SuAc 2.4 RIS enabled corridor management

Roadmap for the further development of RIS enabled Corridor Management in order to foster digital transition in Inland Waterway Transport

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1 Executive Summary

Under Activity 2 (Business Developments) of the Masterplan DIWA project, SuAc 2.4 focused on business developments in the field of RIS enabled Corridor Management. The study identified actions for the further development of RIS and grouped them into short-term, medium-term and long-term category related to their realistic implementation on the timeline along with potential benefits, risks and requirements. The results of the study are concluded in a roadmap proposing specific measures and timing to realise the identified actions. These actions will contribute to the ultimate aim of increasing the attractiveness of IWT over other modalities by fostering digitalisation within IWT and to enable multimodal service integration in the future. River Information Services are contributing to digitisation and digitalisation within IWT per se, so any further development and improvement of RIS, on which the majority of the proposed actions are focusing, is considered as contribution to digitisation and digitalisation within IWT.

Starting point:

River Information Services (RIS) in Europe are developed approximately since the turn of the millennium and are regulated within the RIS Directive since 2005. Whereas the developments focused on national RIS infrastructure, it became more and more clear that harmonised services on international level need to be provided in order to achieve the potential benefits of RIS. Therefore, within the project CoRISMa the concept for RIS enabled Corridor Management was developed. This was taken up by the project RIS COMEX where considerable progress was made in the realisation of harmonised RIS services on Corridor and even on European level by implementing the common systems EuRIS and CEERIS. This was the starting point for the detailed investigation of the status quo and the identification of actions for the further development of RIS enabled Corridor Management in order to foster digitisation and digitalisation within IWT.

Business Requirements:

Based on the continuous contact to the IWT stakeholders and RIS users by all involved partners in previous and ongoing national and international projects and initiatives, the following main business requirements, to which RIS can potentially contribute, are identified:

- Increase accessibility to relevant fairway-, infrastructure-, traffic- and transport-related information in order to optimise route and voyage planning as well as traffic- and transport-management to increase efficiency and safety of navigation within IWT
- Reduce administrative barriers and reporting burdens
- Optimise waiting times at infrastructures (locks/bridges)
- Protect the environment coupled with economic benefits
- Integrate RIS into a multimodal transport architecture to ease the planning and execution of multimodal transports having IWT fully integrated and therefore foster a modal shift towards inland waterborne transport
- Providing RIS data to logistics platforms (business sensitive services)

Based on the identified business requirements above, the envisioned status of River Information Services in the year 2033 shall provide the following key aspects:

- Harmonised services along European IWT network with single point of access to all relevant fairway-, infrastructure-, traffic- and transport-related information available for all IWT stakeholders (within the European Inland Waterway Network)
- Reporting only once with single entering of data to fulfil all reporting requirements for any transport along the European inland waterway network based on full cross-border exchange between systems / authorities
- Reliable and predictable transport along the European IWT network with minimal waiting times at locks/bridges and at transhipment facilities based on optimised traffic- and transport management

- Considerable modal shift towards IWT
- IWT integrated into multimodal transport chain by interconnection of related systems to exchange specific information enabling multimodal and synchro-modal transport planning and execution
- Smart shipping in practise supported by RIS (see results of DIWA SuAc 2.1)
- Increased safety of navigation

Actions proposed to fulfil the identified business requirements:

By consolidating the input of many experienced project partners who are also in close contact with the related users and stakeholders, numerous actions for the further development of RIS Corridor Management were identified and documented. These actions are based on practical experiences and the close contact with the users and stakeholders and therefore also reflect their needs and requirements accordingly. The identified actions are scaled according to their realistic implementation along the timeline:

Figure 1: Timeline of short-, medium- and long-term actions

The individual actions that will contribute to the digitisation and digitalisation within IWT were further grouped into thematic fields and separated into short-term, medium-term and long-term actions, as summarised in the figure below:

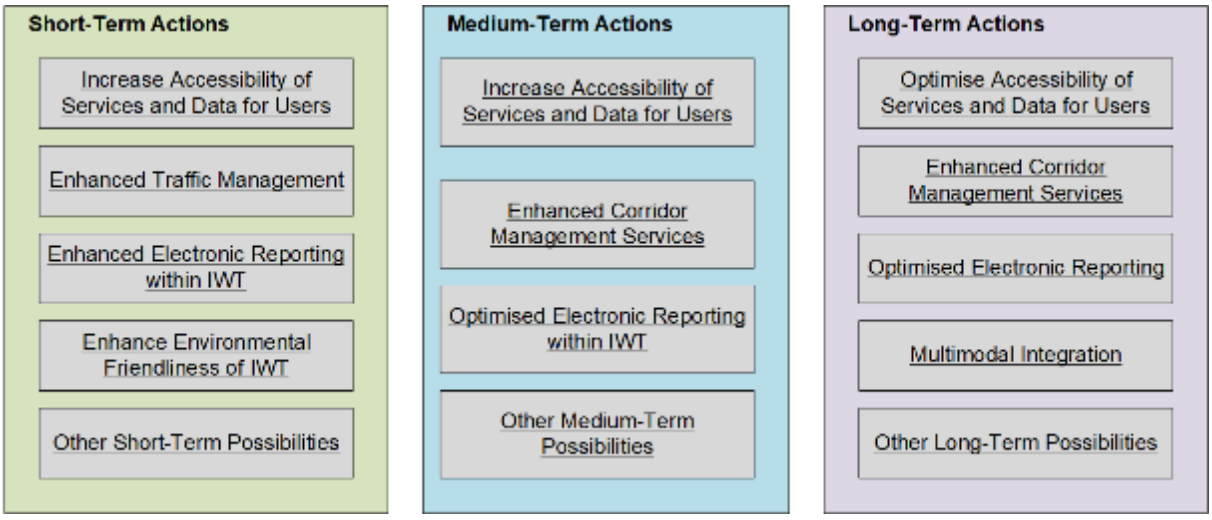

Figure 2: Categories of short-, medium- and long-term actions

The identified actions are indicated and roughly described within the report whereas it has to be stated that the details need to be worked out when the individual actions are to be realised.

Benefits to be gained by the proposed actions:

Together with the proposed actions also the benefits which could be gained by their implementation were investigated in parallel. The identified benefits are mainly grouped into:

- Usability: Increased accessibility of data, increased service quality and quantity, user friendliness, etc.

- Competitiveness with other transport modes: Compatible information services, increased transparency, better interaction with other transport modes, etc.
- Economic benefits: Reduced waiting times and travel durations, efficient planning, etc.
- Environmental benefits: Optimised fuel consumption, contribution to modal split, increased utilisation of infrastructure, calamity abatement support, etc.
- Other benefits: Increased safety of navigation, increased transparency of gaps and bottlenecks, harmonised approach in further development, interoperability, enabler for smart mobility and multimodal integration, etc.

Risks and challenges coming along with the proposed actions:

The potential risks and challenges which have to be considered and tackled by preventive and reactive measures in order to avoid problems within the further development of RIS enabled Corridor Management were identified as well:

- Technical: Missing data, poor quality of data, lack in availability, accessibility interoperability, etc.
- Interaction with private sector: Competition with commercial service providers, implication of authorities in commercial activities, cost-benefit ratio for service provision, business-sensitive and/or GDPR-sensitive data breach, critical downtimes of services, etc.
- Acceptance: Poor quality of data/services, users don't trust the systems, digitalisation in conservative environment, too big steps at once, resistance in sharing data, etc.
- Others: Different status/progress/requirements per country/region, dependency on cooperation, slow evolution of standards and legislation, lack of commitment, dependency on other initiatives and organisations, etc.

The identified risks and challenges clearly indicate that coordination and communication will be a key success factor as preventive measure to overcome these. Most important will certainly be the close integration of users into actual and future developments in order to prevent potential resistance or developments which are not according to the real needs and requirements of the stakeholders.

Prerequisites to realise the proposed actions:

Additional focus was put into the investigation of the requirements in order to realise the identified actions and benefits. The identified requirements are developed on different levels:

- Functional/technical: Gather user feedback, implementation of eFTI regulation, interoperability of systems, multi-versioning for interfaces/messages/etc., multimodal interfaces, availability of APIs, data quality, interconnection with port community systems and other in-house systems, support of mobile devices, etc.
- Standardisation: Evolution of standards following actual technical development by optimised standardisation procedures, less room for interpretation of the standards, standardisation of interfaces/messages/etc. (also for multimodal data exchange)
- Legal: European wide harmonised legal basis for all kind of RIS data exchange and services, legal basis for multimodal data exchange, etc.
- Organisational: Sustainable governance structure for common system operation and further development, optimised frameworks for sustainable operation, harmonised user support and stakeholder management, involvement of competent authorities, realise and coordinate projects and initiatives, etc.
- Financial: Sufficient funds for specific actions (development, operation, etc), commitment to finance operation and further development of RIS Corridor Management, etc.

It is obvious that the actual level of implementation and operation of RIS Corridor Services and related issues are considerably different in the individual regions/countries. Therefore, also the individual requirements are not necessarily valid for all countries/regions, at least not in the same

extent. This has to be considered when planning the realisation/implementation of the individual measures to fulfil the related requirements.

Roadmap for the realisation of the proposed actions:

The actual and future setup of RIS Corridor Management related activities within the upcoming years is visualised within the following figure and put in relation to the timeline for the identified short-term, medium-term and long-term actions:

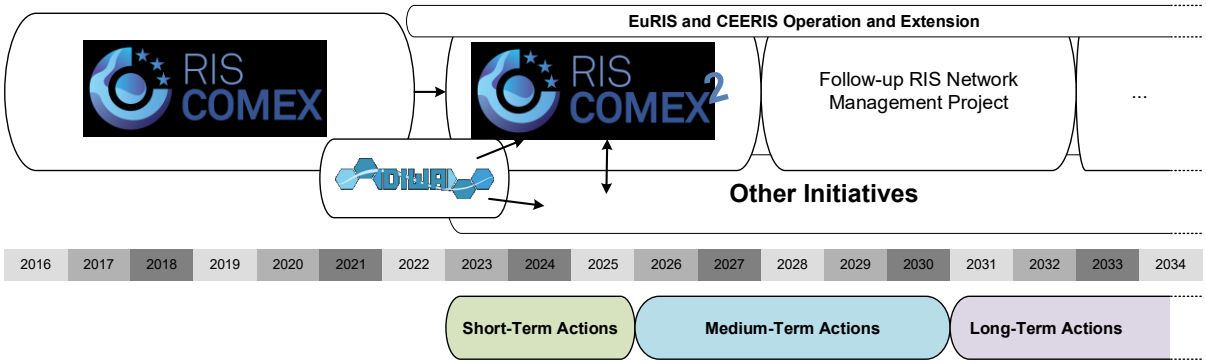

Figure 3: Roadmap for RIS enabled Corridor Management and proposed actions

- By the end of June 2022, the RIS COMEX project is successfully closed and the common systems EuRIS and CEERIS are transferred into sustainable operation providing various RIS Corridor Services; open issues and priority developments identified and documented
- Until January 2023 the project application for a follow-up project (RIS COMEX²) needs to be elaborated and submitted into the 2nd CEF2 Call of the European Commission.
- By December 2023 the final DIWA project results will be available by means of the Masterplan for the Digitalisation within IWT
- Within RIS COMEX², the realisation of the majority of the identified short-term actions will be tackled, together with the preparation and partly implementation of the medium-term actions. Another key aspect will be the sustainable operation and further development of EuRIS and CEERIS
- The remaining medium-term actions as well as the long-term actions have to be tackled in upcoming projects and initiatives depending on the status and progress of RIS Corridor Management development. Therefore, preparations of further follow-up RIS Network Management projects are necessary
    - Due to the fact that the status of provided harmonised River Information Services already goes beyond the level of Corridors, the term “Network Management” is more fitting, reflecting the provision of harmonised RIS along the European waterway network.

The following **stepwise approach** is proposed in order to follow-up with the realisation of the identified actions:

1. Ensure proper operational start and sustainable operation of the EuRIS and CEERIS systems
2. Identify and document open issues and priority developments to be realised for EuRIS and CEERIS after the end of RIS COMEX
3. Submit a project application for a follow-up project of RIS COMEX into the 2nd CEF2 Call in order to ensure financial support for the further development of RIS Corridor Management
4. Besides the fact that RIS COMEX and its planned follow-up project(s) will play a major role in the further development of RIS Corridor Management, it is obvious that there are specific

issues identified which do not fall under the responsibility of the fairway authorities providing the related RIS Corridor services. Therefore, it will be important to specifically identify open issues, actions, potential developments, etc. which would have to be realised by other organisations and initiatives and to share the findings with responsible parties and initiate the necessary actions.

5. Identify relevant other initiatives and ensure appropriate cooperation and coordination in order to utilise synergies in the further development of RIS Corridor Management and to maximise the benefits for the stakeholders.

6. Continue international harmonised cooperation, ideally in common projects

This approach shall be accompanied by specific **continuous measures** for ongoing control and coordination:

- Maintain and communicate the big picture of RIS Corridor Management (overview of systems and services, open issues and gaps, planned future developments, etc) in order to optimise coordination and cooperation among related organisations and initiatives as well as for planning of future projects and initiatives
- Keep close contact with the users and stakeholders of RIS Corridor Management
- Monitor the identified and potential future benefits towards their realisation and set appropriate measures
- Keep an eye on the identified and potential future risks and challenges, set preventive actions and draft reactive measures for those risks
- Continuously maintain the identified and future requirements to further develop RIS Corridor Management and to reach the envisioned benefits and initiate appropriate actions to tackle them
- Maintain coordination on the level of policy makers in order to ensure financial support for the further harmonised development and operation of River Information in Europe.

Within RIS COMEX Sub-Activity 4.5 five ***Guiding Principles*** were elaborated in order to give direction when thinking about the next steps to take in the development of RIS Corridor Management. The Guiding Principles, for which specific individual actions are proposed within the COMEX SuAc 4.5 Report, shall be considered accordingly:

- Harmonized multimodal CM Services
- Optimal support for sustainable decisions
- Enhance predictability
- Enable the full potential of digitalization
- Interaction with surrounding world

2 Introduction

2.1 History of River Information Services

The growing demand for high-quality, cost and time-saving transport services, as well as the exchange and provision of electronic information in a standardised manner, has become a pre-condition and important success factor for logistics companies. In order to better equip inland waterway transport with the necessary tools for these needs, tailormade traffic- and transport-related information and management services - so-called River Information Services (RIS) - have been developed in Europe to assist both freight and passenger shipping on the waterway. According to the PIANC RIS Guidelines, the following groups of RIS can be distinguished:

Mainly traffic related

1 Fairway information Services (FIS)

2 Traffic information (TI)

a) Tactical traffic information (TTI)

b) Strategic traffic information (STI)

3 Traffic management information (TM)

a) Local traffic management (vessel traffic services - VTS)

b) Lock and bridge management (LBM)

c) Traffic Planning (TP)

4 Information to support calamity abatement (CAS)

Mainly transport related

5 Transport logistics Information (ITL)

a) Voyage planning (VP)

b) Transport management (TPM)

c) Port and terminal management (PTM)

d) Cargo and fleet management (CFM)

6 Information on Law Compliancy (ILC)

7 Statistics information (ST)

8 Information for waterway charges and harbour dues (CHD)

Figure 4: Classification of River Information Services (source: PIANC RIS Guidelines)

The maturity level of the listed service categories is quite different. When Fairway Information Services are already well implemented and provided to the users (certainly with several gaps and room for optimisation), other services still need to be realised respectively further developed in order to gain the related benefits for the users. Specific focus is especially to be put on the traffic- and transport-related information services in that respect.

The main objectives of River Information Services are to

- Contribute to safety of traffic and transport
- Contribute to efficiency of traffic and transport
- Contribute to environmentally friendly transport by making inland navigation a reliable, plannable and transparent transport mode in the multimodal transport chain

The available RIS data contributes to the support of traffic and transport related tasks. The RIS information needs are specifically focusing on

- Infrastructure related information
- Vessel related information

- Voyage and cargo related information
- Traffic related information

The harmonisation of River Information Services is EU wide and regulated by the Directive on harmonised River Information Services (RIS) on inland waterways in the Community which has been effective since 20th October 2005. This so-called "RIS Directive" contains mandatory technical provisions for navigational equipment and electronic data interchange along with minimum requirements for RIS implementation. The aim is to prevent the development of a conglomerate of dissimilar RIS applications and incompatible technologies within the EU.

The development of RIS is roughly illustrated within the figure below.

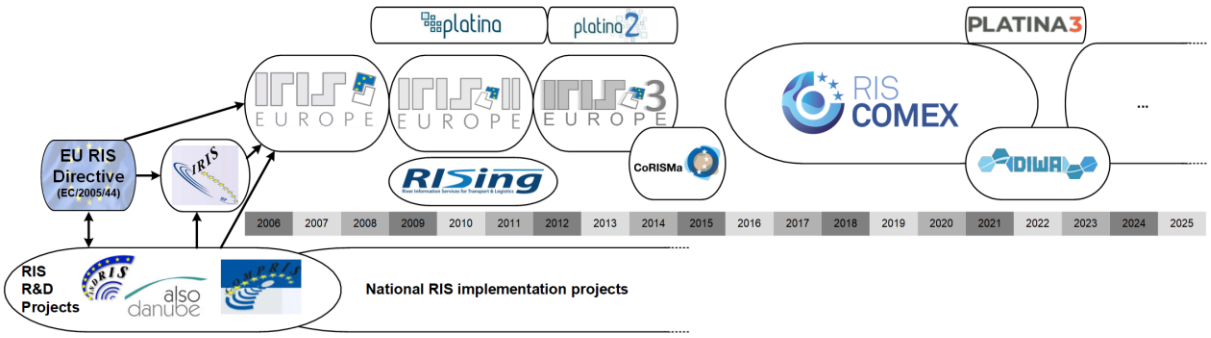

Figure 5: RIS history including priority RIS projects

Whereas in the early Research & Development projects important studies and definitions were worked out to pave the way the for RIS development in Europe, the harmonised RIS implementation started by the multi-beneficiary IRIS Europe initiative accompanied by various national RIS implementation projects which had the main goal to build basic RIS infrastructure.

The study project CoRISMa and the implementation project RIS COMEX are both essential for the definition, understanding and implementation of RIS enabled Corridor Management on the European Inland Waterway network. CoRISMa was taking up an idea that started with the Dutch "Traffic Centre of the Future" initiative and was developing the concept for RIS enabled Corridor Management.

"Corridor Management is defined as information services among fairway authorities mutually and with waterway users and related logistic partners in order to optimise use of inland navigation corridors within the network of European waterways"

Enhancing Inland Waterway Transport with the concept of RIS enabled Corridor Management, as foreseen in the above-mentioned projects, has the objective to lead to the following benefits for IWT on European scale:

- Reduction of waiting times of vessels at locks and bridges and travel durations;
- Improvement of the efficiency of the traffic management operations;
- Information services for reliable voyage planning to improve the operation of skippers, terminal and port operators;
- Improved added value of VTS, lock and bridge operations and Vessel Traffic Management Services in the logistic chain;
- Increased inter-operability with maritime transport activities, information exchange and technologies;
- Simplification of the administration procedures by the usage of intelligent information management.
- Optimised fuel consumption and potential reduction of CO_2 emissions
- Contribution to a more balanced modal split and multimodal integration

- Contribute to increase safety of navigation within IWT

Within the implementation project RIS COMEX, RIS Corridor Management, as worked out in detail within the CoRISMa project, was realised in a harmonised way by joint efforts of partners from 13 European countries.

Within the DIWA project (Masterplan Digitalization of Inland Waterways) a detailed investigation of business and technological developments as well as facilitating topics (like data quality, standardisation) is executed in order to elaborate a detailed masterplan including vision and roadmap for the digitalisation within inland waterway transport in the upcoming decade(s).

Within the planned follow-up project after RIS COMEX RIS Corridor Management shall be further improved and optimised in order to utilise the potential benefits for the users and therefore further contribute to the attractiveness of Inland Navigation as environmentally friendly and competitive transport mode.

2.2 DIWA SuAc 2.4 RIS Corridor Management

The main objective of this SuAc is to describe the business developments and requirements regarding RIS enabled Corridor Management, with focus on:

- The services, information processes and information requirements related to traffic, transport and logistics that are in a development phase;
- Consequences for data and information needs;

In order to reach the main objective, the following tasks were identified to be executed and documented:

- Investigate the (intermediate) results of Corridor Management Projects and initiatives like RIS COMEX and assess the actions for the digital transition for IWT in the period 2022-2032.
- Define the integral and harmonised requirements on corridor services, information and data related to the digital transition of Inland Waterways.
- Draft report (study) on RIS enabled Corridor Management and requirements in relation to the Masterplan Digitalisation of Inland Waterways.

