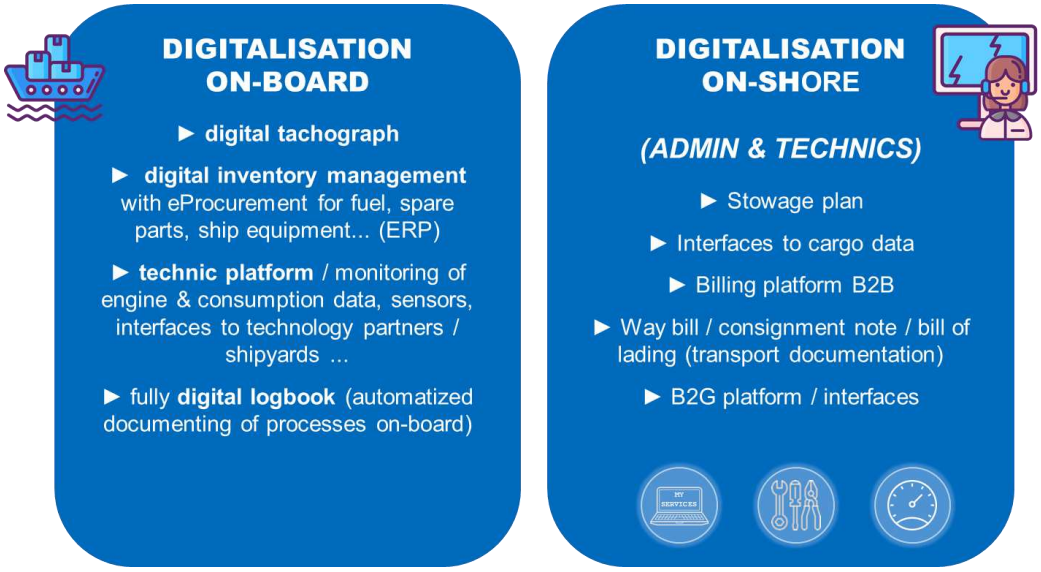


Figure 6: Use cases – modelling (1)

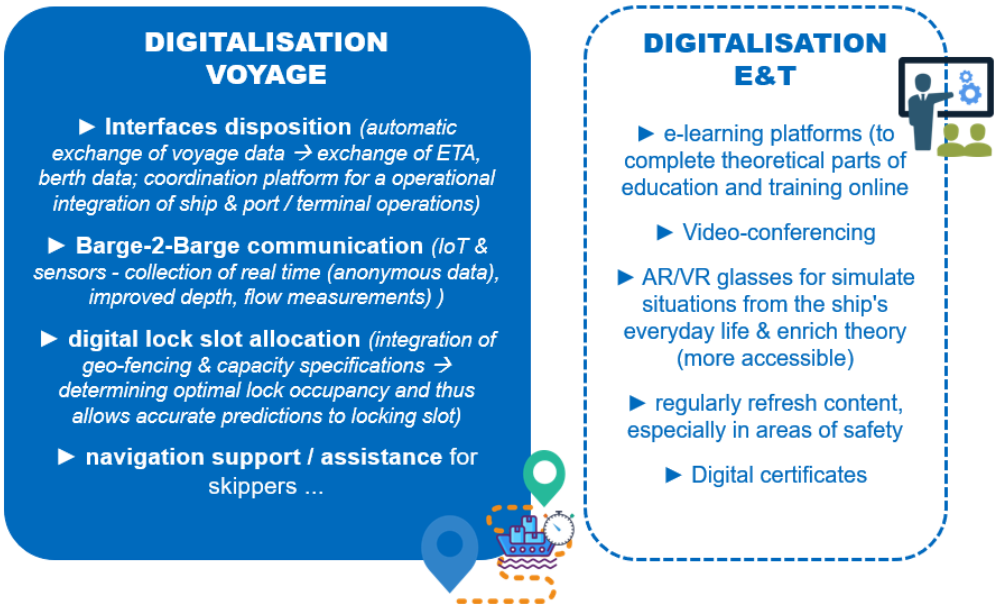


Figure 7: Use cases – modelling (2)

An ideal data platform, containing the information about the crew, cargo, vessel and voyages, acts as a digital backbone for logistics processes involving IWT. It shall not only contain necessary data, but it shall also support the enterprise resource planning and fleet management processes in order to provide state of the art complex logistics solutions for the customers. Such a platform shall focus on the following aspects in line with the administrative and commercial requirements in international logistics:

- **Commercial** aspects covering
  - Order management
  - Cargo management

- **Technical** aspects (vessel operation and maintenance) addressing technologies used onboard, vessel operation related activities and supply, service and maintenance

- **Operational** aspects
  - Voyage planning and voyage execution/navigation

- **Administrative** processes like human resources, accountancy
  - Crew/Human resource management
  - Financial management/invoicing

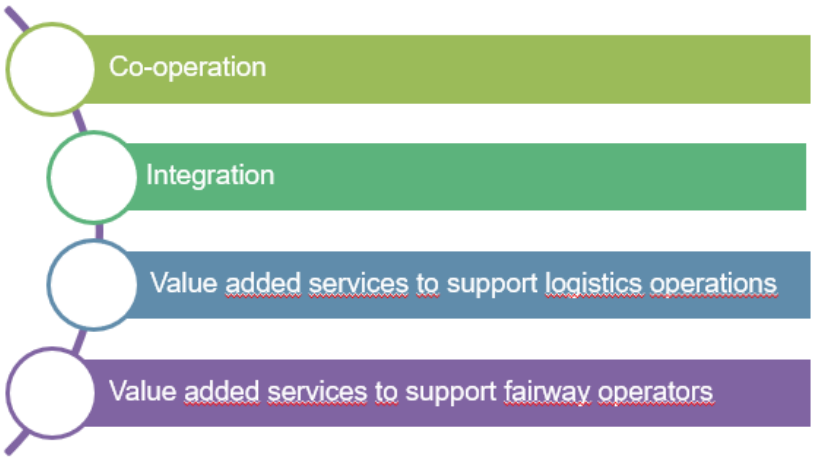
In case when the sector is provided with such a package of services, more cargo can be attracted to Danube IWT and processes can be made more lean, thus a major step can be done towards greening the Danube fleet and the logistics. These aspects have been taken up during the respective discussions which are reflected in Chapter 8.

7 Recommendations on the use and integration of tools, digital data and services in logistics processes

Besides environmental & economic performance, Danube IWT needs improved IT based logistics processes for full integration into managed logistics chains of industry.

The recommendations are mainly addressed to target groups as logistics stakeholders, national / services involved in RIS, public authorities, actors active in IWT projects and initiatives and IWT stakeholders in general.

They are summarised around four key elements:



7.1 Recommendations in the area of co-operation

Some recommendations are putting the focus on the importance for all actors of the IWT sector to constantly exchange views on ongoing developments:

- Continuous co-operation of the national services involved in RIS
- Continuous co-operation between authorities and logistics stakeholders
- Take-over of deployments and deployment experiences from relevant projects and initiatives
- Elaboration of further development plans by considering user feedback
- Promotion of national best practices on international level (e.g. usage of PAXLST)
- Integration of solutions (such as information with relation to port / terminal / berth

management, statistics, waste disposal)

- Development of a central RIS website (one-stop-shop) in line with the relevant actions´ and initiatives´ content and keeping it up-to-date
- Development of a central mobile application with continuous updates in a reasonable manner

7.2 Recommendations in the area of integration

Some recommendations are dealing with the topic integration:

- All countries shall participate in the international exchange of RIS data with special focus on position and electronic reporting data
- All countries shall connect to the European Hull Database
- Continuous elaboration and publication of inland electronic navigational charts and providing updates
- Permanent provision of reference data and their updates concerning the entire Danube section into the ERDMS
- Application of the corridor-level planning and management supporting the better utilisation of the Danube as an international transport backbone
- Maximal possible harmonisation of the IT solutions with the partner countries´ systems
- All countries shall participate in the international exchange of RIS data with special focus on position and electronic reporting data
- Permanent consultation with the sector:
  - Logistics stakeholders
  - Shipping companies
  - Authorities

7.3 Recommendations in the area of value-added services to support logistics operations

A set of recommendations concerns value-added services to support logistics operations. They are about the development and provision of value-added services based on the data derived from the RIS systems:

- Operative usage of the electronic reporting infrastructure and acceptance of ERINOT, ERIRSP and PAXLST messages as fulfilment of reporting requirements
- Automation of statistical data collection by using RIS information
- Providing real-time information towards the connected systems in order to provide complex and integrated services for the IWT sector (e.g. Danube FIS Portal) for the sake of (voyage) planning
- Providing standardised interfaces for the logistics stakeholders that enables them to fulfil reporting requirements, and to retrieve and integrate data into their own systems
- Harmonised use of the DAVID forms

7.4 Recommendations in the area of value-added services to support fairway operators

Some recommendations are linked with value-added services to support fairway operators and are mostly addressing the use of RIS data:

- Integration of RIS data provided by the waterway management organisations with updates, including the inland electronic navigational charts´ basic data, water level and fairway marking information etc.
- Utilisation of RIS data when elaborating the fairway marking plan
- Analysis and utilisation of RIS data when planning and rolling out maintenance dredging

8 Sector requirements and approach for greening and digitalisation, including RIS

The sector has proactively developed its needs and requirements list which has been integrated into the document "AN INLAND WATERWAY TRANSPORT AGENDA FOR EUROPE 2021-2027". Pro Danube International is an active contributor to this work as member of the Naiades II Implementation Expert Group.

In order to respond to the Green Deal and Digital Europe initiatives of the European Commission, the sector formulated two focus areas in the above document:

1. MOVING MORE TRANSPORT TO INLAND WATERWAYS – Creating smart, safe and sustainable mobility by making inland waterway infrastructure and shipping fit-for-future and by integrating inland navigation into multimodal mobility of people and freight so inland waterway transport unfolds its full potential. This shall ultimately lead to an increase in the modal share of inland waterway transport, a reduction of road congestion, safer and more reliable transport, quality jobs and a more sustainable transport system as a whole;

2. ZERO-EMISSION INLAND NAVIGATION - Contributing to Europe's zero-emission and decarbonisation ambition embedded in a coordinated transport and energy policy to pool resources among energy and transport actors to operate on renewables and supply clean fuel to transport, households and industries. Inland navigation is ideally placed to do so, as it is most energy-efficient, a pre-requisite for decarbonised and zero-emission systems.

The main action areas in which to tackle the two core challenges mentioned above were identified during the brainstorm session of the Naiades II Implementation Expert Group on 9 September 2019 **(where PDI has also inputted the sector needs identified in the Danube Region towards all perspective, including digitalisation / RIS)**:

1. People: create an attractive work place with high social, qualification, safety and security standards;
2. Fleet: enable the transition towards zero-emissions and decarbonisation of the fleet while safeguarding competitiveness and safety;
3. Infrastructure: achieve the continuous and reliable navigability of the trans-European inland waterway network and ensure swift links to other modes while assuring sustainability of infrastructure, protecting the environment and adapting to climate change;
4. **Digitalisation: develop and use digitalisation as an instrument to support the developments towards smart and sustainable jobs, fleet and infrastructure connected to other transport modes and sectors.**

The action areas are intertwined, hence an integrated approach is required in order to reach results. This approach can be illustrated via the following scheme:

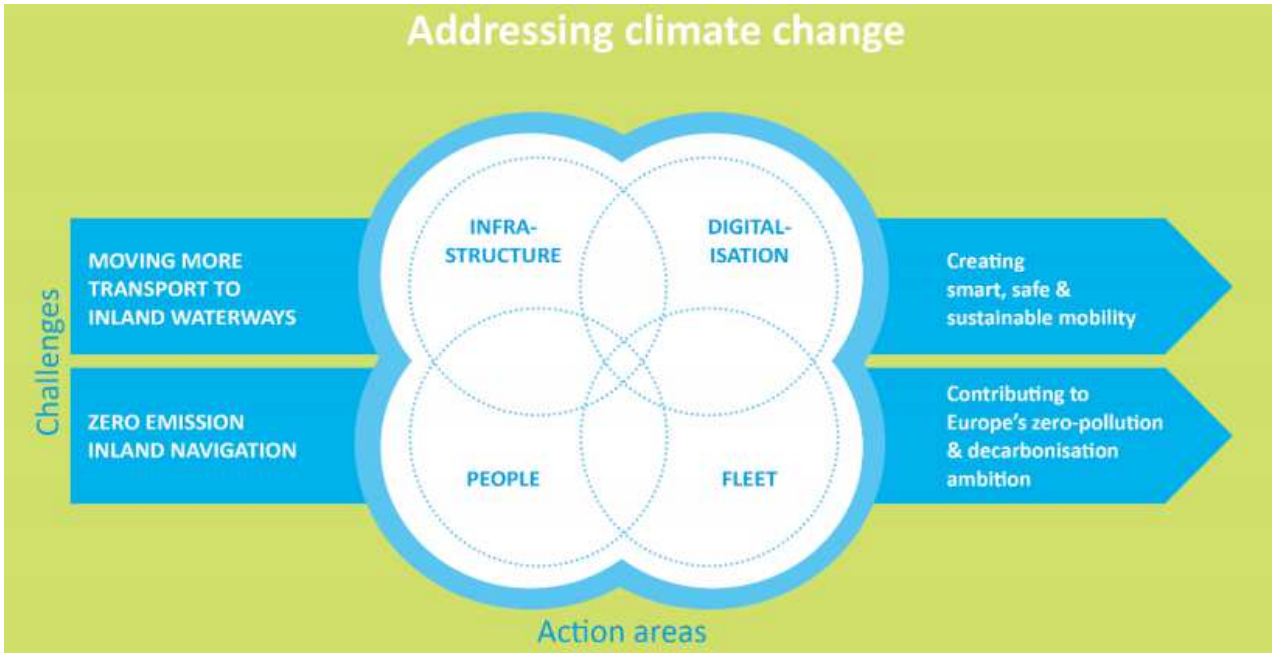


Figure 8: Addressing climate change – © Naiades II implementation expert group

For each of the challenges, ambitions towards 2050 and activities in priority action areas for the period 2020-2027 have been outlined. For digitalisation the following is recommended:

Digitalisation is not regarded as a self-serving purpose. Digitalisation makes the use of inland waterway transport more accessible and helps to make ports, locks and vessels work more efficiently. Smart, connected, cooperative and automated shipping takes root in inland waterway transport with all relevant tools (river information services, databases and platforms, intelligent infrastructure, onboard and on-shore digital tools, electronic documents, cyber risk management including well defined fall back scenarios if risks materialise etc.) and fosters synchro-modality. Development and full implementation of an overarching digitalisation framework centred on the Digital Inland Navigation Area (DINA) includes inter alia the revised River Information Services (RIS), electronic freight transport information (eFTI), smart shipping and multimodal data interoperability including Internet of Things (IoT). Moreover, organising and conducting carriage of cargo or persons is eased by harmonised services accessible through single points of access. For the re-use of data and a lean data management, it is analysed which operational databases are needed by the different transport modes, which are then integrated in a wider cross-disciplinary operational service. This supports logistics users in their strategic and operational decisions and facilitates economic management of transport.