The final expected result of this SuAc is this document which provides the report on the RIS enabled Corridor Management inventory, actions and requirements in order to foster digitalisation within Inland Navigation from that perspective.

The following interdependencies and input have been considered during the elaboration of this report:

- DIWA internal
    - Interdependency is given with all SuAcs within Activity 2 to guarantee a common approach of the SuAcs and to facilitate the integration in the final report.
    - To all other Ac 2 SuAcs and SuAc 3.2
        - How can RIS contribute to their goals?
        - Are there any requirements from them towards RIS?
    - SuAc 3.1 and SuAc 3.3: Opportunities by new technologies and smart sensoring towards RIS
    - SuAc 3.4 and all Ac 4 SuAcs: Requirements out of potential RIS developments towards information model and facilitators
    - SuAc 3.5: Learn from other transport domains
    - Ac 5: Input to Masterplan
- External:
    - Input from external stakeholders
    - Input from the RIS COMEX project

- Actual status of, and open issues related to RIS Corridor management implementation
- RIS Corridor Management Masterplan for the time after RIS COMEX

3 Status of RIS enabled Corridor Management

3.1 CoRISMa

3.1.1 Introduction

Until the timeframe of CoRISMa RIS had been focused at fulfilling, mainly on national level, the basic requirements for all services described by the PIANC RIS guidelines 2004, which have also been published by the European Commission (Regulation EU no. 414/2017 dated 13 March 2007) as one of the technical annexes of the European RIS directive 2005/44.

During the implementation of RIS since 2005 it was found that there are a number of gaps in this implementation in order to let RIS assist waterborne transport to its original intent. It became obvious that there is a lack of interoperability between the national RIS implementations and that the services to support transport management are limited.

Therefore, Corridor Management was considered as the next step in the utilisation of River Information Services. Corridor Management as a concept aims at linking the services together on a route or network of interconnected waterways in order to supply RIS not just locally, but in support of navigation on their voyages on the entire network.

Within the EU-funded project CoRISMa (Corridor RIS Management) the EU member states Austria, Belgium, Germany, Luxembourg and the Netherlands, supported by France, defined "RIS enabled Corridor Management on Inland Waterways in Europe" under the coordination of Rijkswaterstaat. CoRISMa started by 1st of January 2014 and was successfully closed by 31st of December 2015.

3.1.2 Results

Summarized, CoRISMa has resulted in the definition of "RIS enabled Inland Waterway Transport Corridor Management" (see chapter 2.1) and a complete elaboration and structure of the required services and information requirements. Six pilots were realized to prove the concept of Corridor Management and the legal impacts have been assessed as well.

Corridor Management Service Levels:

In order to structure the various services, different levels of Corridor Management Services were introduced. The different levels provide specific information services and therefore have different data requirements. There are certainly several dependencies among the services, mainly related to data requirements among each other but there is no fixed hierarchy among the defined service levels, which are:

Level	Description	Information Services on
1	Corridor Management is a service to enable reliable route planning by supplying dynamic and static fairway and infrastructural information	Static and dynamic Fairway- and infrastructure information (water levels, lock status, predictions, NtS, etc.)
2a	Corridor Management is a service to enable reliable travelling times for voyage planning and for traffic management, by	Actual traffic situation (traffic density, passage durations, anonymized vessel positions, etc.)

	providing traffic information considering the actual traffic situation	
2b	… also considering the predicted traffic situation where considered reasonable	Predicted traffic situation based on traffic planning and forecasts
3	Corridor Management is a service to support transport management of the logistic partners (e.g. transport monitoring, reporting, deviation management).	Information about specific vessels (positions, ETAs, ETA delays) for authorized users. Cargo and/or voyage information of specific transports for authorized users.

Pilots:

Six pilots have been executed within CoRISMa, with the participation of more than 79 active testers, being both end-users (skippers, operators …) and project team members.

Nr	Pilot Name	Region
1	Lock Planning Danube	Aschach (AT)- Jochenstein (DE)
2	Berth Occupation Mosel	Luxembourg (LU) – Trier (DE)
3	Traffic Planning	Rotterdam (NL) – Antwerp (BE)
4	Traffic Planning	Rotterdam (NL) –Duisburg (DE)
5	Vessel Position Data Exchange for logistics	AT-DE-NL
6	Fairway Network Data model	All

A large variety of stakeholders was represented, ranging from authorities to skippers, ship owners, and logistic service providers. As such, this testing phase reflects the direct input from the user's point of view. The CoRISMa team also communicated some testing results to the audience during the final CoRISMa event. The combination of those two sources - (pilot test) and the feedback from the audience during the final CoRISMa event – have indicated the industry has a keen interest into the shown applications for their business processes, although future developments should take suggested improvements into account.

The results and conclusions of these pilots are provided within the specific CoRISMa documentation and were already considered during the preparation and execution of the RIS COMEX project were specific implementations took place to further develop and put into operation what was started within the CoRISMa pilots.

Other relevant results:

Besides the pilots a variety of other important tasks were done within CoRISMa leading to meaningful results, such as:

- Definition study on IWT Corridor Management
- RIS legislative impact analysis
- Gap analysis and guidelines for realisation of RIS enabled Corridor Management
- Functional and technical requirements study for a European FIS and TIS Register and Portal
- Study concerning state of the art reporting processes
- Concept for a traffic planning system
- Concept for vessel position data exchange
- Concept on statistics
- and many more.

The CoRISMa project has succeeded to show that already a high level of information exchange between member states is possible on all three corridor levels, purely by linking existing IT-applications. The results of the pilots and feedback from the testers have proven that RIS is a suitable tool in order to realise Corridor Management. Therefore, a continuation of the harmonised

RIS development in order to enable the Corridor Management approach has to be the next step for RIS in Europe. In that respect, considerable progress was achieved within the project RIS COMEX.

3.2 RIS COMEX

3.2.1 Introduction

RIS COMEX is a CEF funded multi-Beneficiary project aiming at the definition, specification, implementation and sustainable operation of Corridor RIS Services following the results of the CoRISMa study. RIS COMEX started in the course of 2016 and will last until mid of 2022. The project area covers altogether 13 different European countries having 14 partners joined their forces under the coordination of the Austrian Waterway Administration viadonau with the common goal to realise Corridor RIS Services.

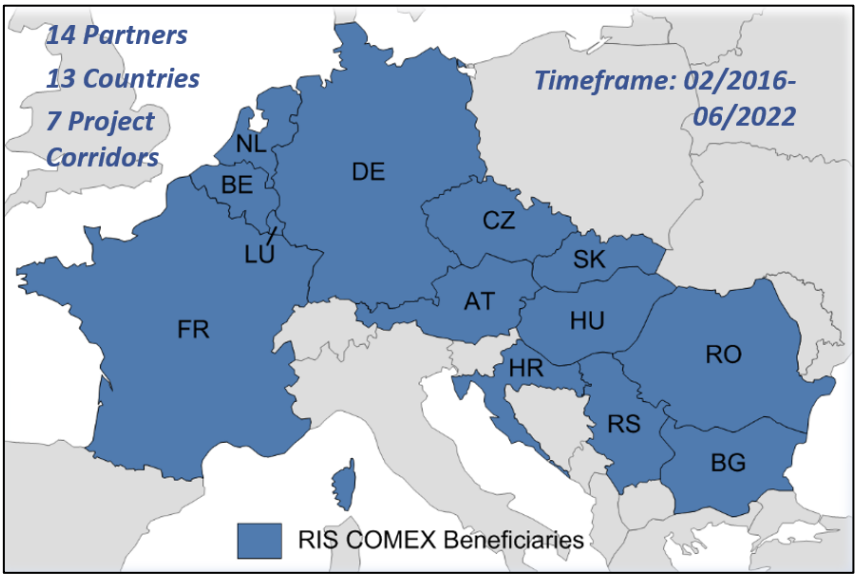

Figure 6: Scope of the RIS COMEX project

RIS COMEX was organised in five Activities. Where Activity 1 deals with classical project management, Activities 2 and 3 are defining, specifying and implementing Corridor RIS Services whose sustainable operation shall be ensured by the results of Activity 4 where the necessary legal, organisational and financial frameworks were established. Additionally, Activity 5 dealt in parallel with other challenges related to the project objectives like safety of navigation, stakeholder management, reference data & statistics, multimodal interfaces and standardisation.

Figure 7: Objectives of the RIS COMEX project

The RIS COMEX Partners jointly elaborated the service definitions and various architecture designs in order to meet the requirements of Corridors Management Services. By carrying out an exploration of existing implementations and conducting gap analyses, it was decided to re-use the Flemish VisuRIS system owned and operated by De Vlaamse Waterweg, to realise the so-called EuRIS system. Furthermore, eight project partners who identified the need for it, agreed to realise a common electronic reporting system (CEERIS). This was the starting point for the implementation phase.

3.2.2 Results

The main result of RIS COMEX is probably the setup of a project-independent sustainable cooperation among partners from 13 European countries in order to provide RIS enabled Corridor Management to the IWT stakeholders.

For that purpose, the RIS COMEX consortium elaborated and put into force a complete framework for sustainable operation of the realised Corridor Services. The legal, organisational and financial frameworks were established in order to ensure the sustainable operation and further development of the Corridor Services including the required data exchange and the provided services for the users.

During the execution of RIS COMEX, it became clear that the ambitious goals of the project will be mainly realised by means of two common systems which will be closely interconnected to each other and which will be sustainably and jointly operated by the related partners:

- EuRIS System
  - Gathers fairway-, infrastructure-, traffic- and voyage related data from national data sources
  - Provides data and services as single point of access for the users
  - Joint governance and operation by 13 countries

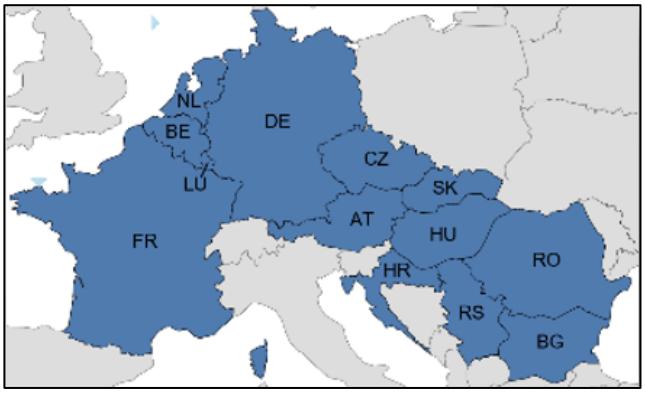

Figure 8: Geographical scope of the EuRIS system

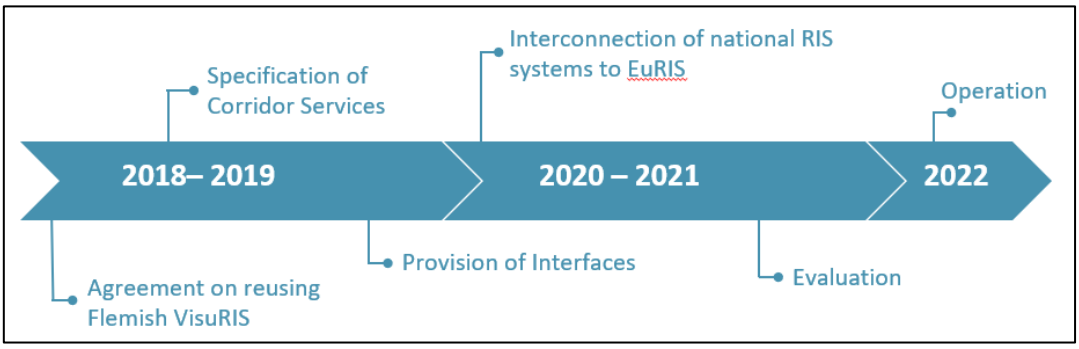

Figure 9: Timeline for the realisation of the EuRIS system

- CEERIS System
  - Common Electronic Reporting Information System
  - Joint governance and operation by 8 countries
  - To enable „reporting only once" with „single entering of data"

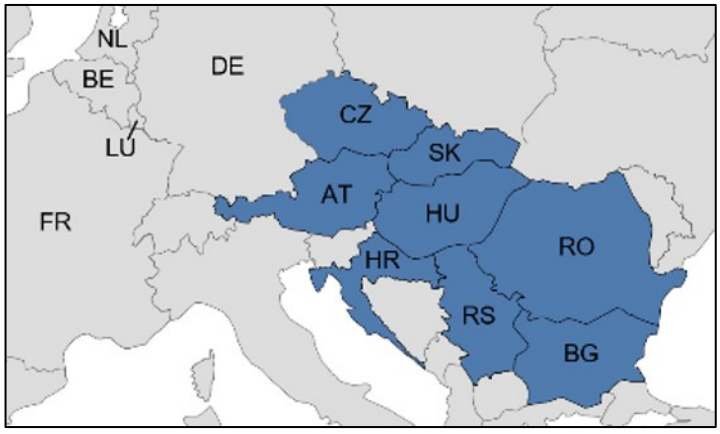

Figure 10: Geographical scope of the CEERIS system

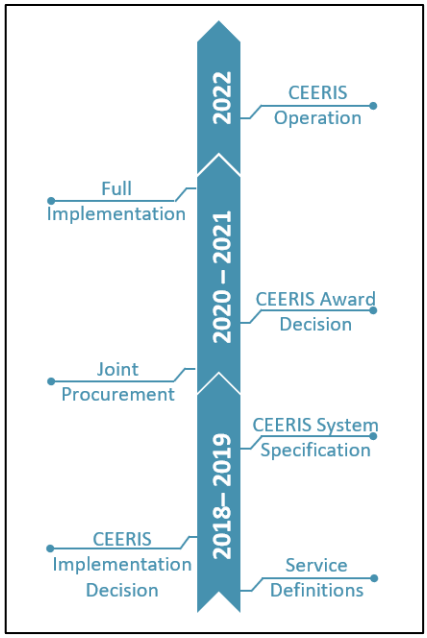

Figure 11: Timeline for the realisation of the CEERIS system

Besides the framework for sustainable operation as well as the realisation and transfer into operation of the two main systems EuRIS and CEERIS, the RIS COMEX consortium also worked on other important aspects resulting in the following considerable output:

- A RIS Corridor Masterplan for the time after RIS COMEX was elaborated as well as recommendations towards a RIS Corridor Management Policy Vision.
- The potential concerning multimodal integration was investigated and documented.
- The project consortium actively contributed to the work of the CESNI/TI Temporary Working Groups related to the further standardisation of the RIS key technologies.
- Certainly, special focus was put on stakeholder management and dissemination.

The following chapters provide a more detailed description on the two systems EuRIS and CEERIS as well as the established framework for sustainable operation as these are considered as the most important and relevant project results towards digitalisation within Inland Waterway Transport.

3.3 EuRIS – the common European RIS Platform

In order to make the specified RIS Corridor Services available to the users, the RIS COMEX partners agreed to realise a common and centralised single access point, the EuRIS system. EuRIS, an adapted clone of the existing Flemish VisuRIS system, was advanced to serve as European RIS platform fulfilling a great variety of information needs of inland waterway stakeholders.

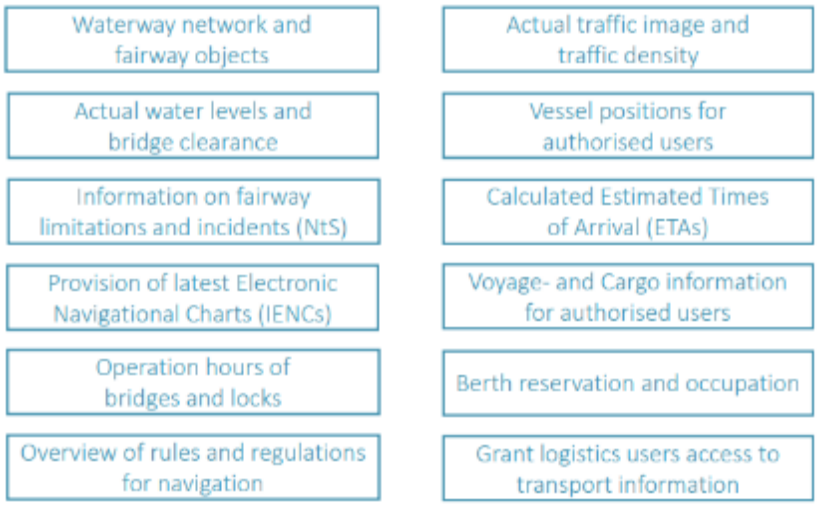

Figure 12: Service groups provided by the EuRIS system

EuRIS gathers relevant RIS information from the national data sources in order to provide optimised fairway-, infrastructure- and traffic-related services in a single point of access for the users enabling reliable route- and voyage planning and sharing as well as traffic- and transport management on pan-European level.

3.3.1 System architecture

The EuRIS platform consists of several core components as illustrated in the figure below. The central EuRIS environment depicts a virtualised processing hub providing all relevant services for processing, data storage, access and logging.

The Systems layer also enables the tight integration for other systems like CEERIS in sharing user management and data exchange.

The Data Sources provided by the national infrastructures of the 13 EuRIS partners feed all required data into the central system. First, the reference data including the digital waterway network, the RIS Index objects or facility files of objects build the basic layer of the platform. Second, fairway information like Notices to Skippers (FTM, WRM, WERM, ICEM), hydrometeo data (water levels, bridge clearance, depth information), Inland ENC or object status information is attached to gain actual data on the fairway and infrastructure. Third, raw AIS data is provided via a secured VPN connection to enable vessel tracking and sophisticated ETA calculations.

Two main services are provided at the moment to the outside world. On the one hand the EuRIS web portal where all information can be retrieved via a GUI and on the other hand the open APIs where all data can be retrieved via machine readable interfaces.

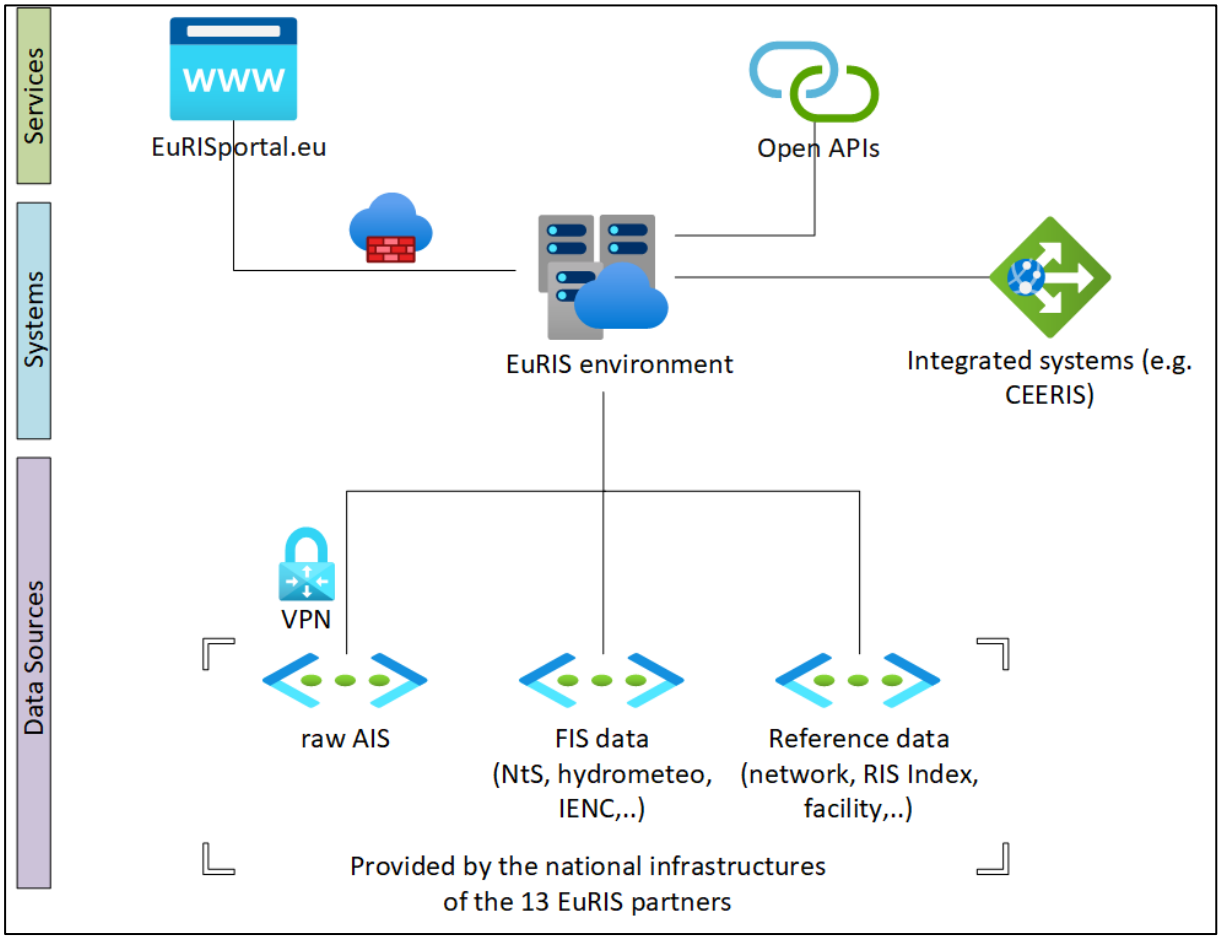

Figure 13: Architecture of the EuRIS system

3.3.2 Data Interfaces

Data from the national infrastructure build the basis for the service provision in EuRIS. To cope with the various data categories to be implemented and interfaced, various acceptable data formats where defined on EuRIS side. The widely known and implemented NtS Web Service enabling the provision of various data categories like limitations or hydrometeo information was defined as standard exchange format. But also new interfaces either being an de facto standard already or being pilot tested in other projects were implemented. Within the table below the data category is linked with the interface method and the expected data format, all grouped by the corridor service level.