As a follow-up, on 30 June 2020 a brainstorming workshop was organised by DG MOVE focussing on the above topics, where PDI was once again active contributor among the stakeholders (river commission, waterway authorities / RIS authorities, other sector organisation). The support to the development and uptake of ICT applications necessary for zero-emission propulsion of inland navigation vessels, but also to further safety and reliability was taken up with high priority.

The attached streamlined guidelines document (Annex 1) was shared with viadonau as EUSDR PA1a and RIS COMEX and serves as constant basis for the sector´s discussions with stakeholders.

9 Conclusions

Several sets of digital data & services are available, however, integration of these is of high importance Europe-wide. The provision of digital services towards logistics stakeholders to support their processes is of high importance.

As the COVID-19 crisis demonstrates, the flow of goods in Europe is a key political and strategic topic that can / shall be supported by digital means:

- Digital documents of the crew
- Digital documents of the vessels
- Digital tracking & tracing of the cargo
- Digital administration of the voyage towards the authorities.

The recommendations of the present document clearly support the achievement of the targets established in the revised EUSDR Action Plan for PA1a[5]:

- ACTION 2: Foster business development
- ACTION 3: Facilitate fleet modernisation
- ACTION 4: Support the further roll-out and enhancement of River Information Services
- ACTION 6: Contribute to the simplification, harmonisation and digitalisation of administrative processes

with which it is to support the optimisation of logistics processes with a green and efficient Danube fleet.

[5] This document is available under the following link: https://danube-region.eu/wp-content/uploads/2020/04/EUSDR-ACTION-PLAN-SWD202059-final.pdf.

10 Annex 1: Streamlined guidelines document

Annex 1: Streamlined guidelines document

Interreg
EUROPEAN UNION
Danube Transnational Programme
GRENDEL

GRENDEL: Green and efficient Danube fleet

Output 4.2

Guidelines for transport & logistics management

Version 1.0 (Final)
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RSOE

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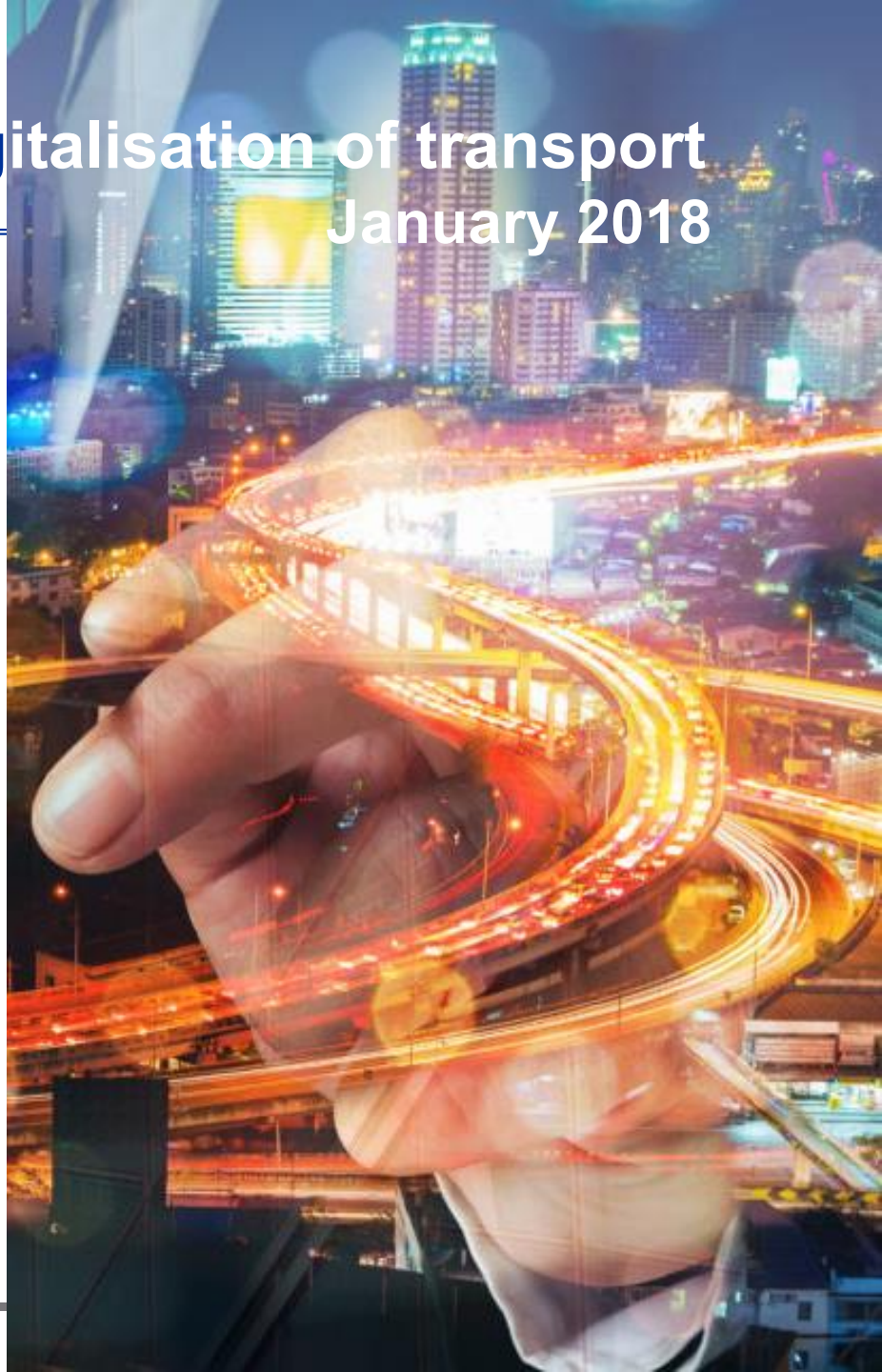
Content

- Digitalisation of transport
- Digitalisation in IWT
- River Information Services
- Use cases
- Guidelines
  - Co-operation
  - Integration
  - Value added services to support logistics operations
  - Value added services to support fairway operators
- Conclusions

Council conclusions on digitalisation of transport
January 2018

- Comprehensive and **multimodal digitalisation strategy** for the transport sector
- Importance of the **GDPR** for the transport sector
- **Impact** of automation and digitalisation of transport **on society**
- Continuation of the work of **Digital Transport and Logistics Forum** (DTLF)
- Encourages railway, logistics, maritime and the inland waterway transport sectors to **share data**



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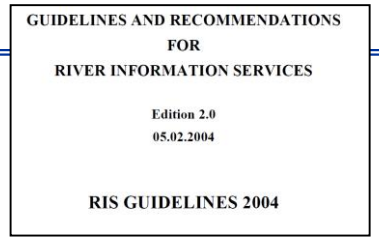
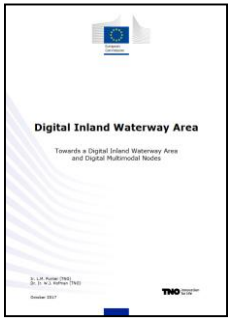
Digitalisation in IWT - framework

River Information Services (RIS)



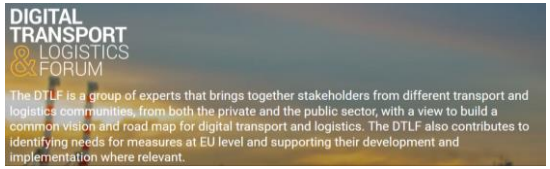
Digital Inland Navigation Area (DINA)

- Hull database
- eIWT: Electronic tool for Inland Waterways Transport → eService Record Books & eLogbooks
- European Crew Database