Level 1 SDD Definition	Data Source/ Interface	Possible Format/ Description
Provision of information about the geography, geometry and dimensions of waterways and objects	IENC	FTP grabber; CMS upload RSS feed
Provision of temporary limitations – fairway and traffic related	NtS 4.0 FTM	FTM 4.0
Lock/bridge operation times and contact information	facility.xml 2.0 and 2.5; VisuRIS COMEX online editor	2.0 or 2.5
Provision of meteorological information	CMS	Links / text page
Provision of water levels at gauges	Kisters API; NtS 4.0 WRM	WRM 4.0
Provision of bridge clearance information	NtS 4.0 WRM	WRM 4.0
Provision of least or minimum guaranteed Water Depth information	Bottleneck WS; CMS; network impact API; NtS FTM 4.0	WAMOS IFBN + IFAF; online CMS; EuRIS API; FTM 4.0
Water level model output data	-	not provided via EuRIS
Availability of fairways and objects	FIS.6, FIS.9a, FIS.9b	
Provision of temporary limitations – ice condition	NtS ICEM 4.0	ICEM 4.0
Navigational rules, regulations and recommendations	CMS	CMS
Waterway and infrastructure charges	CMS + charges yes/no included in waterway network model	CMS + network attribute
Level 2a SDD Definition	**Data Source/ Interface**	**Possible Format/ Description**
Provide anonymised vessel positions and actual traffic density on stretch/corridor	raw AIS	IEC 61162-1
Provide operational data of objects	Object Status WS	tailored service format (new)
Provide actual passage time of object/waypoint by individual vessel	raw AIS	IEC 61162-1
Provide forecasted passage duration of stretch/object	raw AIS	IEC 61162-1
Provide assigned position of vessels in lock chamber and entering sequence to the skipper	Object Access WS	tailored service format (new)
Provide actual passage time of object/waypoint by individual vessel	raw AIS	IEC 61162-1
Provide forecasted passage duration of stretch/object	raw AIS	IEC 61162-1
Provide actual berth occupation	raw AIS + berth shapes via network model	IEC 61162-1
Provide actual berth occupation	raw AIS + berth shapes via network model	IEC 61162-1
Communicate traffic planning to users and authorities	ERIINFO; Object Access; RTA	tailored service format (new)
Provide information on incident to fairway users	-	not provided via EuRIS
Provide historical average and actual passage duration of stretch/object	raw AIS	IEC 61162-1
Provide historical average traffic density of specific stretch/object	raw AIS	IEC 61162-1
Provide historical average and actual passage duration of stretch/object	raw AIS	IEC 61162-1
Level 3 SDD Definition	**Data Source/ Interface**	**Possible Format/ Description**
Provision of vessel position and identification information to authorised parties	raw AIS	IEC 61162-1
Provision of travel durations, ETAs and ETA deviation notifications	raw AIS	IEC 61162-1
Provision of cargo and voyage information to logistics and third parties	ERINOT, ERIVOY, ERISTAT	
Provision of cargo and voyage information to logistics and third parties	ERINOT, ERIVOY, ERISTAT	
Provision of information for efficient reporting and control processes		

Provision of reporting requirements		
Electronic Report Gateway Service	ERINOT, ERIVOY, ERISTAT	
Provision of berth reservation	-	not provided via EuRIS
Provision of travel durations, ETAs and ETA deviation notifications	raw AIS, ERINOT, ERIVOY	

3.3.3 Digital Waterway Network

The GIS based digital waterway network is the backbone of EuRIS representing the main interconnected European waterways. To establish such a digital network graph a Reference Network Model was newly specified defining all relevant parameters and data formats for the fairway network and objects. Together with the RIS Index data the information on the fairway objects was further enhanced.

The representation of the coloured waterways based on the CEMT class categorisation in the figure below highlights the exploit of the digital waterway network.

Figure 14: Waterway network covered by the EuRIS system

All fairway objects like locks, bridges, harbours, terminal, berths or fairway hectometres are represented by a coloured RIS Index dot depicted in the figure below.

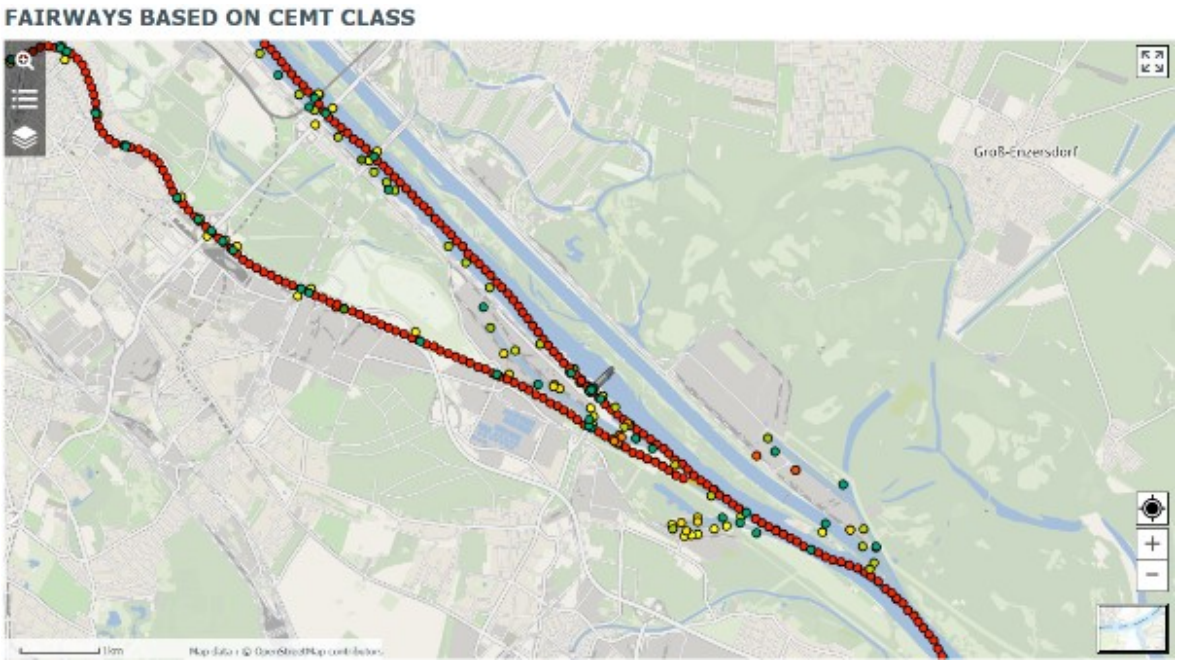

Figure 15: Details on waterway network provided by the EuRIS system

3.3.4 Services provided by EuRIS

The level 1 services comprise the reference data as well as the fairway information services. Most important information on limitations and blockages are provided via NtS (see figure below). Not only the interfaced national data is provided but EuRIS is also processing and compiling new data out of the input gathered like the so-called Network Impacts which reference actual severe limitations on the fairway or infrastructure.

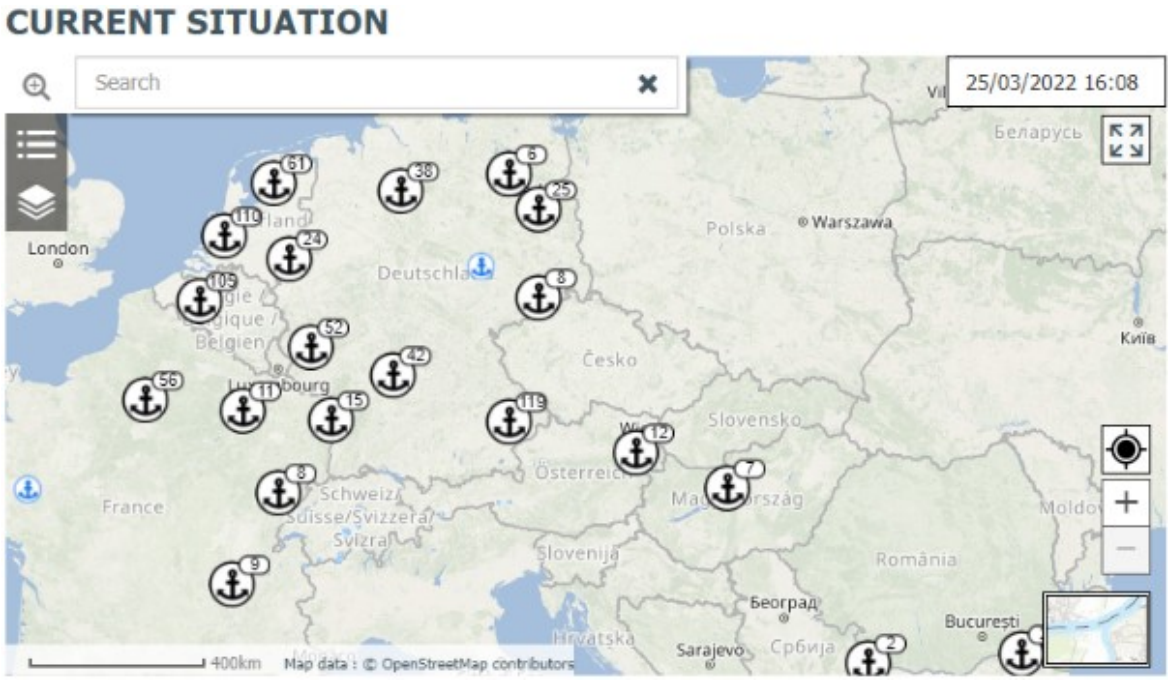

Figure 16: Notices to Skippers provided via the EuRIS system

Actual data on water levels, bridge clearance or water depth is most important for any pre-trip planning. All relevant dynamic information is gathered and presented in a user-friendly way e.g. including hydrographs for historic, actual and forecasted water level information (see figure below).

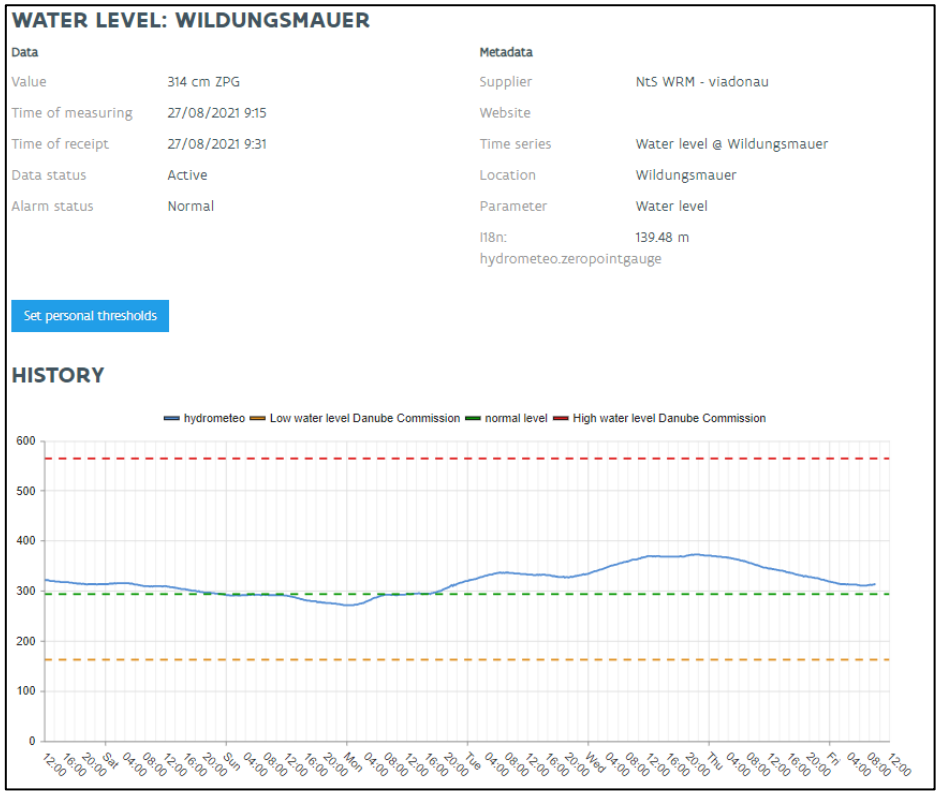

Figure 17: Hydrometeo information provided via the EuRIS system

Using different layers not only the waterway network and the fairway objects can be presented but also an IENC overlay map can be highlighted serving the needs of IWT users (see figure below).

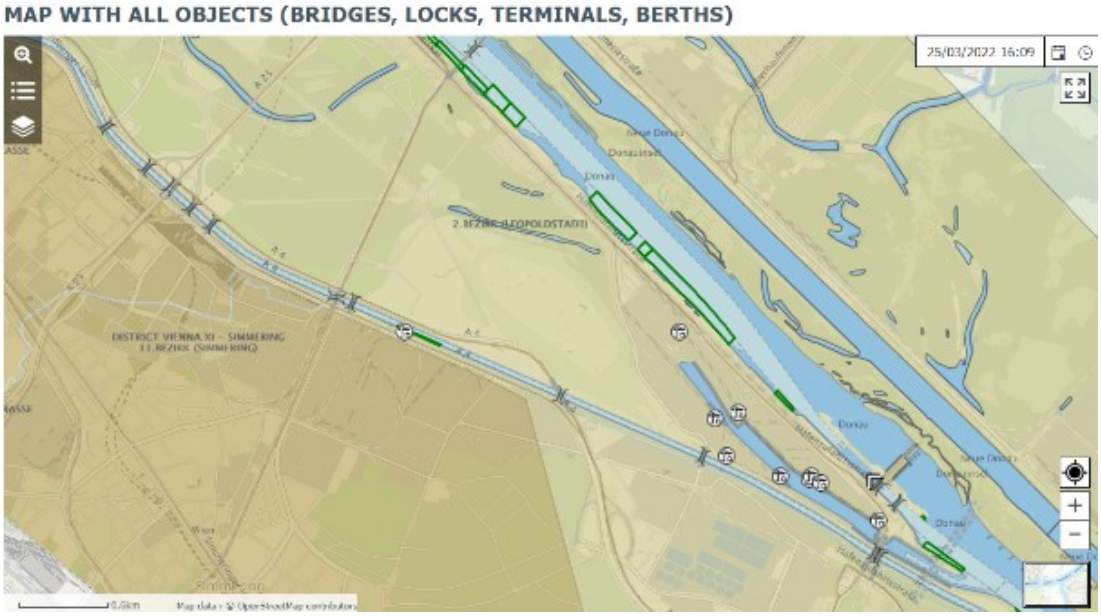

Figure 18: Objects on map provided by the EuRIS system

Level 2 information mainly deals with traffic related data. Main source is the raw AIS data from the national AIS infrastructures securely provided to EuRIS. This is the basis for an actual anonymised traffic image presented in the figure below. The vessel operator as data owner has full control of his data and is able to grant access to his extended AIS information to third parties.

Figure 19: Traffic density information provided by the EuRIS system

If berth reference data is available in addition to AIS, the indicative berth occupation service is enabled. The figure below gives an overview on the berthing areas and the current occupation by vessels.

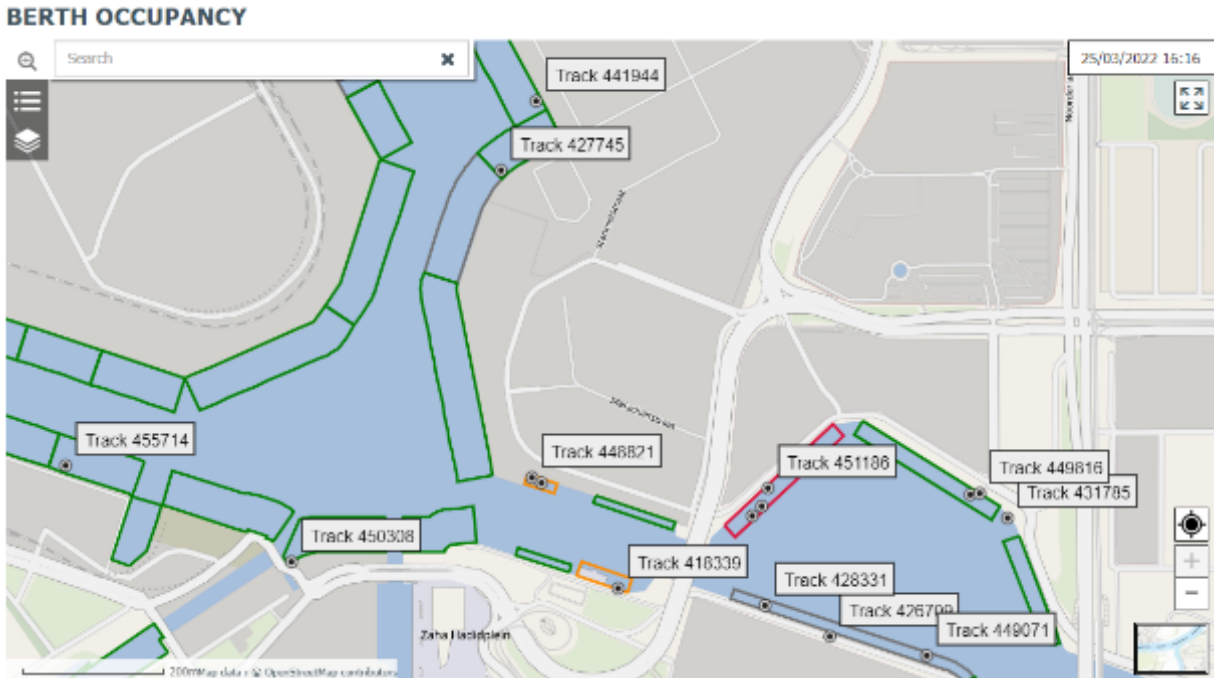

Figure 20: Vessel positions provided by the EuRIS system

Level 3 services provide access for third party and logistic users. A first example was described above when granting access to position data to third parties. An additional service highlighted in the figure below is the voyage planner in which all information is combined well known from Google maps for instance. Possible routes are matched with actual limitations and the traffic situation, as a result providing a voyage description and ETAs to the user.

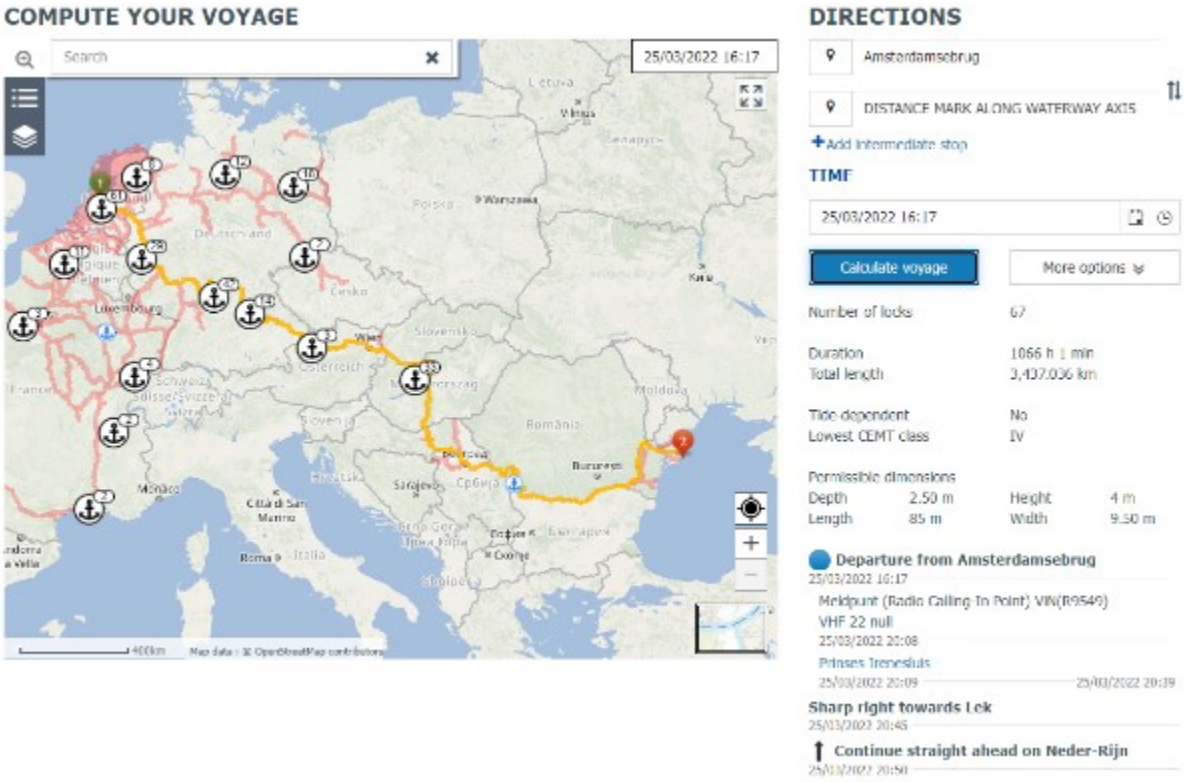

Figure 21: Route calculations and voyage planning provided by the EuRIS system

3.4 CEERIS – a common electronic reporting system

CEERIS stands for Central & Eastern European Reporting Information System and is a joint initiative of the RIS COMEX partners from Austria, Bulgaria, Croatia, Czech Republic, Hungary, Romania, Serbia and Slovakia in order to tackle the administrative barriers and to reduce the reporting burdens within the concerned region. Only those countries who identified the need for such a common electronic reporting system have jointly realised the CEERIS system. The other countries from the RIS COMEX consortium already have electronic reporting systems in operation and had therefore no need to join this CEERIS initiative.

CEERIS was realised as common electronic reporting system to enable the vessel operators to fulfil all reporting requirements for a specific voyage/transport by „reporting only once“ with „single entering of data“. Thus, CEERIS will contribute significantly to the reduction of administrative barriers and reporting burdens within Inland Navigation by enabling efficient and transparent electronic reporting procedures. The following figure provides an overview on the main features for the three CEERIS user groups.

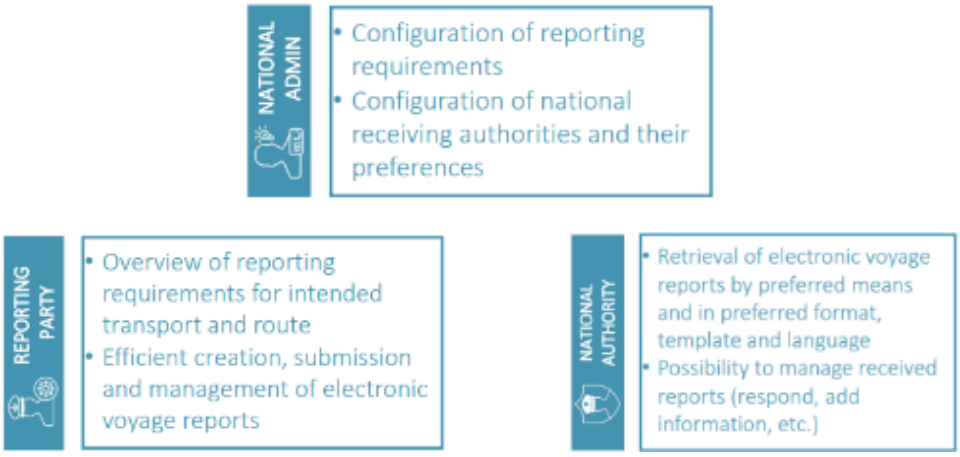

Figure 22: Main user groups services by the CEERIS system

The following subchapters provide some details about the CEERIS architecture and the services provided to the users.

3.4.1 Problem analysis: Actual situation, landscape ERI exchange in Europe

The following figure illustrates the status of electronic reporting system implementation and related international exchange of ERI messages among neighbouring countries.

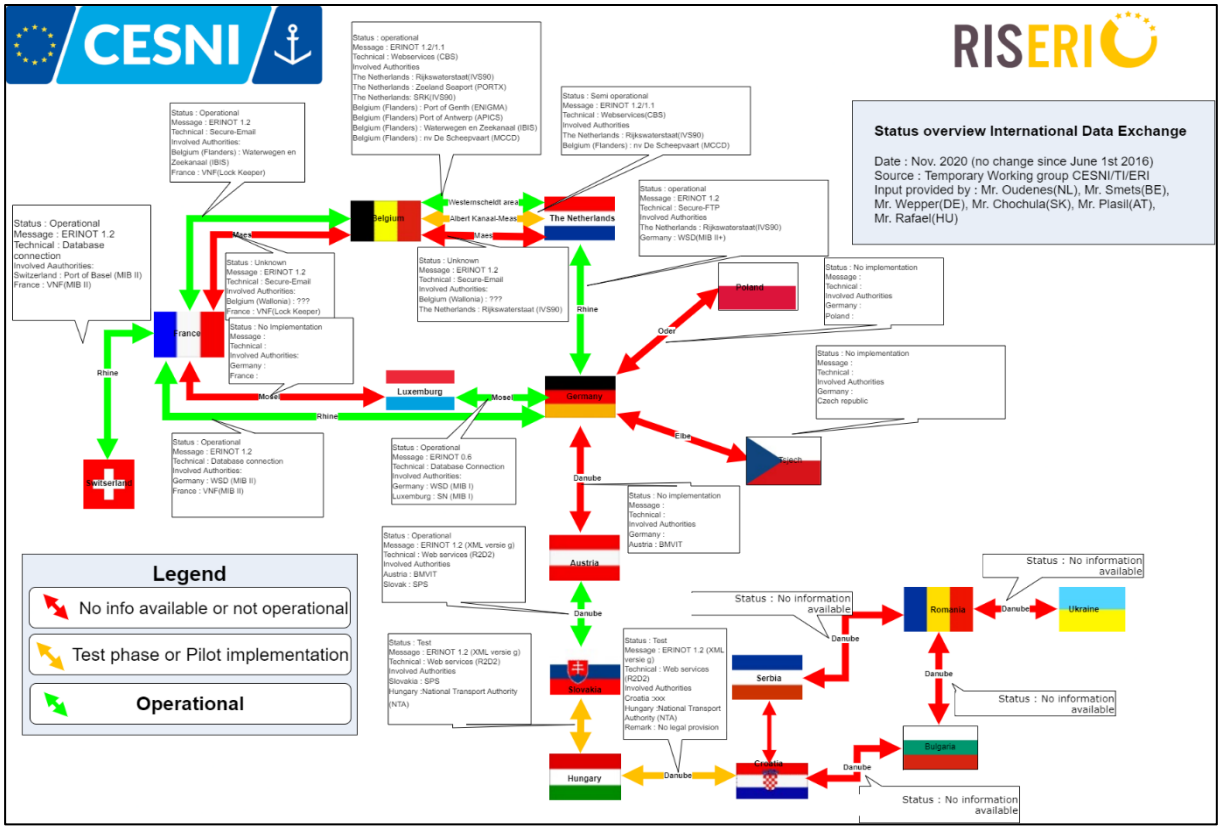

Figure 23: Landscape of electronic reporting systems and services in Europe by Nov 2020

Especially within the Danube region the implementation of ERI systems and services was lacking behind and there was no cross-border exchange of ERI messages (besides the exchange of the dangerous goods voyage reports between Austria and Slovakia). Based in this situation, the above mentioned eight countries made the decision to join their forces within the RIS COMEX project to realise a common electronic reporting system – CEERIS.

3.4.2 eRIBa

eRIBa (electronic Reporting for Inland Barges, previously known as the Single Window for Inland Navigation) is a smart communication platform for the exchange of digital reporting information between the inland shipping operator and the waterway authorities in Flanders and on the Western Scheldt. eRIBa makes the reporting process more efficient for the inland shipping operator. eRIBa also allows the inland shipping operator to submit a single digital report at the start of his navigation route, provided there are no changes along the way.

For instance, if the inland shipping operator plans to sail from Zeebrugge to Antwerp, eRIBa allows him/her to report his/her information digitally when he/she leaves Zeebrugge. The inland shipping operator no longer haves to provide information when he/she enters the navigation area of De Vlaamse Waterweg nv or the Port of Antwerp, unless any changes occur along the way. The reported information is forwarded automatically by eRIBa to all waterway authorities on your shipping route, on the condition that the inland shipping operator reports at least two waypoints through his/her reporting software. This information is exchanged fully in accordance with legislation and privacy rules.

As from 4 January 2021, the reporting process for inland navigation has been simplified to one digital report. From that date onwards, the information of the the inland shipping operator will be shared through eRIBa.

eRIBa will also act as an enabler for digitalisation in inland navigation. Due to the once only principle, information sent at start of a voyage will be used to optimize as well traffic management as extra services like specific port services, even if the skipper is not in the neighbourhood. It will also enable third parties (under strict alignment of the GDPR) to offer better (logistic) services.

De Vlaamse Waterweg nv, Port of Antwerp, Port of Zeebrugge, North Sea Port, Port of Ostend, Agency for Maritime and Coastal Services and the Joint Nautical Management use eRIBa and were responsible for developing it. There is also close cooperation with Rijkswaterstaat (The Netherlands).

Further information is available at https://eriba-platform.be/en/

3.4.3 System Architecture

The figure below illustrates the system architecture of the CEERIS system.

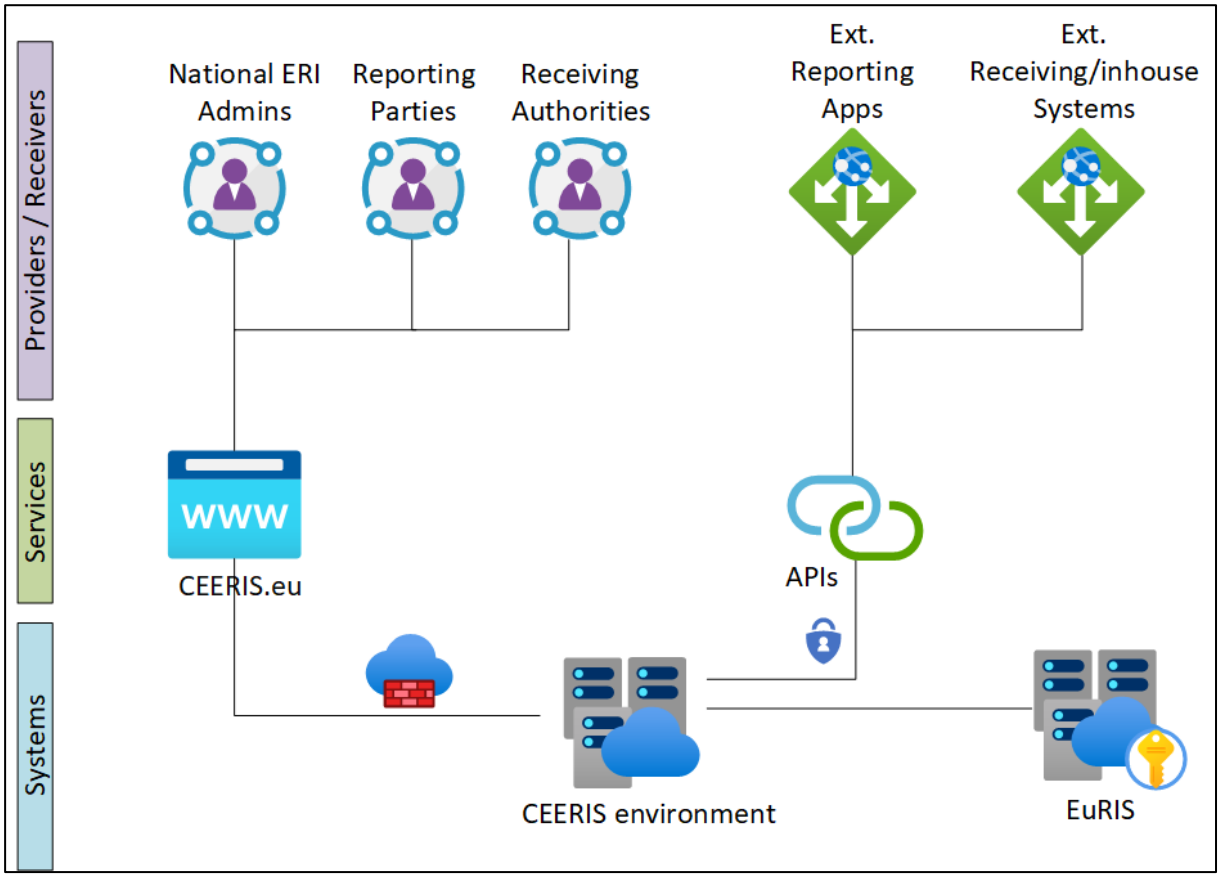

Figure 24: Architecture of the CEERIS system

The CEERIS system is closed interconnected with the EuRIS system for the following reasons:

- CEERIS uses the user management (authentication and authorisation) provided by the EuRIS system in order to enable the users to use both systems with the same user account.
- CEERIS gets relevant available reference data from the EuRIS system in order to maintain consistency and interoperability.
- CEERIS uses the route calculation services of the EuRIS system in order to identify the correct route for a voyage and to identify out of that specific route the related reporting requirements for the individual voyage.
- CEERIS provides a basic voyage report to EuRIS in order to allow EuRIS to calculate the voyage status and provide updated voyage information (updated ETAs and/or actual passing times at specific waypoints) back to CEERIS whereas this information is also used for triggering the forwarding of specific voyage reports to the individual national Receiving Authorities.

The services and functions are provided to the users mainly by the CEERIS portal which is available under www.ceeris.eu. Within the portal there are three different sub-portals available, one for each of the user groups:

- National ERI Admin portal: To configure and maintain the national reporting requirements and national Receiving Authorities
- Reporting Party portal: To create, submit and manage the individual voyage reports including status monitoring (responses of Receiving Authorities, etc.). The portal allows the usage of templates or cloning existing voyage reports to create new ones. Furthermore, the usage of favourites is provided for many individual data fields in order to ease the creation of the voyage reports.

- Receiving Authority portal: To have an overview in a dashboard about all incoming voyage reports per authority and to be able to manage these reports (manual/automatic response, issuing of permits, etc.).

Furthermore, APIs are provided for the direct interconnection and usage of the CEERIS services by existing systems.

3.4.4 Services

3.4.4.1 Configuration of reporting requirements (National ERI Admins)

The main objective of this service is to provide information to the Reporting Parties about mandatory and voluntary reporting requirements along the route of a specific voyage.

Service functions:

- Enable configuration of mandatory (and voluntary) reporting requirements per country/authority within the service, which is done by the national ERI Admins
- Request of voyage specific reporting requirements
- Overview of reporting requirements

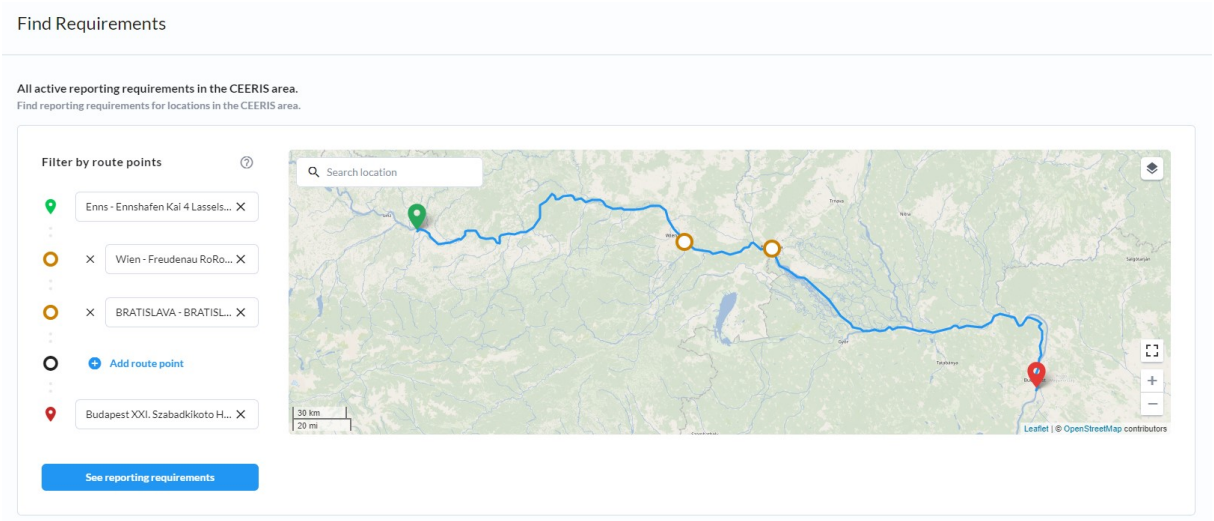

Figure 25: Search mask for configured reporting requirements within the CEERIS system

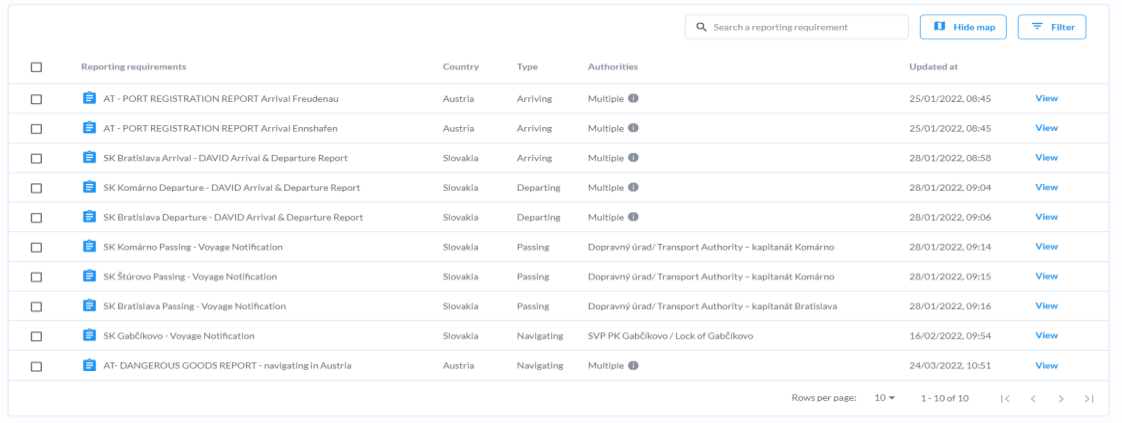

Figure 26: List of configured reporting requirements within the CEERIS system

3.4.4.2 Creation and submission of voyage reports (Reporting Parties)

Authorised users (Reporting Parties) are enabled to fulfil their reporting obligations and to voluntarily report additional information in an efficient and user-friendly way by supporting the user with all relevant information (reporting requirements, reference data, templates based on existing reports, usage of favourites, etc.) necessary to efficiently create and submit new or update or cancel existing Electronic Reports.

Supported service functions:

- Reporting Party enters basic transport data (departure, destination, optional waypoints, type of transport)
- CEERIS provides an overview of valid configured reporting requirements for that specific voyage (transport) and the Reporting Party can unselect individual reporting requirements before starting the creation of the related voyage report, so all reporting is always and explicitly done with full consent of the Reporting Party
- The Reporting can enter all required information for the specific transport in a user-friendly way using templates, reference data and favourites and can submit the voyage report
- The Reporting Party certainly has an overview on all own previous and actual voyage reports created within CEERIS and is able to manage them (update, cancel, clone, etc.)