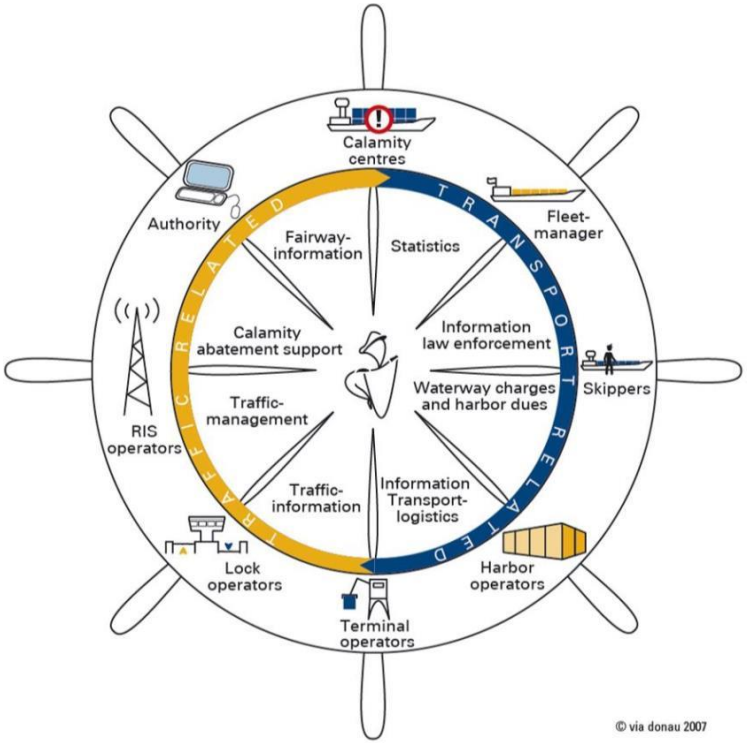
Digital Transport and Logistics Forum (DTLF)

- eFTI – authorities are required to (a) accept electronic cargo transport information made available by operators



CEF Building blocks …

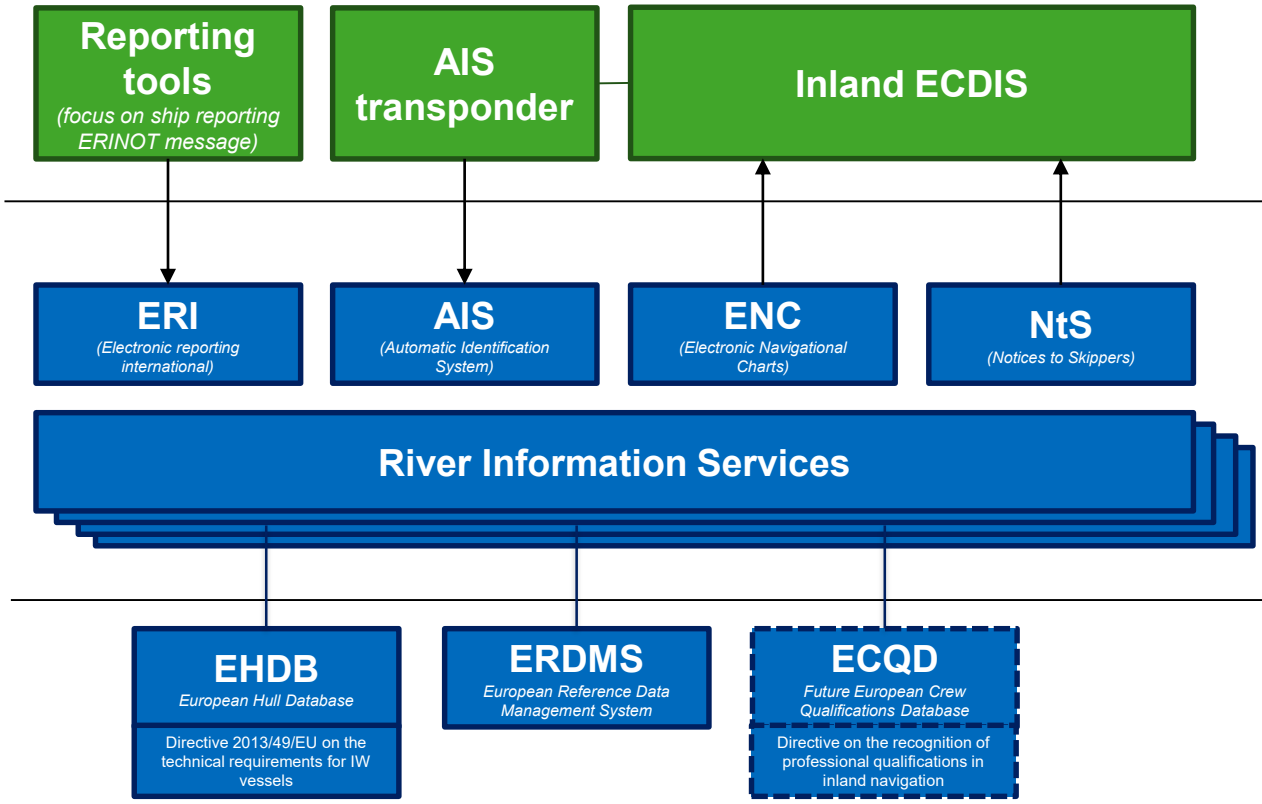
River Information Services



RIVER INFORMATION SERVICES RIS

Telematics Systems and Information Services in order to increase the safety and efficiency of inland waterway transport

Current RIS System *Simplified*



Barge operator

- *Web portals to view fairway info & NtS*
- *ECDIS for displaying charts & to support navigation (incl. NtS overlay) – linked with AIS & radar on-board*
- *SW for electronic ship reporting*

Fairway authorities
(national implementations of RIS)

Shared DBs
(limited access by authorities only)

Legal & commercial bottlenecks for sharing data

Privacy legislation

- European Hull DB (EHDB): underlying regulations prohibit data sharing with 3rd parties (only fairway authorities and other actors specified in the service agreement for EHDB
- Location: skippers & crew living on the vessel →position is not considered personal data (acc. to EU Data Protection Directive 95/46/EG), BUT it can be considered as such when linked to other identifying info about persons on-board.
- Crews & their qualifications: IWT workers' qualification directive ... *personal data may be processed only for the purposes of implementation, enforcement and evaluation of the directive and exchange of information between the authorities and producing statistics* → re-use of data for other purposes or controlled sharing with 3rd parties not foreseen.

Commercial sensitivity

- RIS directive ... *"the introduction of RIS should not lead to uncontrolled processing of economically sensitive data relating to market operators"* (e.g. to traffic patterns and individual voyages and calls in terminals. Fairway authorities can collect this data for VTT purposes, but it is not intended to share this data with 3rd parties.)