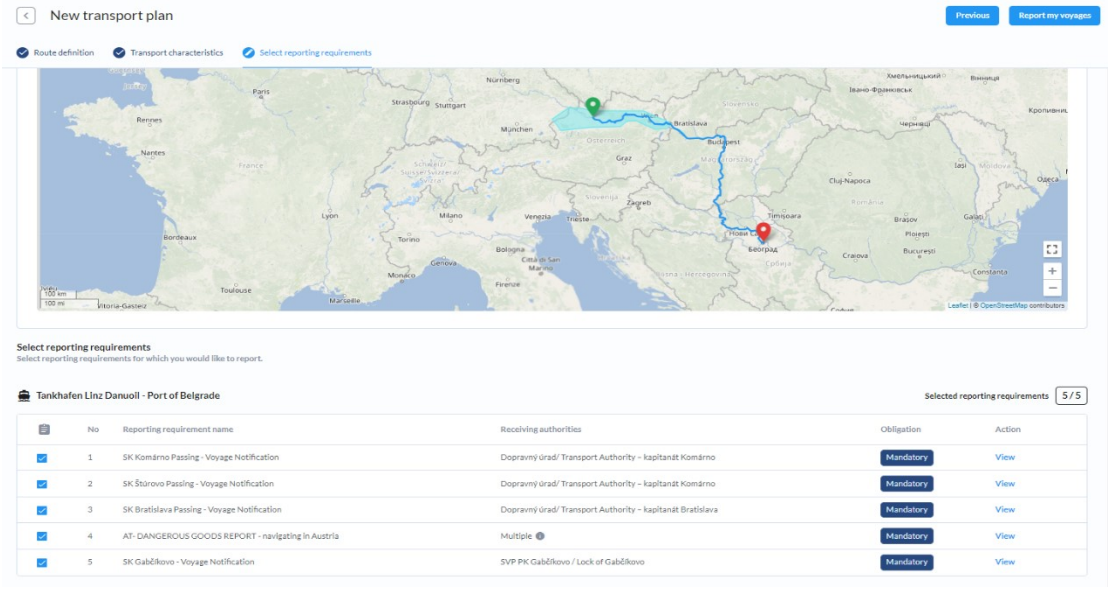

Figure 27: Reporting Party screen, create a new transport plan within the CEERIS system

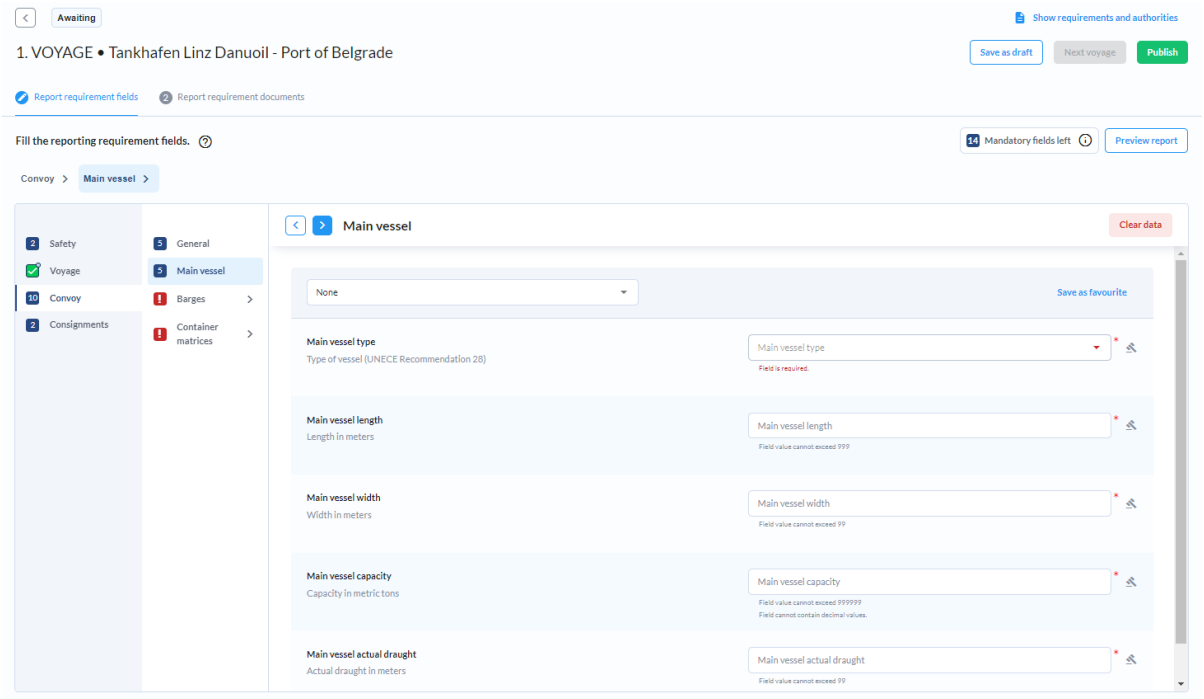

Figure 28: Reporting Party screen, complete voyage report within the CEERIS system

Once the Reporting Party submits a voyage report, the CEERIS system takes over the delivery of the individual customised reports to the Receiving Authorities which is described in the following sub-chapter.

3.4.4.3 Receiving voyage reports (Receiving Authorities)

Submitted voyage reports are transferred into customised report templates (which are individually configurable per authority) and are provided to the related Receiving Authorities by the preferred means:

- Directly within the CEERIS Dashboard
- As attachment (PDF, XML) or formatted text/table by e-mail
- As xml message(s) via the API

Supported service features:

- Receive customised voyage reports
- Manage (approve, reject, respond, etc.) received voyage reports (only possible within the CEERIS Dashboard and via API, not via e-mail)

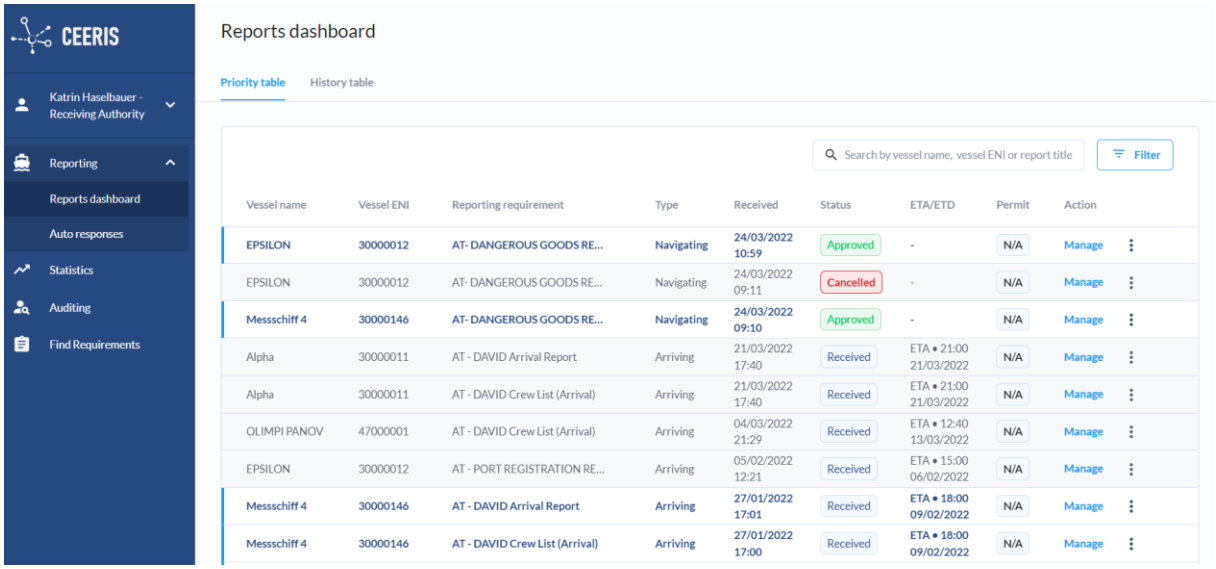

Figure 29: Dashboard of the Receiving Authorities within the CEERIS system

3.5 Framework for sustainable operation

Cooperation between Member States is necessary to enable Corridor Management. In order to formalize and consolidate this cooperation in a sustainable way, a legal, organisational and financial framework has been established. Main goal of this framework was to guarantee on the one hand the legally-sound basis for the operation of the systems and the related international exchange of RIS data. On the other hand, the partners had to agree on the organisational setup, the governance and financial aspects of the system operation and further developments. This solid and sustainable cooperation enables the transfer of both systems, EuRIS and CEERIS, into sustainable operation.

Therefore, the following frameworks were elaborated and signed:

- European Corridor Management Agreement (EuRIS Cooperation Agreement)
  - Agreement among the EuRIS Parties towards the joint governance and operation of the EuRIS system and related Corridor Services (includes several instruments as integral part of the agreement, like the EuRIS Cost & Voting Key Plan, Core Arrangement 1, Core Arrangement 2)

- Core Arrangement 1
  - Legal agreement on (GDPR compliant) data provision for Corridor RIS for vessel operators and logistics users concluded between national RIS Authorities/Providers

- Core Arrangement 2
  - Legal agreement on (GDPR compliant) data exchange between parties of the European Corridor Management Agreement and CEERIS Management Agreement in order to supply RIS enabled corridor management services and to share data with other national authorities/providers for the compliance with legal obligations

- CEERIS Management Agreement
  - Agreement among the CEERIS Parties towards the joint governance and operation of the CEERIS system and related services (includes Core Arrangement 2 and the CEERIS Cost & Voting Key Plan as integral part of the agreement)

Accompanying the above-mentioned agreements and arrangements, specific data processing agreements with relevant contractors as well as data processing impact analysis were elaborated for the sake of data protection in terms of privacy related information.

3.6 Inventory of available Corridor Services

The basic intention within RIS COMEX was to realise the envisioned Corridor Services on Corridor Level. Therefore, 6 project corridors were identified which are presented within the tables below indicating which individual Corridor Service were realised per country and per Corridor. The decision whether a specific service is supported within the individual corridors was made on country level.

As indicated in the tables below, not all services are realised within all countries and corridors within the RIS COMEX project. Indicated in red are those services which are not realised in the related country / corridor or which are already in operation by existing national systems and services (e.g. electronic reporting specific services). This can have different reasons like low priority or lack of required input data in order to fulfil the information requirement for the specific service. In some cases, also the lack of resources or other specific issues were the cause for not realising the related service.

Services indicated in red only mean that these are not realised within RIS COMEX, it does not necessarily mean that these services will never be realised in the respective country. It is rather realistic, that these missing services will be realised in the upcoming period.

Details about the Corridor Services realised within the RIS COMEX project can be found in the related RIS COMEX project documentation.

3.6.1 Level 1 Corridor Services: Fairway and Infrastructure

The following table provides a list of the Level 1 Corridor Services included interpretation and information requirements as elaborated within RIS COMEX as starting point for the detailed service definitions followed by their realisation.

Level 1		
Service	**Service interpretation**	**Information Requirements: Provide information on ...**
FIS.1 Geography of the navigation area and their updates	Provide info on geography of the navigation area and their updates (e.g. IENCs): Content and update (intervals) based on defined quality criteria and (latest) applicable standards; optimised publication process (online); (detailed static Bridge/Lock info: FIS.14); (Dynamic Vertical Bridge Clearance: FIS.7); Harbour facility infos optional based on cooperation of the ports;	... bank of waterways , boundaries of the fairway etc ... non-navigable or unsurveyed water area ... anchorage areas, mooring facilities and berths ... permantly moored vessel or facility in the waterways ... harbour area ... catergory of harbour facility ... constructions and facility ... (official) aids-to-navigation ... traffic signs
FIS.3 Water depths contours in the navigation channel	Depth data (e.g. in IENC bathymetric layer) with defined content and update intervals and optimised publication process (online) based on (latest) applicable standards and defined quality criteria;	... depth profile of the fairway ... shallow sections / critical sections
FIS.4 Long time obstructions in the fairway	Information on permanent obstructions to be provided together with FIS.1 info;	... permantly moored vessels or facility in the fairway ... long-time / permanent obstructions in the fairway
FIS.6 Temporary obstructions in the fairway	Provide information about temporary obstructions and restrictions / limitations (e.g. via NtS) including planned maintenance; Info on temporary limitations (dredging, bridge/lock repair works, etc.);	... temporary obstructions / restrictions / limitations in the fairway
FIS.14 Physical limitations on waterways, bridges and locks	Detailed information on locks (e.g. position and type of the doors) and bridges (e.g. moveable parts, shape, curved/flat) (info beyond FIS.1);	... construction and facility of bridges ... construction and facility of locks ... construction and facility of berth ... construction and facility of other waterway infrastructure
FIS 11 Short term changes of lock and bridge operating times	Provision of information on short term changes of lock and bridge operating times;	... short term changes of lock and bridge operating times
FIS.13a Regular lock and bridge operating times	Provision of information on regular lock and bridge operating times; Also contact information shall be covered by this service	... Regular lock operating times ... Regular bridge operating times ... fix lock schedules (alternatively, if available) ... fix schedules of movable bridges (alternatively, if available)
FIS.13b Opening hours of Harbours and/or Ports	Provide information on the relevant (for Inland Navigation) opening hours of Harbours, Ports and Terminals; Example: Monday-Friday: 06.00 – 22.00, Saturday: 06.00 – 17.00, Sunday: Closed; Publication optional (if available) e.g. on FIS Portal (?), European Ports Online (?), Facility Data Editor to IENCs (?); Info for skippers and used for voyage/route planning, etc.;	... opening hours of harbours, portas and terminals ... fix port schedule (alternatively, if available) ... fix terminal schedule (alternatively, if available)
FIS.13c Contact information and opening times of authorities	Provide contact information and opening times of relevant authorities and other parties relevant for any navigational issues;	... Contact data of authorities and other relevant parties ... Opening times of authorities and other relevant parties
FIS.5a Actual meteorological information	Provide information on national/regional meteorological info service providers; Service will include a link to external data source	... service providers of continuous weather information
FIS.5b Predicted meteorological information	Provide information on national/regional meteorological info service providers; Service will include a link to external data source	... service providers of weather warnings
FIS.7a Actual water levels at gauges	Provide information on actual water levels at gauges (quality criteria to be defined);	... actual water levels
FIS.7b Future water levels at gauges	Provide information on predicted water levels at gauges (quality criteria to be defined);	... predicted water levels
FIS.7c Actual vertical bridge clearance	Dynamic actual Vertical Bridge Clearance based on defined quality criteria;	... actual vertical bridge clearance
FIS.7d Future vertical bridge clearance	Provide information on predicted vertical bridge clearance based on predicted water levels;	... predicted vertical bridge clearance
FIS.7e Least actual Depth	Actual minimum available water depth in the fairway (additionally also within the deep channel*) for a certain stretch (from A to B). To be provided by a service based on measured depth data together with accurate actual water level information (FIS.7a) for that stretch (or for critical stretches); For defined sections additional publication (e.g. by Shallow Section Track Plots); * deep channel in order to provide meaningfull information enabling optimised draught of the vessels; Alternatively for canals: Provide information on guaranteed minimum depth;	... least actual depth information
FIS.7f Least predicted Depth	Calculated based on actual bathymetric depth data together with accurate predicted water level information (FIS.7b) for that stretch (fairway and ideally also for the deep channel) for the defined future timeframe;	... least predicted depth information
FIS.8 State of the rivers, canals, locks and bridges in the RIS area	Provide the status (availability) of the infrastructure at a requested point in time; The status of infrastrcutrure is calculated based on static and dynamic informaton provided by other services and local data sources.	... barrage status ... lock chamber status (in operation, partial in operation, not in operation, reason, duration) ... Status of movable bridge openings (in operation, partial in operation, not in operation, reason, duration) ... Fairway status/condition per section (available, available with limitations, closed, reason, duration)
FIS.9a Actual restrictions caused by flood and ice	Provide information on restrictions (navigation not possible) on specific stretches caused by ice and/or high water; Technical realisation, esp. Data sources and publication (e.g. NtS) to be investigated; "Flood" is understood as "High Water" and "High Discharge";	... restrictions caused by actual ice conditions ... restrictions caused by high water conditions
FIS.9b Predicted restrictions caused by flood and ice	Provide information on expected ice conditions and planned ice breaking including expected restrictions for the specific stretches; High Water Predictions covered by FIS.7b;	... predicted ice situation ... expected restrictions caused by predicted ice situation ... expected restrictions caused by high water ... planned ice breaking measures
FIS.15 Navigational rules and regulations	Provide information on navigational rules and regulations (e.g. list and download) and/or links to those; Service will include a link to external data source	... traffic rules and regulations
FIS.16 Rates of waterway infrastructure charges	Provide information on fairway charges (and potentially also harbour dues) or links to related websites/documents;	... waterway charges ... infrastructure charges
FIS.17 Regulations and recommendations for pleasure navigation	Provide information on regulations and recommendations (if available) for pleasure navigation or links to related websites/documents; Service will include a link to external data source	... traffic rules and regulations

Figure 30: Level 1 Corridor Services out of RIS COMEX implementation plan

The following table provides an overview on the realisation of the individual Level 1 Corridor Services within the project corridors, respectively within the individual countries, within RIS COMEX:

Level 1 Corridor Services	Amst.-Antwerp-Liege / Brussels		Rhine			Danube								Elbe		Mosel			Dunquerke-Scheldt	
Service	BE	NL	DE	FR	NL	AT	BG	DE	HU	HR	RO	RS	SK	CZ	DE	DE	FR	LU	BE	FR
FIS.1 Geography of the navigation area and their updates																				
FIS.3 Water depths contours in the navigation channel																				
FIS.4 Long time obstructions in the fairway																				
FIS.6 Temporary obstructions in the fairway																				
FIS.14 Physical limitations on waterways, bridges and locks																				
FIS 11 Short term changes of lock and bridge operating times																				
FIS.13a Regular lock and bridge operating times																				
FIS.13b Opening hours of Harbours and/or Ports																				
FIS.13c Contact information and opening times of authorities																				
FIS.5a Actual meteorological information																				
FIS.5b Predicted meteorological information																				
FIS.7a Actual water levels at gauges																				
FIS.7b Future water levels at gauges																				
FIS.7c Actual vertical bridge clearance																				
FIS.7d Future vertical bridge clearance																				
FIS.7e Least actual Depth																				
FIS.7f Least predicted Depth																				
FIS.8 State of the rivers, canals, locks and bridges in the RIS area																				
FIS.9a Actual restrictions caused by flood and ice																				
FIS.9b Predicted restrictions caused by flood and ice																				
FIS.15 Navigational rules and regulations																				
FIS.16 Rates of waterway infrastructure charges																				
FIS.17 Regulations and recommendations for pleasure navigation																				

Figure 31: Implementation status of Level 1 Corridor Services by the end of RIS COMEX

The services indicated in red within the table above are not realised within the scope of RIS COMEX but will potentially be realised in the future, depending on the needs and requirements from the IWT sector but also depending on the feasibility and effort related to their realisation.

3.6.2 Level 2a Corridor Services: Traffic

The following table provides a list of the Level 2a Corridor Services included interpretation and information requirements as elaborated within RIS COMEX as starting point for the detailed service definitions followed by their realisation.

Level 2a		
Service	**Service interpretation**	**Information Requirements: Provide information on ...**
TIS.3 Actual overview of the position of vessels on an certain stretch and/or corridor	Anonymised vessel position information; Provide information on traffic density on a certain stretch based on the anonymous vessel positions; Quality criteria and technical realisation to be investigated (depending also on legal requirements);	... actual positions of the vessels (anonymised) ... actual traffic density on a certain stretch
TIS.4 Actual overview regarding the operational status or operation of objects	Locks: Provide information on door status, chamber availability and level, signal lights status (red, green); Bridge status: Opened or closed (or opening or closing), signal lights status;	... lock door status (open, closing, closed, opening, malfunction, unknown) ... water level at lock chamber (low, leveling up, high, leveling down, unknown) ... signal light status of locks (green, red, other, unknown) ... status of a Bridge (opened, closing, closed, opening) ... signal light status of bridges (green, red, other, unknown)
TIS.5a Actual passage of an object by individual vessels	Timestamp of passing an object (departure) by an individual vessel (e.g. for updating the voyage plan, ETA, etc.);	... actual Passage Time (timestamp) at specific objects
TIS.5b passage durations for infrastructure passing (e.g. locks)	Provide information on how long does it take to pass specific infrastructure (e.g. locks) per CEMT class; Data sources to be investigated: Historical average passage durations [TIS.2] plus consideration of actual traffic situation [traffic density - TIS.3]);	... forecasted (actual expected) passage duration (hh.mm.ss) at specific objects considering the actual traffic situation (density) (CM.TIS.3): ... forecasted (actual expected) waiting duration at locks and openable bridges ... forecasted (actual expected) locking duration For locks: Passage duration = Waiting duration + entering duration + Locking duration + leaving duration
TIS.5c lock chamber planning	Additional (TIS.5) Service 1: Provide information on RTA (requested time of arrival: Be careful with terminology!) to the skipper (from the lock master); Additional (TIS.5) Service 2: Provide information on Position of vessels in lock chamber: *) Assigned position of own vessel as info from lock master to skipper, *) Assigned positions of all vessels in the lock chamber (for skipper and/or lock master), Additional (TIS.5) Service 3: Sequence of entering the lock chamber as info from lock master to the skippers (incl. assigned position in lock chamber);	... RTA from the lock master to the skipper ... assigned position of the own vessel from lock master to skipper ... assigned positions of all vessels in the lock chamber ... requested sequence of entering the lock chamber from lock master to skippers ... number (and details?) of vessels approaching and number of vessels within the lock per navigation direction
TIS.5d Actual passage of specific stretch (e.g. between two locks) by individual vessels	Timestamp of passing a specific waypoint (e.g. river-km) by an individual vessel (e.g. for updating the voyage plan, ETA, etc.);	... actual Passage Time (timestamp) at a specific waypoint of a stretch (e.g. river km)
TIS.5e passage durations for specific stretches (e.g. between two locks)	How long does it take to pass a specific stretch (e.g. between locks) per CEMT class; Data sources to be investigated (historical average passage durations [TIS.1] plus consideration of actual traffic situation [traffic density - TIS.3]);	... actual passage duration (hh.mm.ss) required for navigating through a specific stretch or section (e.g. between two locks) considering the actual traffic situation (density)
TIS.6a Actual occupation of public berths	Provision of occupation of specific berths in % based on actual vessel position information; realisation with some challenges (see CoRISMa pilot results); Occupation is calculated based on anonymised actual vessel position data (AIS);	... number of vessels at public berth ... percentage of occpied space at public berth ... available free space at public berth
TIS.6b Actual occupation of private berths	As occupation is calculated based on actual vessel position data (AIS), there is no information required from the private berth operators; Depends on the approval of the private berth operators to publish the occupation information;	... number of vessels at private berth ... percentage of occpied space at private berth ... available free space at private berth
TPM.10 communicate traffic planning to users and authorities	Services to be defined: e.g. Update of onboard traffic planner; sending of RTA info from authority to skipper; ERIRSP(?) etc.; Lessons learned from CoRISMa pilots 1, 3 and 4!	... RTA from traffic management authority (and other authorities / logistics users) to skipper (onboard applications) ... Lock chamber planning information from lock operator to skipper ... Voyage report update enquiry from authority to skipper ... Incident report from authority to skipper
CAS.1 Information on incidents focused on traffic situation	Provide information about the incident to fairway users (immediately after the incident): Type, severeness, location, expected duration;	... incident type, severeness, location, expected duration
TIS.1a Statistical overview traffic flows per vessel classes (CEMT)/ Means of Transport	Provide information on average and actual (recent) sailing time over a certain stretch for different vessel characteristics (vessel/convoy type);	... average sailing time (passage duration) over a certain stretch ... actual (recent) sailing time (passage duration) over a certain stretch
TIS.1b Statistical overview density per vessel classes (CEMT)/ Means of Transport	Provide information on average traffic density over a certain stretch for different vessel characteristics;	... average traffic density over a certain stretch based on anonymised vessel position data including indication of the vessel characteristics (vessel/convoy type)
TIS.2 Statistical overview regarding passage time of objects for certain vessel classes (CEMT)	Provide information on average and actual (recent) passage duration of a certain object (e.g. lock: passage duration = waiting time + locking duration incl. entering and leaving the lock) for different vessel characteristics (vessel/convoy type);	... average waiting times at locks and openable bridges ... actual (recent) waiting times at locks and openable bridges ... average locking duration ... actual (recent) locking duration

Figure 32: Level 2a Corridor Services out of RIS COMEX implementation plan

The following table provides an overview on the realisation of the individual Level 2a Corridor Services within the project corridors, respectively within the individual countries, within RIS COMEX:

Level 2a Corridor Services	Amst.-Antwerp-Liege / Brussels		Rhine			Danube								Elbe		Mosel			Dunquerke-Scheldt	
Service	BE	NL	DE	FR	NL	AT	BG	DE	HU	HR	RO	RS	SK	CZ	DE	DE	FR	LU	BE	FR
TIS.3 Actual overview of the position of vessels on an certain stretch and/or corridor																				
TIS.4 Actual overview regarding the operational status or operation of objects																				
TIS.5a Actual passage of an object by individual vessels																				
TIS.5b passage durations for infrastructure passing (e.g. locks)																				
TIS.5c lock chamber planning																				
TIS.5d Actual passage of specific stretch (e.g. between two locks) by individual vessels																				
TIS.5e passage durations for specific stretches (e.g. between two locks)																				
TIS.6a Actual occupation of public berths																				
TIS.6b Actual occupation of private berths																				
TPM.10 communicate traffic planning to users and authorities																				
CAS.1 Information on incidents focused on traffic situation																				
TIS.1a Statistical overview traffic flows per vessel classes (CEMT)/ Means of Transport																				
TIS.1b Statistical overview density per vessel classes (CEMT)/ Means of Transport																				
TIS.2 Statistical overview regarding passage time of objects for certain vessel classes (CEMT)																				

Figure 33: Implementation status of Level 2a Corridor Services by the end of RIS COMEX

The services indicated in red within the table above are not realised within the scope of RIS COMEX but will potentially be realised in the future, depending on the needs and requirements from the IWT sector but also depending on the feasibility and effort related to their realisation.

3.6.3 Level 2b Corridor Services: Traffic Forecast

The following table provides a list of the Level 2b Corridor Services included interpretation and information requirements as elaborated within RIS COMEX as starting point for the detailed service definitions followed by their realisation.

Level 2b		
Service	**Service interpretation**	**Information Requirements: Provide information on …**
TIS.7 Predicted traffic flows including the density for certain vessel classes (CEMT) / Means of Transport	Provide information on predicted traffic density in the timeframe of approx. 6 hours (e.g. based on actual traffic density and traffic flows, voyage plans, historical data on how the traffic might develop, other data sources[?])	… predicted positions of the vessels (anonymised) … predicted traffic density on a certain stretch
TIS.8a Predicted passage time of objects for certain vessel classes (CEMT)	Predicted timestamp of expected passing of an object (e.g. departure from a lock) by an individual vessel (e.g. for updating the voyage plan, ETA, etc.) based on TIS.2 and predicted traffic flows (TIS.7)	… predicted Passage Time (timestamp) at specific objects
TIS.8b predicted passage durations for infrastructure passing (e.g. locks)	Provide information on how long does it take to pass specific infrastructure (e.g. locks) per CEMT class; Data sources to be investigated: Historical average passage durations [TIS.2] plus consideration of predicted traffic situation [traffic density - TIS.7]);	… predicted passage duration (hh.mm.ss) at specific objects considering the predicted traffic situation (density) (TIS.7): … predicted waiting duration at locks and openable bridges … predicted locking duration For locks: Passage duration = Waiting duration + entering duration + Locking duration + leaving duration
TIS.8c predicted passage time of specific stretch (e.g. between two locks) by individual vessels	Predicted timestamp of expected passing of a specific waypoint of a stretch (e.g. river-km) by an individual vessel (e.g. for updating the voyage plan, ETA, etc.) based on TIS.1 and predicted traffic flows (TIS.7);	… predicted Passage Time (timestamp) at a specific waypoint of a stretch (e.g. river km) considering the predicted traffic situation (density) (CM.TIS.7)
TIS.8d predicted passage durations for specific stretches (e.g. between two locks)	Provide information on how long does it take to pass a specific stretch (e.g. between locks) per CEMT class based on TIS.1 and predicted traffic flows (TIS.7);	… predicted passage duration (hh.mm.ss) required for navigating through a specific stretch or section (e.g. between two locks) considering the predicted traffic situation (density) (CM.TIS.7):
TIS.9a Predicted occupation of public berths	Potential service: Provide information on predicted berth occupation (e.g. based on berth reservation services and/or statistics data [e.g. for specific periods like christmas, weekends, etc.] and/or voyage plans and/or potenatially other sources [?]);	… predicted percentage of occupied public berth space at a certain time / in a time period … reserved public berth space (in percent or list of vessels) at a certain time / in a certain period
TIS.9b Predicted occupation of private berths	see above	… predicted percentage of occupied public berth space at a certain time / in a time period … reserved public berth space (in percent or list of vessels) at a certain time / in a certain period

Figure 34: Level 2b Corridor Services out of RIS COMEX implementation plan

The following table provides an overview on the realisation of the individual Level 2b Corridor Services within the project corridors, respectively within the individual countries, within RIS COMEX:

Level 2b Corridor Services	**Amst.-Antwerp-Liege / Brussels**		**Rhine**			**Danube**								**Elbe**		**Mosel**			**Dunquerke-Scheldt**	
Service	BE	NL	DE	FR	NL	AT	BG	DE	HU	HR	RO	RS	SK	CZ	DE	DE	FR	LU	BE	FR
TIS.7 Predicted traffic flows including the density for certain vessel classes (CEMT) / Means of Transport																				
TIS.8a Predicted passage time of objects for certain vessel classes (CEMT)																				
TIS.8b predicted passage durations for infrastructure passing (e.g. locks)																				
TIS.8c predicted passage time of specific stretch (e.g. between two locks) by individual vessels																				
TIS.8d predicted passage durations for specific stretches (e.g. between two locks)																				
TIS.9a Predicted occupation of public berths																				
TIS.9b Predicted occupation of private berths																				

Figure 35: Implementation status of Level 2b Corridor Services by the end of RIS COMEX

Level 2b focuses on traffic forecast and related services. Due to the complexity it was agreed that these services are first realised within the NL-BE Corridors to gain experiences before rolling them out towards the other Corridors. This is the reason why the majority of the Corridors, respectively the individual countries, have not realised these Level 2b services within RIS COMEX.

3.6.4 Level 3 Corridor Services: Transport

The following table provides a list of the Level 3 Corridor Services included interpretation and information requirements as elaborated within RIS COMEX as starting point for the detailed service definitions followed by their realisation.

Level 3		
Service	**Service interpretation**	**Information Requirements: Provide information on …**
TTI.1 Presentation of own vessel's position	Provide and present vessel position information of all vessels a user is authorised to get;	… vessel positions of all vessels a user is authorised to get (user authentification required): … Vessel name, ENI, MMSI … Coordinates, Country/Fairway Section/Hectometer … Port of destination and ETA (data source AIS) … other data to be defined within Activity 2
TPM.1 Provision and presentation of ETAs of vessels	Provide ETAs of specific vessels at a specific object/destination to authorised users based on access rights; Provide RTDs at a specific origin in order to reach a specific object/destination by a defined RTA, to authorised users based on access rights; Provide estimated travel durations from a specific origin to a specific destination along a specific route;	… estimated date/time of arrival (ETA) … the related destination … travel durations (sailing times) … calculated Required Time of Departure (RTD)
TPM.2 Provision and presentation of voyage plans of vessels	Service enabling reporting parties (e.g. skippers, vessel operators) of voyage plans (e.g. ERIVOY, ERINOT) to forward the voyage plan directly to any related logistics user in order to increase efficiency e.g. during transhipment process due to optimised planning; Service enabling authorised logistics users to get the related voyage plans;	… ERINOT … ERIVOY … Other data to be defined within Activity 2
VP.10 Provision of cargo information to logistics partners	Service enabling reporting parties (e.g. of cargo reports like ERINOT) to forward consignment information (cargo info incl. Departure, destination, eta, etc.) directly to any related logistics user; Service enabling authorised logistics users to get the related consignment information;	… ERINOT … Other data to be defined within Activity 2
ILE.10 Provision of information for increased efficiency during vessel inspections	Provide information to competent authorities (voyage plans, cargo info, persons on board, ETAs, incl. updates, etc.) enabling them to increase efficiency of vessel inspections (with the permission of the skippers / vessel operators/owners in order to potentially reduce waiting times for inspections and inspection durations);	… vessel positions … ETAs (e.g. at inspection points) … voyage plans (ERINOT, ERIVOY) … cargo (ERINOT) … persons on board (PAXLST) … other data to be defined within Activity 2
ILE.11a Reporting Requirements	Provide services to logistics users to enable easier compliance with rules and regulations (reporting burdens like cargo reports, statistics reports, etc.);	… ERIVOY … ERINOT … PAXLST … statistics reports according to EUROSTAT regulation (transit, etc.) … other data to be defined within Activity 2
ILE.11b: Electronic Report gateway service	Enable reporting parties to create all required electronic voyage and cargo information to fulfil the given reporting requirements, in the most convenient and user friendly way avoiding the necessity to enter same information more than once.	… ERIVOY … ERINOT … PAXLST … CUSCAR … Statistics Reports … Etc.
PTM.5 Berth reservation	Provide the posibility for skippers to make a reservation (announcement) for a specific berth for a specific timeframe.	… timeframe of reservation … available berth space within the defined timeframe … reserved berth … vessel/convoy dimensions, respectively occupied berth space … vessel/convoy ID, respectively user data required for reservation
TIS.10 Predicted deviation of a voyage	ETA deviation notification service compared to recent voyage plan (respectively compared to last ETA request) for specific waypoints on the route based on actual position and actual traffic situation (density, passage durations, etc.);	… the predicted deviation of the original voyage plan (of skipper) at defined waypoints on the route (locks, crossings, berths,) and terminals/ports: … vessel name, ENI … updated ETA at specific point … Identification of specific point … reference to original voyage plan (optional) … other data to be defined within Activity 2

Figure 36: Level 3 Corridor Services out of RIS COMEX implementation plan

The following table provides an overview on the realisation of the individual Level 3 Corridor Services within the project corridors, respectively within the individual countries, within RIS COMEX:

Level 3 Corridor Services	Amst.-Antwerp-Liege / Brussels		Rhine			Danube								Elbe		Mosel			Dunquerke-Scheldt	
Service	BE	NL	DE	FR	NL	AT	BG	DE	HU	HR	RO	RS	SK	CZ	DE	DE	FR	LU	BE	FR
TTI.1 Presentation of own vessel's position																				
TPM.1 Provision and presentation of ETAs of vessels																				
TPM.2 Provision and presentation of voyage plans of vessels																				
VP.10 Provision of cargo information to logistics partners																				
ILE.10 Provision of information for increased efficiency during vessel inspections																				
ILE.11a Reporting Requirements																				
ILE.11b: Electronic Report gateway service																				
PTM.5 Berth reservation																				
TIS.10 Predicted deviation of a voyage																				

Figure 37: Implementation status of Level 3 Corridor Services by the end of RIS COMEX

The services indicated in red within the table above are not realised in the related countries/corridors within the scope of RIS COMEX but will potentially be realised in the future, depending on the needs and requirements from the IWT sector but also depending on the feasibility and effort related to their realisation. The Electronic Reporting related services (TPM.2, VP.10, ILE.10, ILE.11a, ILE.11b) were already (partly) available and in operation within several countries by their national electronic reporting systems (e.g. BICS-IVSnext in NL, NAMIB in DE, etc) so there was no special focus on these services by some countries within RIS COMEX. Nevertheless, for the upcoming period after RIS COMEX it is of utmost importance to interconnect the existing electronic reporting systems (CEERIS-NAMIB-IVSnext-etc.) with each other to foster the exchange of cargo- and voyage information in order to ease the reporting procedure.

3.7 Summary of actual status and open issues to be tackled

Tremendous developments have been achieved within the RIS COMEX project with the implementation of RIS enabled Corridor Management by realising the common systems EuRIS and CEERIS accompanied with the entire organisational, financial and legal framework for their sustainable operation,

On the other hand, it becomes obvious that there are still many open issues and necessary improvements to be tackled in order to achieve the intended benefits. A good indication for this are the tables provided in the previous chapters which already clearly indicate the gaps concerning the individual corridor services per country/corridor. Therefore, it will be one of the key aspects in a follow-up project to investigate these gaps and to eliminate them if suitable and feasible. Further focus needs to be put on:

- Increase accessibility of data and services
- Geographical extension(deploy services to additional countries)
- Elimination of data/service gaps (get rid of red cells in tables above) to reach harmonised level of services for the users
- Increase data quality (data consistency/quality checks, improvement of national data acquisition)

- Meet the requirements agreed within the RIS COMEX Corridor Services SLAs (and complete/optimise these SLAs)
- Interconnection of ERI systems to exchange voyage reports
- Interconnection of existing in-house systems

Based on the actual status and open issues/gaps of RIS Corridor Management the related Business Requirements were investigated and are provided in the following chapter.

4 Business Requirements towards RIS enabled Corridor Management

4.1 Business Requirements from IWT user's perspective

Based on the continuous contact to the IWT stakeholders and RIS users by all involved partners in previous and ongoing national and international projects and initiatives, the following main business requirements, to which RIS can potentially contribute, are identified:

- Increase accessibility to relevant fairway-, infrastructure-, traffic- and transport-related information in order to optimise route and voyage planning as well as traffic- and transport-management to increase efficiency within IWT
    - That includes on the one hand the availability of the data itself and on the other hand the accessibility, ideally by means of a single point of access rather than gathering relevant information from multiple different regional or national websites/portals/services.
    - This requirement shall not be underestimated as it implies a lot of necessary actions towards the provision of harmonised data and services in an acceptable quality. The amount of different important data and services is to be considered which are to be provided and/or optimised.
    - This requirement certainly also implies the necessary interconnection of various systems which have to be kept in sustainable operation.
- Reduce administrative barriers and reporting burdens
    - Related to the potential RIS contribution towards this business requirement, especially the reporting requirements for IWT are in the focus. The main challenge is to ease the fulfilment of these reporting requirements for the skippers and vessel operators ideally by enabling reporting only once with single entering of data for the entire transport.
    - To reach this target, it is important to optimise the existing electronic reporting related systems and to interconnect them accordingly in order to realise the required exchange of cargo- and voyage information.
    - Another aspect certainly are the requirements out of the upcoming eFTI Directive which seem to be essential and have to be supported by electronic reporting within IWT.
- Optimise waiting times at infrastructures (locks/bridges)
    - This implies the availability of reliable information about the infrastructure (operating times, status, etc.) but also about the vessel itself (position, type, dimensions, ETA at lock/bridge, etc.).

    - On the other hand, a kind of intelligent lock/bridge management system needs to be available in order to combine the information towards optimised planning and operation (e.g. the locking cycles).
    - Furthermore, the related regulations/legislation/procedures may be adapted based on approved (pilot) results.
- Protect the environment coupled with economic benefits
    - Making IWT more attractive and compatible towards the other modes of transport by facilitating digitisation/digitalisation by means of sophisticated and reliable information services, can contribute to a more balanced modal split fostering the environmental benefits of IWT especially compared to road transport as well as economic benefits for the involved stakeholders.
    - Optimised voyage planning and traffic management can potentially contribute to a reduction, respectively an optimisation, of fuel consumption which generates both environmental and economic benefits.
    - The same applies for increased utilisation of infrastructure (optimised lock/bridge but also berth/terminal planning and usage) and vessel capacities (more cargo can be loaded in case of trustful accurate water depth information along the route)
- Integrate RIS into a multimodal transport architecture to ease the planning and execution of multimodal transports having IWT fully integrated and therefore foster a modal shift towards inland navigation
    - This is certainly a rather long-term objective but preparatory work has already started within the DTLF initiative of the European Commission and which is also reflected within specific Sub-Activities of the DIWA project (e.g. SuAc 2.2, SuAc 2.4).
    - Considering the challenges to harmonise RIS among the countries, regions and corridors that were already tackled in the past and those which are still ahead, this requirement of multimodal integration has to be realised in a stepwise approach.
- Providing RIS data to logistics platforms (business sensitive services)

4.2 Where do we want to be in 10 years?

Based on the identified business requirements above, the envisioned status of River Information Services in the year 2033 shall provide the following key aspects:

- ➔ Harmonised services along European IWT network with single point of access to all relevant fairway-, infrastructure-, traffic- and transport-related information available for all IWT stakeholders (within the European Inland Waterway Network)
- ➔ Reporting only once with single entering of data to fulfil all reporting requirements for any transport along the European inland waterway network based on full cross-border exchange between systems / authorities
- ➔ Reliable and predictable transport along the European IWT network with minimal waiting times at locks/bridges and at transhipment facilities based on optimised traffic- and transport management
- ➔ Considerable modal shift towards IWT
- ➔ IWT integrated into multimodal transport chain by interconnection of related systems to exchange specific information enabling multimodal transport planning and execution
- ➔ Smart shipping in practise supported by RIS (see results of DIWA SuAc 2.1)
- ➔ Increased safety of navigation

5 Proposed Actions to fulfil the requirements

Within this chapter, proposed actions (short term, medium term and long term) are developed in order to realise the identified requirements. These actions are dealing with the further development of RIS enabled Corridor Management and therefore directly contribute to the digitisation and digitalisation within Inland Waterway Transports. Furthermore, the envisioned benefits to be realised as well as the identified risks and challenges coming along with the proposed actions are discussed.