Liability

- Based on voyage plans & traffic patterns it is possible for a fairway authority to calculate ETAs or schedule lock operations → however delays may happen and potential providers of such services want to limit liability or are reluctant to share such data at all

Commercial agreements

- Customer-supplier* specific agreements require certain level of confidentiality regarding details of the cargo carried and the specific customer served

Summary based on the pre-findings consolidated in DINA

DIGITAL INLAND WATERWAY AREA

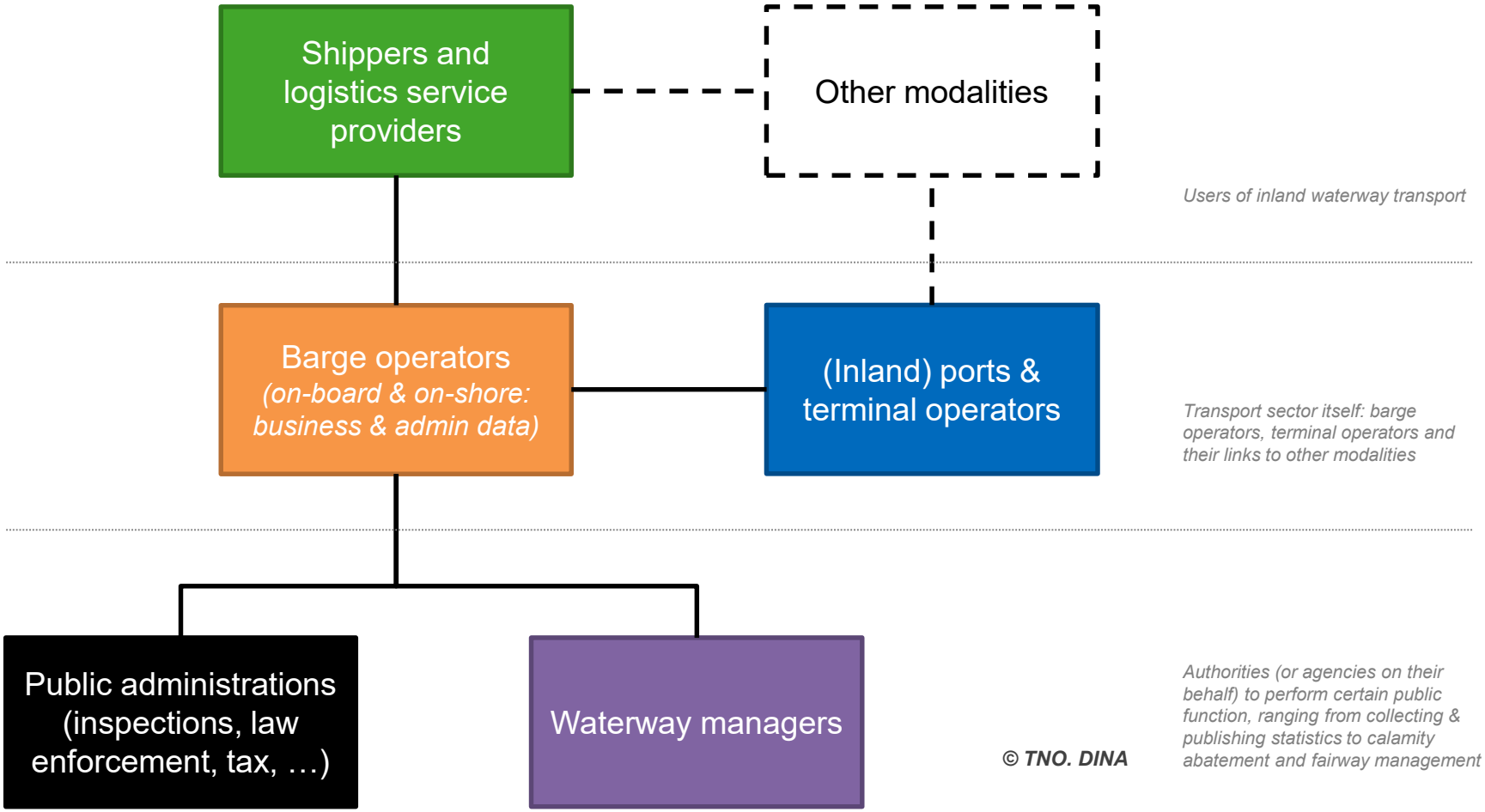
*The proposed Digital Inland Waterway Area (DINA) is a concept to **interconnect information** on **infrastructure, people, operations, fleet and cargo** in the inland waterway transport sector and to connect this information with other transport modes.*