The proposed actions, benefits and risks are initially identified by the SuAc 2.4 partners within a brainstorming session at the kick-off meeting and were further completed and detailed during several feedback cycles. Based on the continuous contact of the involved partners with their IWT stakeholders and based on the evaluation and feedback from the users on the various implemented systems and services over the past years, it can be assumed that the needs and requirements of the sector as well as of the related authorities are well known and considered accordingly.

5.1 Actions – Short Term

In this sub-chapter, the identified actions are listed and described which could be realised on short-term based on the available systems and services. Under short-term, the timeframe 2023-2025 is understood. It is expected that the proposed short-term actions can be directly realised based on the status of the RIS Corridor Management related systems and services as off by the end of RIS COMEX.

Data and Service Accessibility	**Level**	**Priority**	**Effort**
Extend, optimise, complete EuRIS/CEERIS API's for use by 3rd parties (functional/technical web services) and consider also the relevant aspects (legal, cybersecurity)	D-M	M	M
Integration of existing systems (e.g. EuRIS, CEERIS, other [national/regional] RIS and/or ERI systems)/services into existing in-house systems of the stakeholders (e.g. fleet managers, port and terminal operators, authorities) in order to increase accessibility of data and to support integration into internal processes	D-M	M	M
Integration of existing services: Start with multiple use cases/pilots to incorporate the existing services into the processes of the stakeholders (e.g. vessel operation, navigation, voyage planning, traffic management, transport management, logistics, statistics, etc).	D-L	L	H
Extend the geographical scope of the Corridor Services (e.g. integration of missing regions and integration of additional countries into EuRIS like CH, PL, UA, MD as well as integration of the sector like ports and terminals)	I-M	H	M
Provision of a EuRIS mobile app (focus on which data and how to be visualised, filtering, consideration of own position, configuration of favourite screen/data/etc.)	D-L	L	M
Provision of a CEERIS Mobile App (if data entry for reporting is suitable; potentially when working with templates/favourites and/or when just a few data fields have to be completed/updated; to be checked if required by Reporting Parties and/or Receiving Authorities; potentially two separate customised apps)	D-L	L	M
Increase the quality and quantity of provided services and information on IWT based on user feedback and requirements	D-H	H	H
Better provision of information for non-commercial users (e.g. boat ramps for pleasure crafts)	I-L	L	M
Harmonisation of reporting			
Enable the users responsible for voyage reporting (Reporting Parties) to fulfil all reporting requirements by reporting only once per transport of cargo and voyage data within IWT with single entering of data: This requires interconnection and harmonisation of existing electronic	D-H	H	H

reporting systems. Electronic Reporting is already in operation in many countries by means of different systems and reporting applications (e.g. BICS) and voyage reports are also partly exchanged between individual neighbouring countries (e.g. NL-BE-DE, LU-FR-DE, AT-SK). The main objective will be to interconnect these systems and application to reach the mentioned goal.			
Prepare the implementation of eFTI principles within RIS (identify relevant issues, necessary amendments, etc) in order to establish available relevant systems as certified eFTI platforms as next step	D-H	H	M
Optimised planning of control procedures (registration tool for control procedure, agreement on time/location among skipper and control authority)	D-M	M	M
Optimisation of ERI Messages (creation and maintenance of XSDs)	I-M	H	M
Traffic Management			
Optimised planning at locks/bridges based on actual traffic situation (time for locking to be agreed among infrastructure operator and skipper)	I-M	M	H
Forecast of (short-middle-long term) traffic situation (traffic forecast model) for traffic management (identification of potential chokepoints/bottlenecks, slot management at locks/bridges, etc.)	D-H	M	H
Provide relevant actual information to related entities involved in incident management processes	D-M	H	L
Implementation of status of objects (live object data on locks/bridges)	D-M	M	M
Environmental protection			
Provide better information on berth and terminal facilities (e.g. for waste disposal, electric loading points, etc.)	D-L	M	L
Others			
Setup and optimise user support for the EuRIS and CEERIS system, internationally coordinated to support the users as best as possible (consider language, reaction times, etc.)	D-H	H	H
Harmonisation of RIS Corridor Services in Europe: Identify and eliminate gaps related to the provision, reliability, accessibility and usefulness of services, interfaces and data considering regional differences related to requirements and implementation status	D-H	H	H
Support statistics by providing customised data to statistics services. In that respect the results of the related CoRISMa SuAc 3.3 study shall be investigated to identify potential support services	D-M	M	M
Create awareness for IWT for a broader public (logistics companies) by disseminating the existing/new services/systems accordingly	I-L	H	L
Harmonise the NtS published by each authority (e.g. by realisation of a common NtS Editor Tool (to be checked with requirements by RIS Directive))	D-M	M	H
Geographical extension of the D4D Portal (and/or integrate the related functionality to visualise the IENCs within a Web Map Service into EuRIS) in order to have all IENCs of the European Inland Waterway Network within once system and therefore within one source of data	D-L	L	M
Secure a viable user base: Promote EURIS and get as much fairway users to use it as possible	I-H	H	M
Identify and set appropriate measures to prepare multimodal integration	D-H	H	M

Legend:
Level: Level of contribution to digitalisation within IWT (I…indirect, D…direct, L…low, M…medium, H…high)
Priority: Prioritisation towards realisation of the individual tasks (L…low, M…medium, H…high)
Effort: Expected complexity, effort and costs towards the realisation (L…low, M…medium, H…high)

The table above lists the short-term actions concerning a contribution to digitalisation within inland waterway transport by means of further development of RIS Corridor Management and the related services for the users.

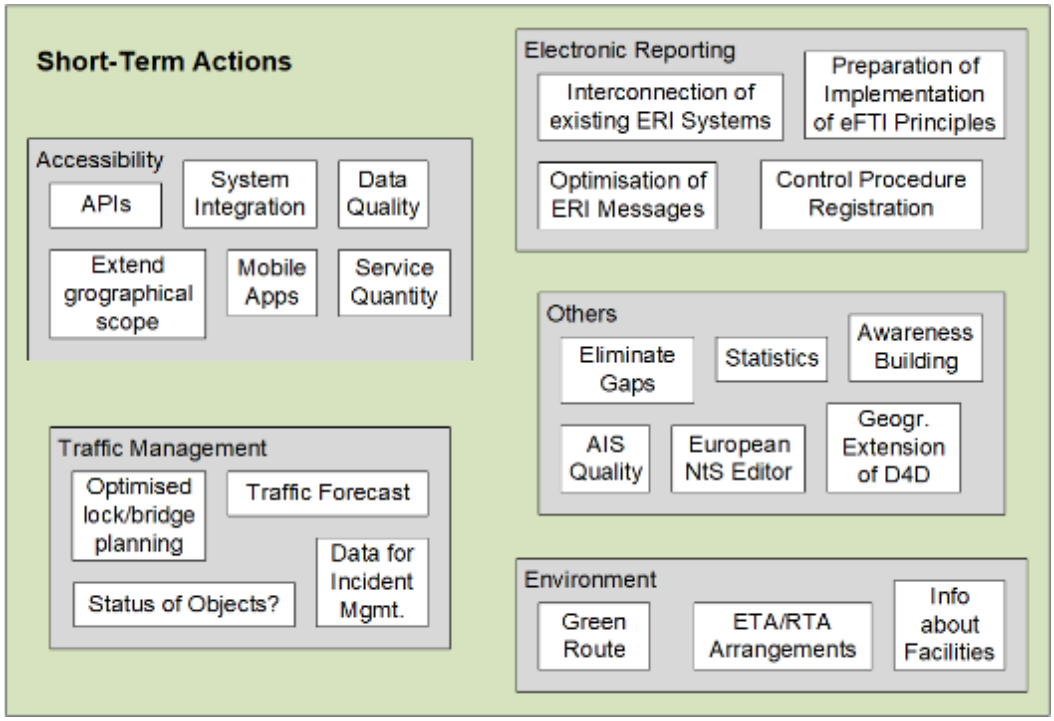

Figure 38: Overview of proposed short-term actions

As the figure above summarises, the identified short-term actions mainly focus on the optimisation of the Corridor Services themselves, the increased accessibility of these services and integration into the daily business of the related stakeholders in order to gain the optimum benefits out of it. It can be assumed that the listed short-term actions can potentially be realised within a follow-up project after RIS COMEX.

5.2 Actions – Medium Term

In this sub-chapter, the identified actions are listed and described which are expected to be realistically implemented on medium-term perspective. The following identified potential actions cannot be realised immediately on short-term due to complexity, dependencies and/or specific preparation work required before these actions can be realised.

Under medium-term, the timeframe 2026-2030 is understood.

Data and Service Accessibility	Level	Priority	Effort
Interconnection and integration of Corridor Services (e.g. provided by EuRIS and CEERIS) with other systems (e.g. logistics systems, port community systems, transport platforms, traffic management application, etc.)	D-H	H	H
Harmonise and provide all relevant reference data by one single point of access. In that respect detailed investigations and agreement need to be made in order come to such a solution considering the ERDMS operated by the European Commission, the Reference Data Support Services of the EuRIS system and other sources of reference data (UNECE, BICS tables, etc.)	D-H	H	M
Provide one common European RIS support and feedback platform for users	I-M	H	H

• Feedback by skippers on fairway, RIS data, ENCs and any other RIS data used on-board to other skippers (increase of navigation safety) and to responsible organisations (in order to increase data quality) • Provide adequate communication actions (e.g. comment section, chat section, etc.) • Organisational setup and responsibilities need to be clearly defined and established in order to take the comments/feedback serious and react on them			
Harmonisation and optimisation of reporting			
Reporting of voyage/cargo/persons on board information only once with single entering of data European-wide by interconnection of ERI Systems in order to optimise reporting procedures and to reduce the reporting burdens for the skippers/vessel operators (Reporting Parties) to fulfil the reporting requirements towards the authorities for IWT	D-H	H	H
Standardisation of non-standardised ERI Messages if required and based on operational experiences and optimisation (e.g. WASDIS, CUSCAR/ERIMAN, INVRPT, ERIINFO, BERMAN, eFTI XSD?)	D-M	M	L
Establish existing relevant systems as certified eFTI platforms (e.g. CEERIS)	D-H	H	M
Preparation of harmonised electronic reporting obligation. This requires well-functioning reliable and user-friendly reporting applications before the user can be obliged to use such systems. Reporting all voyages electronically would enable to gain additional benefits (e.g. increase safety of navigation as all info is available on short notice in case of an accident; increased actions towards statistics).	D-H	H	M
Automatic feedback on expected itinerary (route/voyage plan) and ETA's when submitting electronic voyage information (voyage plan update message [ERIINFO] as response to created/submitted transport report; ERIVOY could be used for the specific case where the skipper requests estimates on waypoint ETA's/suggested route)	D-M	M	M
Foster the continuous update and share of relevant ETAs (ETA deviation management) to involved stakeholders to optimise the planning and execution of remaining transport	D-M	M	M
Enhanced / additional services			
Berth occupation prediction based on historical data	D-L	M	M
Provide relevant long-term (multiple years?) fairway and infrastructure information on planned/expected limitations (lock revisions, etc.) harmonised on Corridor / European level to optimise transport planning	I-L	L	L
Provide relevant real-time information (vessel info [type, dimensions, position, etc.], cargo info, persons on board data) to support incident management and establish the related procedures considering also legal issues (e.g. emergency service provides shall only have access to specific data in case of an emergency)	D-L	H	M
Increase the quality and quantity of provided services and information on IWT based on user feedback and requirements as well as based on operational experiences	D-M	H	M
Calculation and provision of greenest route (CO2 emission, fuel consumption, external costs?) next to shortest and fastest IWT route (already available)	D-L	M	H
Include sailing regimes in voyage computation (would be interesting, especially combined with alternative fuels infrastructure making sure the sailing breaks can be combined with refuelling)	D-M	M	M
Others			
Implement and optimise automatic data consistency and quality checks before providing the data to the users in order to ensure that the data is correct, up-to-date and useful.	I-M	M	M

Identify potential useful analysis/statistics based on the available historical data within EURIS in order to improve relevant IWT procedures, to remove any bottlenecks, to improve information services etc.	D-M	M	M
Realise one European NtS Editor instead of having individual national NtS systems whereas it was already identified that the international exchange of NtS, besides the existing standardisation of the related NtS web-services, is difficult due to different interpretation of the standards. One common solution would increase data consistency and would have also benefits related to implementation and operational costs which could then be shared by the countries instead of having to maintain individual systems.	D-H	H	H
Coordinate appropriate measures to enable multi-modal integration	D-H	H	H
Increase environmental friendliness of IWT by providing actions to realise a "greener" journey by optimal route planning and fuel consumptions based on reliable fairway, infrastructure and traffic information as well as agreed RTAs (e.g. at locks, terminals)	I-M	M	M
Increase of AIS data quality (missing ENI/IMO number, obviously wrong dimensions, double use of ENI/MMSI, spoofing, etc.) by means of data consistency checks including AIS consistency checks by central data verification	I-M	M	M

Legend:
Level: Level of contribution to digitalisation within IWT (I…indirect, D…direct, L…low, M…medium, H…high)
Priority: Prioritisation towards realisation of the individual tasks (L…low, M…medium, H…high)
Effort: Expected complexity, effort and costs towards the realisation (L…low, M…medium, H…high)

The table above provides the identified actions on how RIS Corridor Management can be further evolved in order to contribute to digitalisation within IWT on medium term. It is not always possible to give a realistic estimation whether a specific possibility can be implemented on medium-term or rather on long-term due to many dependencies, therefore the indication medium/long term has to be considered carefully.

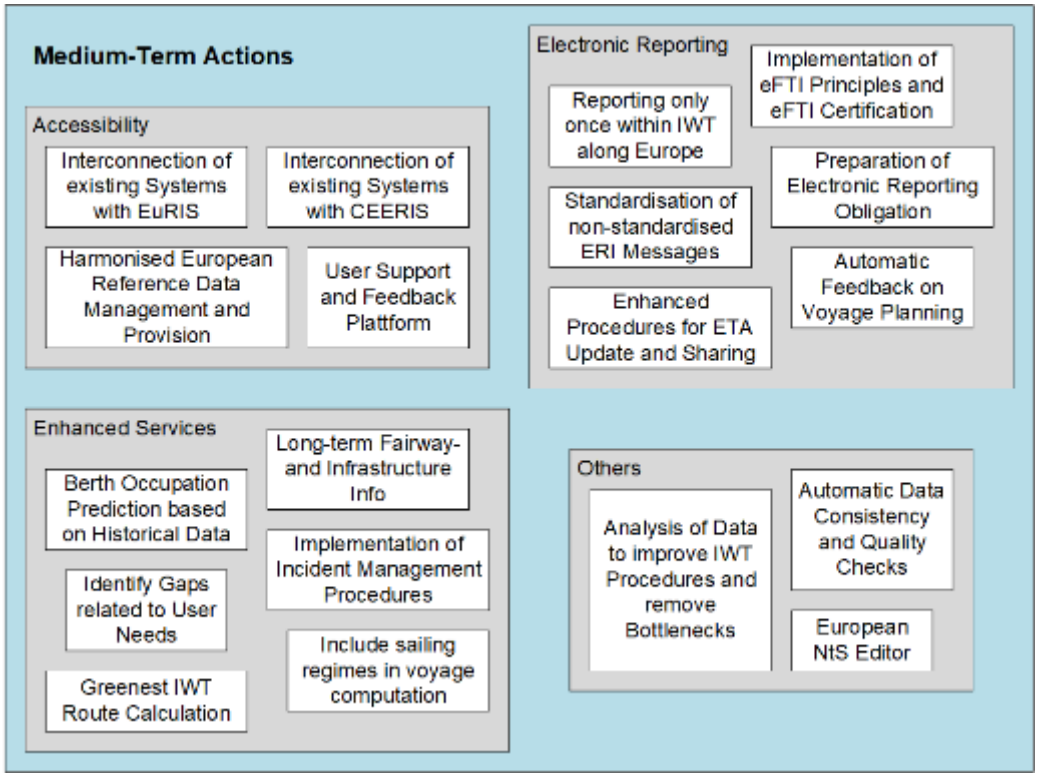

Figure 39: Overview of proposed medium-term actions

The figure above summarises the identified actions which are considered to be realistically realised within the medium-term perspective.

It is clearly identified that the medium-term actions focus on further harmonisation of the Corridor Services and the related systems to optimise accessibility as well as the quantity and quality of the provided services and data. From user perspective it would be ideal if there are as less systems and data sources as possible in order to maintain accessibility and consistency of the provided data and services.

A key focus has to be put on voyage reporting in order to harmonise and ease the reporting procedures and data handling within IWT for the users.

5.1 Actions – Long Term

In this sub-chapter, the identified actions are listed and described which are expected to be realistically implemented only on long-term perspective due to high complexity, extensive dependencies and/or substantial preparation work required before these actions can be realised.

Under long-term, the timeframe 2031ff is understood.

Typical long-term actions are related to Synchro Modality and Smart Shipping which still require a lot of preparational work on different levels (legal, organisational, technical, financial) and which have to be realised in a well-coordinated cooperation among many different stakeholders (e.g. of different transport modes in case of Synchro Modality).