1. More efficient navigation and traffic management

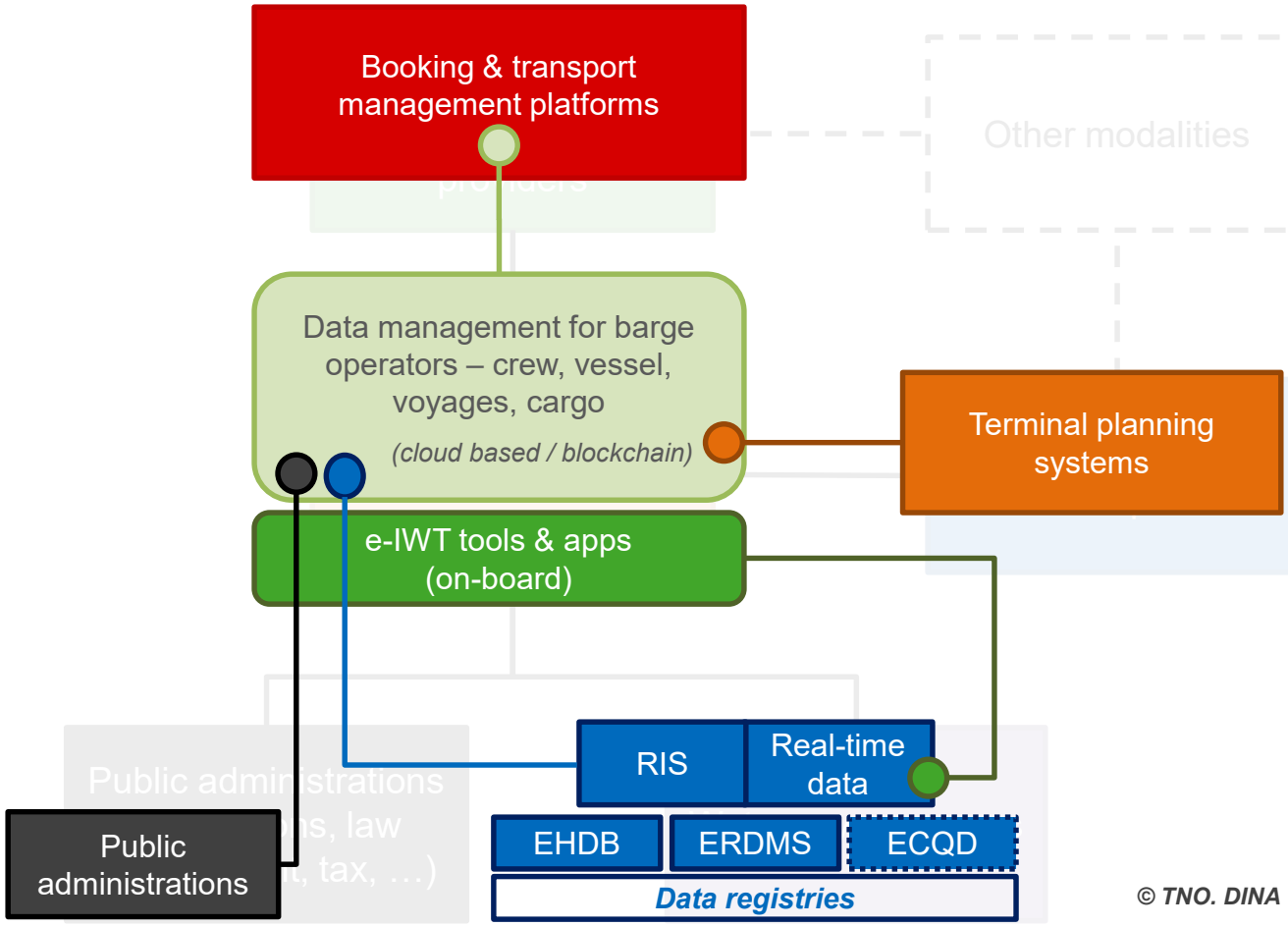
2. Integration in logistics processes

3. Reducing the administrative burden

Digitalisation *Simplified overview of actors*



Digitalisation *DINA Architecture*

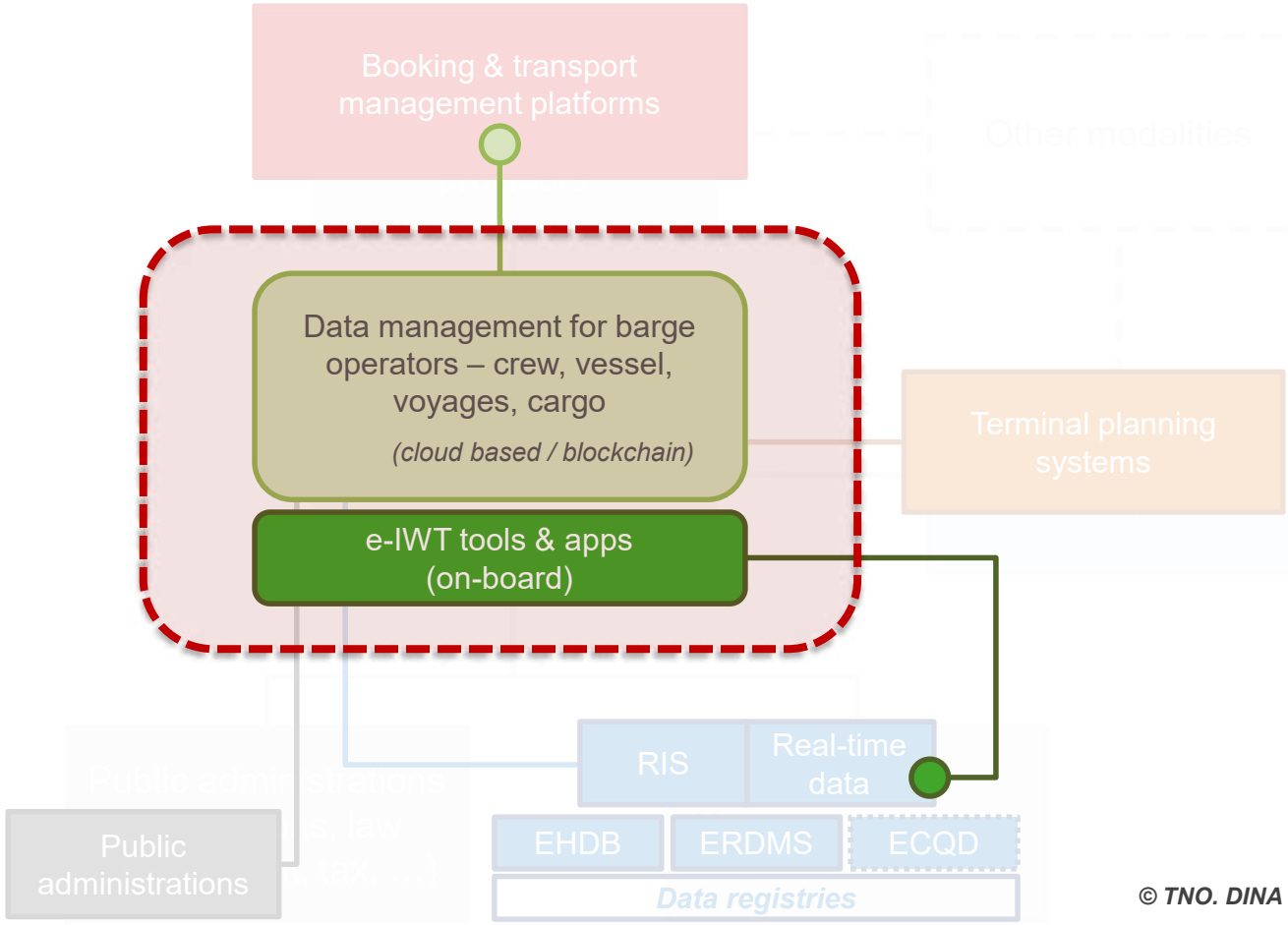


DINA Architecture

- An **extension of RIS**: providing additional (real-time) data, making them more interoperable and making the more useable for barge operators using new **on-board e-IWT tools**
- A **data platform for barge operators**: allowing theme to control their own data and operations. This should allow barge operators to share data in a controlled way with other stakeholders such as public authorities (for reporting purposes), (inland) ports and terminals
- An **integration with booking and transport management platforms of shippers and logistics service providers**. This should provide better visibility and better integration of IWT in the full logistics chain covering multiple modalities

Note: the circle indicates the position of the interface, the colour indicates the actor who is responsible for the effort to connect to it.

Digitalisation *DINA Architecture*



© *TNO. DINA*

DINA Architecture

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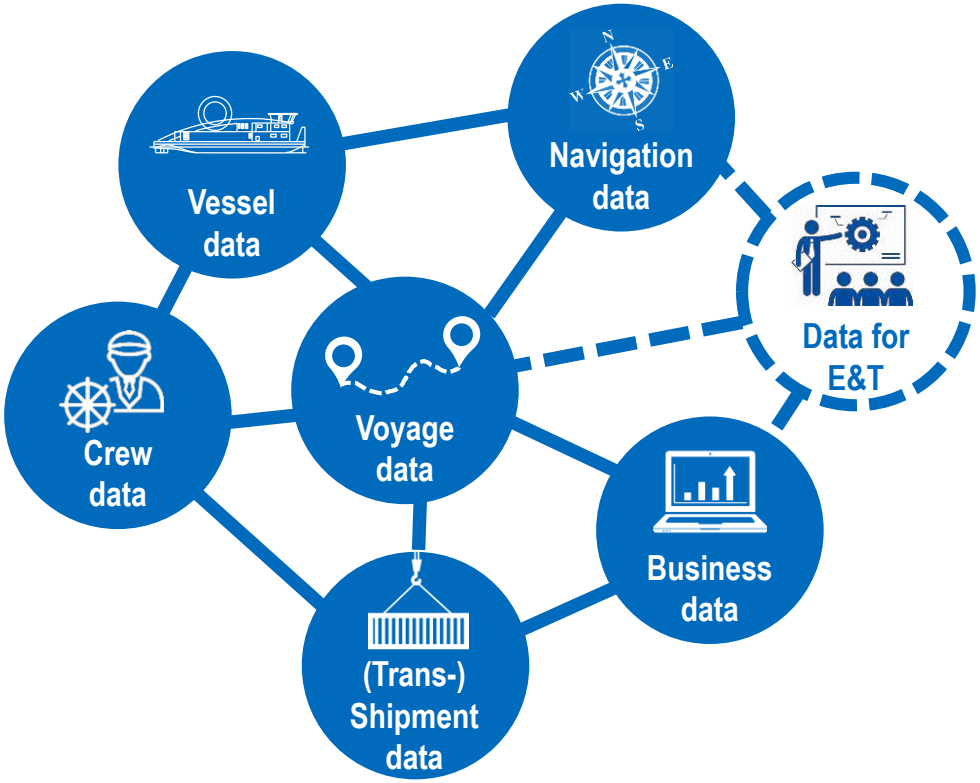
Data & processes analysis *Starting point*



- *Type of data collected*
- *Data source: where & how*
- *Owner of data*
- *Who uses collected data*
- *Use Cases - modelling*

Vessel related data

Logbook

- Logbook with data entered daily or immediately when happen
- Oil control book
- *Attestation steam boilers, other pressure vessels*
- *Attestation for liquefied gas installations ....*

Documentation

- Inland navigation vessel certificate
- Installation and performance certificate for navigational radar installations and rate-of-turn indicators, for Inland AIS equipment and for tachographs in inland navigation
- Ship Station Licence (radio communication frequency)
- The Guide concerning the radiotelephone service on Inland Waterways
- ...

Reporting

To navigation authorities

- (mandatory on Rhine) Electronic reporting for container transport – for controlling purpose
- (mandatory on Rhine) Electronic reporting for tank ships – for controlling purpose

To port authorities

- Electronic reporting towards ports – for port fees, use of port facilities, info about "greening labels" for incentives provided by ports if the vessel is green etc.

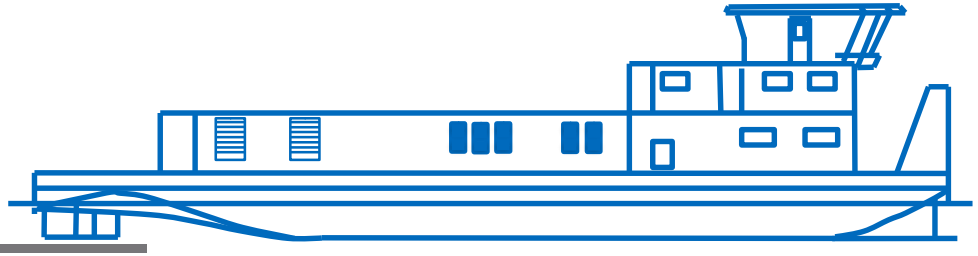
Ship operation data

Inland AIS

- **Ship positions** & co. Purpose: traffic image & planning for authorities. Ownership: ship-owner. Collected: AIS transponder

Technical data

- engine performance, consumption & maintenance, div. monitoring alarms etc. → Purpose: (1) skipper to monitor the current operation; (2) technical department of fleet operator e.g. to optimise maintenance intervals, analyse sailing behaviour & optimise fuel consumption, voyage optimisation – bunkering, etc. Ownership: ship-owner. Use of sensors, IoT, AI, Data Analytics



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Crew related data

Documentation

- Skipper certificate
- Certificate for navigating using radar
- Radio operator's certificate
- ADN certificate
- ...

Service record book

- The service record book enables the boatman to attest his physical and mental fitness, his experience in navigation, and his qualification: section listing journeys undertaken; listing of qualifications obtained...

  Ownership: each crew member. Linked to the Logbook (in vessel related data)

Logbook (vessel & crew)

A logbook must be kept in the wheelhouse of every vessel, with the exception of port tugs and pushers, crewless push barges, Administration service boats and recreational craft. Responsibility for the presence of the logbook and the entries it must contain lies with the boatmaster.

- *Daily: operating mode, crew, for each crew member sailing and resting times*
- *Immediately: the time of the start of the first voyage of the day and the time of the end of the last voyage of the day, working times of each crew member, changes during sailing*

(Trans-)Shipment related data

Discharge certificate

- Proof of unloading, cleaning of the ship, taking over of transfer residue, washing water etc.

Loading certificate

- Proof of the obligation of the carrier in inland navigation to deliver the freight to the holder of the loading certificate at the port of destination

Bill of lading

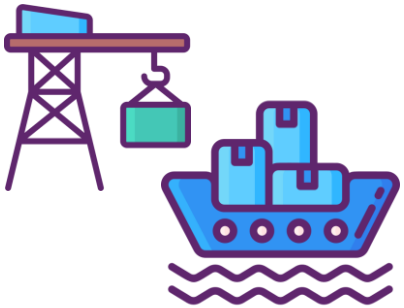
- Proof of the obligation of the carrier in inland navigation to deliver the cargo at the port of destination to the holder of the bill of lading (content in many items identical to the consignment note

Shipping declaration

- A transit declaration (also: dispatch note) is an accompanying document for the cross-border transport of goods

Load / unloading plan

- Overview of loading conditions / stowage plan of inland vessel in preparation for loading / unloading
- ....



Voyage planning data

Notices to Skippers

- Info on maintenance work, temporary navigation limitations, etc.,
- information on ice conditions, water levels & predictions (increased prediction times),
- lock information (operating hours, closures)

Ownership: public available sources e.g. via RIS / NtS

Position data & ETA

- Real-time ship position and estimated time of arrival data (tracking / tracing)
- Collected: AIS / GPS transponder
- Purpose: Optimise vessel planning, interface with ports and other modes of transport
- Ownership: ship-owner

Status information to supplies

- Like „Proviant“, supply of parts, fuel supply
- Collected: skipper
- Purpose: optimisation of voyage planning, when / where to bunker, get supplies on board, etc.
- Ownership: ship-owner

Data relevant to navigation

Different systems available for navigational purposes (as data sources)

- Inland AIS
- Radar
- RIS
- Inland ECDIS
- VHF
- ...

→ Available equipment generates data and spread through the public infrastructure, e.g. position data → not suitable for the commercial

Data important for navigation

- **Position** (and condition) of own ship and other ships
- Information on the voyage (including water level, draft, currents, distances to e.g. bridges, quay walls, lock gates)
- Traffic information and weather information
- Lock information
- Berth and temporary transhipment points

Assistance systems

On-board systems

- Anemometer: wind speed and wind direction
- Tools / instruments for depth measuring
- Flowmeter
- Turning speedometer

Assistance functions

- Autopilot
- Mooring assistant
- Web guide assistant
- Track keeping system
- Controllers: for propellers, rudders, main & bow thruster, etc.

Use cases - modelling

DIGITALISATION ON-BOARD

► **digital tachograph**

► **digital inventory management** with eProcurement for fuel, spare parts, ship equipment... (ERP)

► **technic platform** / monitoring of engine & consumption data, sensors, interfaces to technology partners / shipyards ...

► fully **digital logbook** (automatized documenting of processes on-board)

DIGITALISATION ON-SHORE

(ADMIN & TECHNICS)

► Stowage plan

► Interfaces to cargo data

► Billing platform B2B

► Way bill / consignment note / bill of lading (transport documentation)

► B2G platform / interfaces

Use cases - modelling

DIGITALISATION VOYAGE

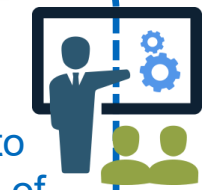
► **Interfaces disposition** *(automatic exchange of voyage data → exchange of ETA, berth data; coordination platform for a operational integration of ship & port / terminal operations)*

► **Barge-2-Barge communication** *(IoT & sensors - collection of real time (anonymous data), improved depth, flow measurements))*

► **digital lock slot allocation** *(integration of geo-fencing & capacity specifications → determining optimal lock occupancy and thus allows accurate predictions to locking slot)*

► **navigation support / assistance** for skippers ...

DIGITALISATION E&T



► e-learning platforms (to complete theoretical parts of education and training online

► Video-conferencing

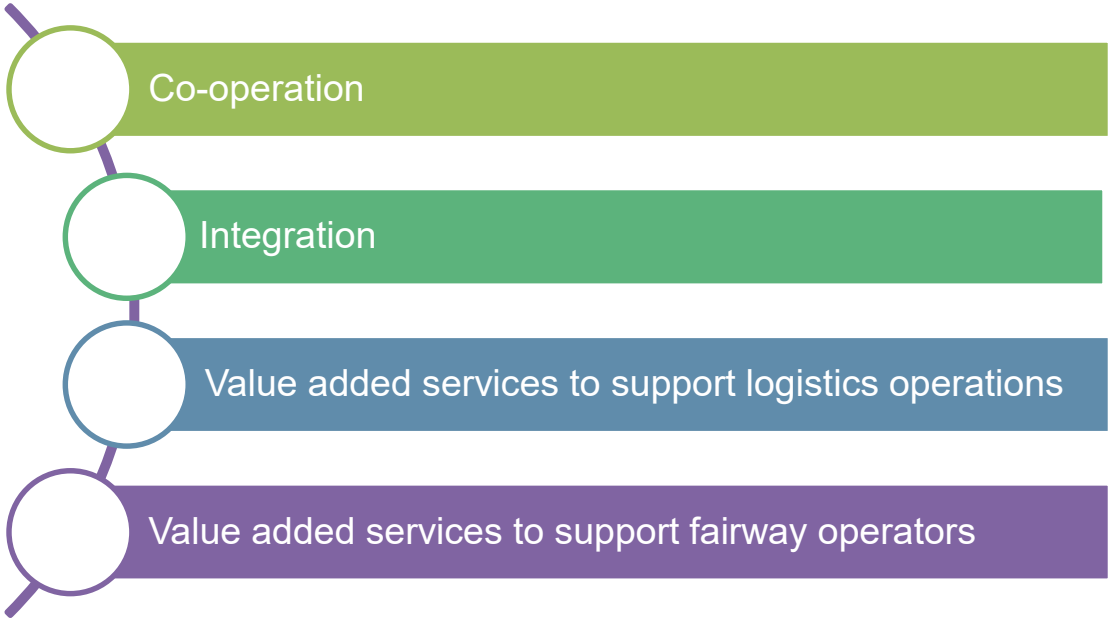
► AR/VR glasses for simulate situations from the ship's everyday life & enrich theory (more accessible)

► regularly refresh content, especially in areas of safety

► Digital certificates

Guidelines (1/5)

- Besides environmental & economic performance, Danube IWT needs improved IT based logistics processes for full integration into managed logistics chains of industry
- **A general concept with recommendations on use & integration of tools, digital data & services in logistics processes was prepared**
- These recommendations are summarised on the following slides around four key elements:



Guidelines (2/5)

- **Co-operation**
  - Continuous co-operation of the national services involved in RIS
  - Continuous co-operation between authorities and logistics stakeholders
  - Take-over of deployments and deployment experiences from relevant projects and initiatives
  - Elaboration of further development plans by considering user feedback
  - Promotion of national best practises on international level (e.g. usage of PAXLST)
  - Integration of solutions (such as information with relation to port / terminal / berth management, statistics, waste disposal)
  - Development of a central RIS website (one-stop-shop) in line with the relevant actions´ and initiatives´ content and keeping it up-to-date
  - Development of a central mobile application with continuous updates in a reasonable manner

Guidelines (3/5)

- **Integration**
  - All countries shall participate in the international exchange of RIS data with special focus on position and electronic reporting data
  - All countries shall connect to the European Hull Database
  - Continuous elaboration and publication of inland electronic navigational charts and providing updates
  - Permanent provision of reference data and their updates concerning the entire Danube section into the ERDMS
  - Application of the corridor-level planning and management supporting the better utilisation of the Danube as an international transport backbone
  - Maximal possible harmonisation of the IT solutions with the partner countries´ systems
  - Permanent consultation with the sector:
    - Logistics stakeholders
    - Shipping companies
    - Authorities

Guidelines (4/5)

- **Value added services to support logistics operations**
  - Development and provision of value added services based on the data derived from the RIS systems, such as:
    - Operative usage of the electronic reporting infrastructure and acceptance of ERINOT, ERIRSP and PAXLST messages as fulfilment of reporting requirements
    - Automation of statistical data collection by using RIS information
    - Providing real-time information towards the connected systems in order to provide complex and integrated services for the IWT sector (e.g. Danube FIS Portal) for the sake of (voyage) planning
    - Providing standardised interfaces for the logistics stakeholders that enables them to fulfil reporting requirements, and to retrieve and integrate data into their own systems
    - Harmonised use of the DAVID forms

Guidelines (5/5)

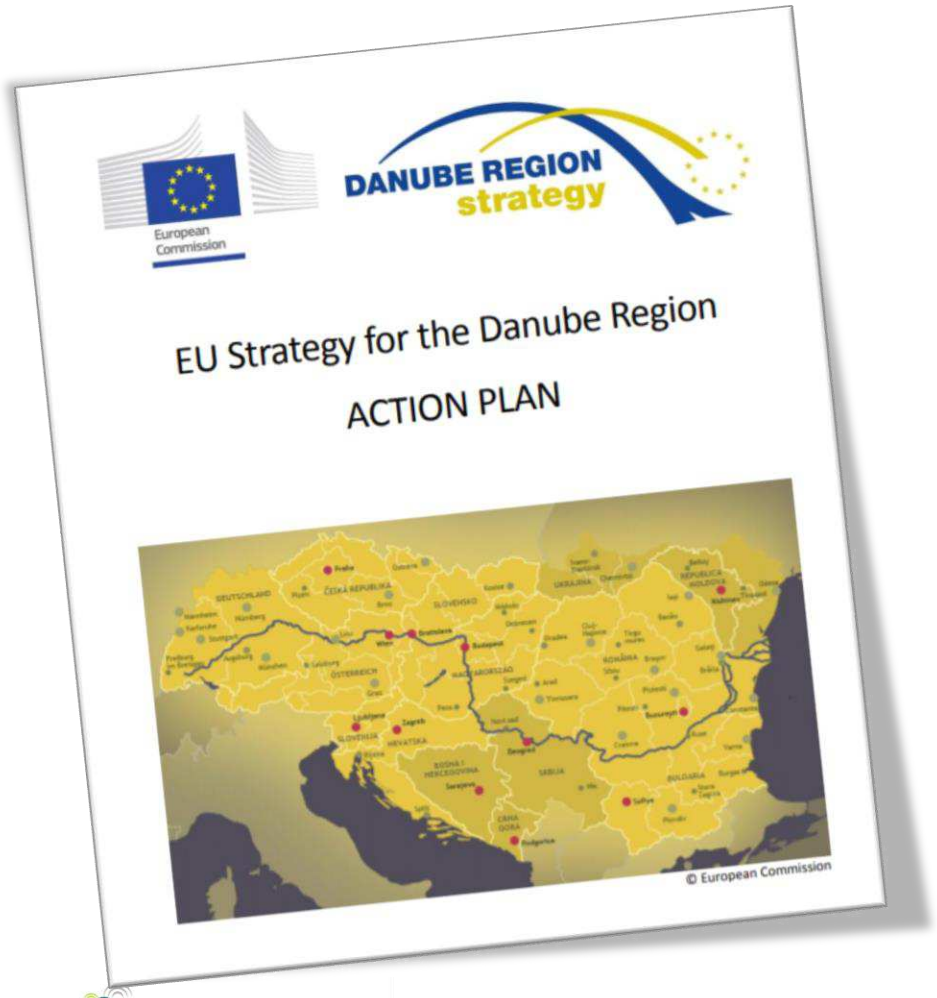
- **Value added services to support fairway operators**

  - Integration of RIS data provided by the waterway management organisations with updates, including the inland electronic navigational charts´ basic data, water level and fairway marking information etc.
  - Utilisation of RIS data when elaborating the fairway marking plan
  - Analysis and utilisation of RIS data when planning and rolling out maintenance dredging

Conclusions (1/2)

- Several set of digital data & services are available, however, Europe-wide integration of these is of high importance
- The provision of digital services towards logistics stakeholders to support their processes is of high importance
- As the COVID-19 crisis demonstrates, the flow of goods in Europe is a key political and strategic topic that can / shall be supported by digital means:
  - **Digital documents of the crew**
  - **Digital documents of the vessels**
  - **Digital tracking & tracing of the cargo**
  - **Digital administration of the voyage towards the authorities**

Conclusions (2/2)



The GRENDEL project and the recommendations of it clearly support the achievement of the targets established in the revised EUSDR Action Plan´s for PA1a

ACTION 2: Foster business development

ACTION 3: Facilitate fleet modernisation

ACTION 4: Support the further roll-out and enhancement of River Information Services

ACTION 6: Contribute to the simplification, harmonisation and digitalisation of administrative processes

with which it is to support the optimisation of logistics processes with a green and efficient Danube fleet

Interreg
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Danube Transnational Programme
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Pro Danube & RSOE

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GRENDEL “Green and efficient Danube fleet”

Towards modernisation & greening of Danube inland waterborne sector and strengthening its competitiveness

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