Data and Service Accessibility	Level	Priority	Effort
Further harmonise the data accessibility for the users. Ideally, from user perspective, would be one system as single point of access for all required data and services; instead of several national/regional applications (duplicating the effort, fragmented data accessibility, etc.). If possible and feasible, get rid of redundant parallel (national) systems by substituting them by harmonised European Services (basic national infrastructure certainly needs to remain (e.g. AIS infrastructure, etc.).	D-M	H	M
Realise integration of Corridor Management (services and data) into daily business operation and procedures of the stakeholders	D-H	H	H
Harmonisation and optimisation of reporting			
Integration of available pre-transport information (e.g. bill of lading) into electronic reporting and simplification of reporting process by using available data instead entering it (again)	D-H	M	M
Introduction of digital signatures for documents to be signed, if required (e.g. DAVID Forms)	D-M	M	M
Harmonisation of Reporting Requirements (legal perspective) as far as possible. This would ease the reporting processes, increase transparency about the reporting requirements and reduce the reporting burdens for the skippers/vessel operators.	I-M	M	H
Establish harmonised electronic reporting obligation	D-H	H	H
Multimodal integration / Synchro modality (Long Term)			
Reporting only once with single entering of data in multimodal transports	D-H	H	H
Offer at least the same value/benefits of information services as other transport modes (see results of DIWA SuAc 2.5)	I-M	H	M
Multimodal integration (exchange and provision of up to date multi modal information and alternatives, multimodal services, multimodal transport planning) to foster seamless utilisation of IWT integrated in intermodal transport chain (synchro modality as consequence of multimodal integration)	D-H	H	H

Realise integral voyage management by sharing at least actual ETAs at specific objects like locks, transhipment facilities etc. among the concerned transport modes to optimise transport and traffic management (locking procedures, berth reservation, transhipment procedures, etc.) fully integrated with other modes	D-M	H	H
Enhanced / additional services			
Berth occupation forecast based on traffic forecast model (Corridor Services Level 2b)	D-M	M	M
Automatic slot reservation at locks based on earliest possible departure and latest possible arrival including advanced RTA communication from locks to skippers to optimise fuel consumption, travel and waiting times, etc. as well as to optimise the infrastructure utilisation (legal challenges to be considered)	D-H	M	H
Provide optimised lock/bridge cycle forecast information based on national planning systems (short term) and/or based on traffic forecast model	D-H	M	H
Harmonised/common lock planning system(s)	I-M	L	H
Compare possible routes with routes along other transport modes (could be critical as this is business sensitive information/interpretation)	I-L	L	H
Others			
Enhanced staff planning for fairway/lock authorities as well as transhipment facilities based on forecasted traffic volumes	I-L	M	M
The European Hull Database (EHDB) needs to be optimised in order to allow its usage and to gain the initially planned benefits out of it. This includes the necessary monitoring and optimisation of the data quantity (many countries are still not providing their vessel certification data sets to the EHDB) as well as the data quality (many datasets contained within the EHDB are outdated and not actual anymore, therefore unreliable). Specific attention needs to be drawn on the interconnection of related other systems (e.g. national Hull DBs, EuRIS) and integration of specific data into relevant processes (e.g. verification of vessel claims within EuRIS, etc.).	D-M	M	M
The ongoing implementation of the architecture of the European Crew Qualifications Data Base (ECQDB) needs to be followed and potential optimisation and integration into daily business (e.g. of control authorities) has to be identified and realised.	D-M	M	M

Legend:
Level: Level of contribution to digitalisation within IWT (I…indirect, D…direct, L….low, M…medium, H…high)
Priority: Prioritisation towards realisation of the individual tasks (L…low, M…medium, H…high)
Effort: Expected complexity, effort and costs towards the realisation (L…low, M…medium, H…high)

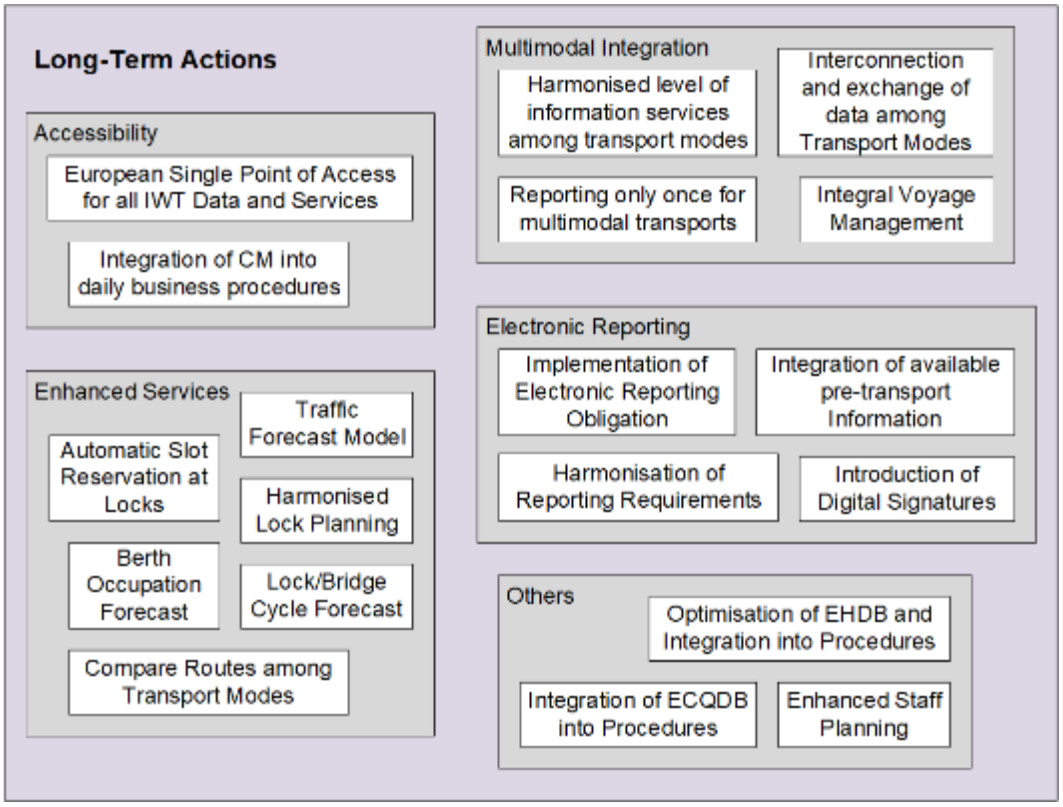

Figure 40: Overview of proposed long-term actions

Besides the further development of the RIS Corridor Services, a key pillar within the long-term perspective will certainly be **multimodal integration** by establishing the related interfaces and data exchange procedures to support multimodal transport planning and execution as well as traffic management in order to increase transparency and flexibility towards multimodal and synchro-modal transports. Within RIS COMEX Sub-Activity 5.4, a concept and requirements for Multimodal Corridor Management (MMCM) were investigated, whereas MMCM is defined as:

"The combined application of technologies and a commitment of network partners to work together and exchange well defined and standardized information towards optimizing the match between the right services and the transportation demand at the least social, environmental and economic cost while maximizing the return on previous and future investments in infrastructure and services."

The following success factors for the realisation of MMCM were identified and are described within the RIS COMEX SuAc 5.4 Report along with other important details which are to be further investigated and considered when realising specific tasks towards MMCM:

- CSF1: Network, Collaboration and Trust
- CSF2: Sophisticated Planning
- CSF3: ICT/ITS Technologies
- CSF4: Legal and Political Framework
- CSF5: Awareness and Mental Shift
- CSF6: Pricing/Cost/Service
- CSF7: Physical Infrastructure

Another key-aspect within the proposed long-term actions are the so-called European Services (European Hull Database-EHDB, European Crew Qualifications Database-ECQDB) will play an important role in the long-term perspective towards digitalisation within inland navigation. These services/systems need to be realised in a usable way and to be brought into sustainable operation in order to increase the availability of relevant data provided by reliable data sources and to avoid data

inconsistencies. Based on this, related interconnections and integration of the data and services has to be tackled.

5.2 Potential Benefits to be realised by the proposed actions

This sub-chapter provides the potential benefits which could be gained by the further development of RIS enabled Corridor Management fostering the digitalisation within IWT focusing on the realisation of the identified short-term, medium-term and long-term actions as presented in the chapters above.

Usability benefits
The accessibility and usefulness of relevant data for the users is increased
Considerably more reliable and harmonised real-time Information is accessible for the users
Shorter waiting times for responses (e.g. from authorities) based on enhanced information exchange and availability (e.g. due to integration into in-house systems)
Increased quality and quantity of services and data provided to the IWT users
Due to the accessibility of reliable information, IWT users are less dependent on their own experiences and knowledge of waterways, infrastructure, etc.
Competitiveness with other transport modes
Better interaction with other modes of transport becomes more and more realistic
Information services provided within IWT seem compatible with other transport modes
Increased transparency in multimodal transport planning
Reach at least the same information / standardisation position as opposed to road/rail/maritime/aviation
Economic benefits
Reduced waiting times and travel durations based on actual and reliable information (e.g. ETA deviations respectively ETA updates based on actual vessel position and fairway/traffic/infrastructure information along the remaining route)
Efficient personnel planning based on updated and accurate ETA information (e.g. at loading/unloading facilities)
Optimized berth management and transhipment procedures
Environmental benefits
Increased utilisation of locks (fewer empty basins) resulting in reduced waiting times for vessels and reduced water consumption due to optimised locking procedures
Reduced fuel consumption due to optimal planning (e.g. of locking procedures, loading/unloading procedures) and RTA communication based on reliable and actual information (e.g. vessel positions, ETAs)
Support incident management to minimise environmental impact in case of incidents by providing relevant reliable information to related organisations (e.g. rescue and emergency service providers)
Contribution to a more balanced modal split fostering environmentally friendly IWT
Other benefits
Possibility to easily identify bottlenecks and gaps related to the provided Corridor Services by monitoring and comparing the provided services and data per country and Corridor. It is directly visible which data is available for which country/Corridor (= service and data quantity) and data consistency checks can identify problems within the quality of the provided data.
Possibility to gain direct feedback from the users to identify gaps and potential improvements of provided data, services and functionality as well as on the fairway and infrastructure itself
Frameworks for sustainable operation of common systems like EuRIS and CEERIS (e.g. EuRIS Cooperation Agreement binding 13 countries strongly together) eases the further development and operation as well as the optimisation of systems and services towards the users
Authorities and national service/data providers are forced to be conform with EU standards and to build interoperable services in order to be able to provide the services and data to the users
Reliable services are to be used as enabler for smart mobility
Increased safety of navigation within IWT

The table above provides a certainly non-complete list of potential benefits which could be gained by realising the identified actions as provided in the previous chapters. The already identified potential benefits nevertheless clearly show the potential which still is not utilised by the current state of RIS and RIS enabled Corridor Management and therefore justify further efforts to realise the identified further actions.

5.3 Risks and challenges coming along with the proposed actions

This sub-chapter discusses the potential risks and challenges which have to be considered and tackled by preventive and reactive measures in order to avoid problems within the further development of RIS enabled Corridor Management by realising the proposed actions and to reach the potential benefits as presented in the chapters above.

Technical
Missing data (e.g. not every fairway user has AIS on board)
Poor data quality (e.g. wrong vessel-IDs within AIS data, non-accurate or outdated ETA information)
Users are not always online (missing internet connection, simply not using systems/services when sailing)
Lack of interoperability with other transport modes and/or logistics concepts e.g. FEDERATED
Interaction with the private sector
Competition with commercial parties concerning data provision (e.g. ETAs - who is right)
Too much implication of authorities in commercial activities
A lot of effort (on authority side) for little benefit for the sector
Bad usage of commercial-sensitive information
Data breach leads to severe consequences (business damage, liability)
Users are depending so much on the services that downtimes have critical consequences
Sceptical users
Data quality not good enough to be trustful
Users don't trust the Systems
Digitalisation in a rather conservative environment
Trying to run before we can walk
Some vessel operators (or other data owners) do not want to share information
Others
Different status and progress in digitalization per country/region
Cooperation between partners/Member States does not work out
Slow update cycles for standards & legislation hindering technical/functional improvements
Lack of commitment or lack of resources at authorities in order to maintain ref data up to date
Dependency on other initiatives and organisations

Based on the preliminary identified risks and challenges as listed in the table above, the following conclusions and recommendations are drawn:

- The listed identified potential risks and challenges clearly indicate that coordination and communication will be a key success factor as preventive measure to overcome these risks
- Most important will certainly be the close integration of users into actual and future developments in order to prevent potential resistance or developments which are not according to the real needs and requirements of the stakeholders
- Furthermore, it is recommended to establish and continuously maintain an overall risk management mechanism related to the operation, provision and further development of RIS enabled Corridor Management
- Therefore, the potential risks have to be investigated in more detail, described and rated (likeliness, impact) followed by the identification of preventive and reactive measures in order to minimise the likeliness of the individual risks and, in the case a risk becomes true, to have actions defined in order to minimise the impact

5.4 Prerequisites to realise the proposed actions

Based on the identified actions and potential benefits related to the further development of RIS Corridor Management as provided in the previous chapters, the individual prerequisites to reach these goals were investigated and are provided within this chapter. The listed prerequisites reflect the actual status of RIS enabled Corridor Management and incorporate the necessary next steps related to the envisioned further developments in order to foster and to accelerate the digitisation and digitalisation within IWT.

Therefore, the prerequisites to support the digital transition within IWT by providing enhanced Corridor RIS Services (as discussed within the previous chapter) are developed on different levels:

- Functional/technical
- Standardisation
- Legal
- Organisational
- Financial

It is obvious that the actual level of implementation and operation of RIS Corridor Services and related issues are considerably different in the individual regions/countries. A clear example of this is the status of the Level 2b Corridor Services which are realised only along one RIS COMEX project Corridor so far. Therefore, it might be that some individual of the following prerequisites are already fulfilled within specific countries/regions or even systems. This has to be, and certainly will be, considered when planning the realisation/implementation of the individual measures to fulfil the related prerequisites.

5.4.1 Functional / Technical Prerequisites

Functional and technical prerequisites
Gather, organise and consider feedback and suggestions from the users to optimise the systems and services towards their real needs and requirements and set appropriate measures to implement them
Implementation of new Regulations which effect IWT like eFTI (make relevant systems eFTI compliant = certified eFTI platform)
Maintain a clear view on the current status and next steps of digitalization within IWT
Ensure interoperability of interconnected systems in practice by integrating exchanged data into daily procedures and make use of the integration (not just in theory)
Where feasible and necessary, realise enhanced multi-versioning by introducing update procedures for interfaces, data formats, messages, etc. in order to avoid problems when all systems/service would have to be updated simultaneously
Clearly defined multimodal interfaces for Electronic Data Interexchange
Ensure reliable interfaces (Service quality)
All data/content which is provided to users, needs to be updated/maintained by all partners for the participating Member States
Provided system functionality has to be user-friendly
Close interconnection of Port Community Systems (both maritime and inland) with RIS
Pilot implementation of multimodal data exchange / joint services (e.g. for route & transport planning, electronic reporting)
Support for small devices (mobile)
Data quality/reliability dashboard is needed to trust the data
Provided services and data have to be reliable and up to date, otherwise it is not trustworthy
Harmonisation of Level of Services (e.g. publication of NtS)

5.4.2 Standardisation Prerequisites

Standardisation prerequisites
The room of interpreting the standards has to be minimised in order to ensure a harmonised and interoperable implementation of the standards (in the past it was identified that the standards were differently interpreted within national implementation which lead to the problem, that the related data could not easily be exchanged and consolidated)
Standardised interfaces / messages / procedures
The evolution and adoption/publication of standards should be in-line with the actual developments and new technologies

5.4.3 Legal Prerequisites

Legal prerequisites
EU-wide legal basis to avoid that multilateral agreements necessary every time data is exchanged between parties (incl. authorities) for all kinds of RIS including data exchange
EU-wide legal basis for multimodal data exchange and multimodal services
Validation of implementation Acts
Amend ES-TRIN (regulation on vessel requirements like required onboard staff) based on digitalisation
Get rid of legislations that require paper and stamps
Low entry level legislation
Reduce overlapping regulations
Agree on EU legislation (stricter national legislation on top of EU legislation could become an obstacle)
Legal framework on sharing the data with 3rd parties (and their customers)
Harmonised legislation among EU Member States
EU Policy is overarching the modes - no silo thinking & approach

5.4.4 Organisational Prerequisites

Organisational prerequisites
Governing board with sufficient mandate to plan and execute changes on common systems
Optimise frameworks for sustainable operation and further development of common systems
User support and content management team (Service Desk for end users)
Harmonised User Support
Establish a user reference group to be in contact with several stakeholders, e.g. service providers (AEDINS - cooperation of service providers like TRESCO, PERISKAL, ...)
Maintain a clear and realistic roadmap with broad support
Establish an efficient and effective steering of the common systems and services
Ensure national willingness to depend on EuRIS
Ensure national willingness to gear their information systems towards EuRIS
Have the competent authorities from the Member States involved and committed to the common systems and services
Realise further coordinated projects
Realise 24/7 system operation and user support
When the marked relies on systems, additional efforts (and budget) is required to ensure availability and reliability of the related system, services and data
Onboarding of additional countries (e.g. CH, PL)

5.4.5 Financial Prerequisites

Financial prerequisites
Investigate the potential necessity for business models (for the common systems) with the potential goal to finance (parts of) the operational costs (it is not allowed to make profit with the provided systems and services as they were co-financed by the EU and most partners are non-profit organisations)
Sufficient national/European funds are required to ensure further development and sustainable operation of the common systems and services
A balance between financial contribution and influence has to be found
Ensure funding for further developments
Establish sustainable financing of system operation and user support
Ensure sustainable maintenance and support
Ensure long term budget commitments from partners
Organize EU funding for maintenance of common systems

6 Roadmap to realise the proposed actions to fulfil the identified business requirements

This chapter provides the roadmap and proposed measures towards the realisation of the proposed actions and the further development of RIS Corridor Management in a stepwise approach. RIS are directly contributing to the digitisation and digitalisation within IWT by providing related information services customised to the requirements of the stakeholders. Therefore, this roadmap and the proposed measures are considered as direct contribution to foster digitisation/digitalisation with IWT.

6.1 Timeline

The following figure illustrates the actual and future setup of RIS Corridor Management related activities and puts the timeline for the identified short-term, medium-term and long-term actions in relation.

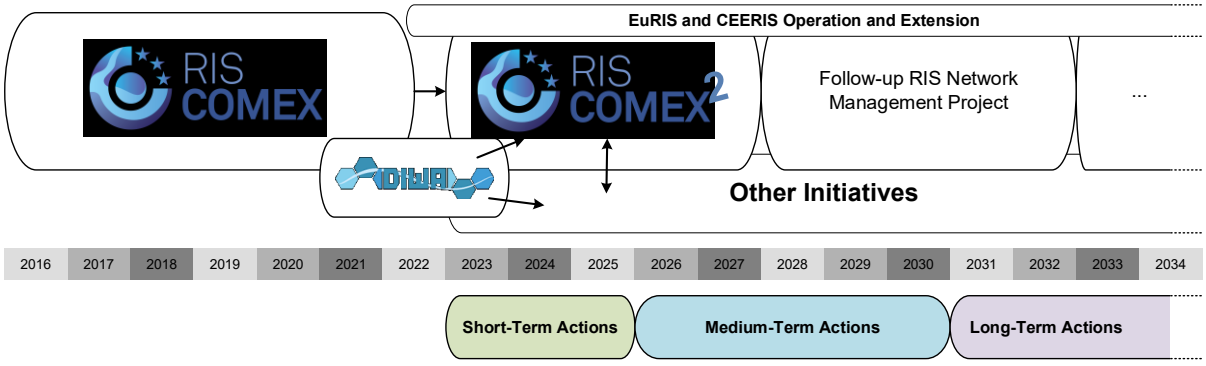

Figure 41: Roadmap for RIS enabled Corridor Management and proposed actions

- June 2022: End of RIS COMEX; EuRIS and CEERIS in operation providing various RIS Corridor Services; open issues and priority developments identified and documented
- July 2022ff: Sustainable operation and further development of EuRIS and CEERIS after the end of RIS COMEX

- May 2022 – January 2023: Elaboration and submission of project application for RIS COMEX follow-up project (= RIS COMEX²)

- December 2023: Availability of final DIWA project results (Masterplan for the Digitalisation within IWT)

- January 2023 – December 2027: Intended duration for the RIS COMEX² project

- 2023 – 2025: Realisation of the identified short-term actions

- 2026 – 2030: Realisation of the identified medium-term actions

- 2027: Preparation of further follow-up RIS Network Management project (due to the fact that the status of provided harmonised River Information Services already goes beyond the level of Corridors, the term "Network Management" is more fitting, reflecting the provision of harmonised RIS along the European waterway network)

- 2031ff: Realisation of the identified long-term actions

6.1 Approach

The following ***approach*** is proposed in order to follow-up with the realisation of the identified actions:

1. Ensure proper operational start and sustainable operation of the EuRIS and CEERIS systems by the end of and beyond the RIS COMEX project
    - Who: RIS COMEX Consortium
    - Until: End of RIS COMEX

2. Identify and document open issues and priority developments to be realised for EuRIS and CEERIS after the end of RIS COMEX
    - Who: RIS COMEX Consortium
    - Until: End of RIS COMEX

3. Submit a project application for a follow-up project of RIS COMEX into the 2nd CEF2 Call in order to ensure financial support for the further development of RIS Corridor Management
    a. based on the status of RIS Corridor Management by the end of RIS COMEX
    b. considering the intermediate results of the DIWA project (identified actions and potential developments, etc.)
    c. focus on
        i. elimination of identified gaps
        ii. implementation of identified priority developments
        iii. realisation of identified short-term actions
        iv. preparation/realisation of identified medium-term actions
        v. preparation for future realisation of identified long-term actions
    - Who: Initiated by the RIS COMEX Consortium, to be completed by the RIS COMEX² Consortium
    - Until: Deadline for 2nd CEF Call (mid January 2023)

4. Besides the fact that RIS COMEX and its planned follow-up project(s) will play a major role in the further development of RIS Corridor Management, it is obvious that there are specific issues identified which do not fall under the responsibility of the fairway authorities providing the related RIS Corridor services. Therefore, it will be important to specifically identify open issues, actions, potential developments, etc. which would have to be realised by other organisations and initiatives and to share the findings with responsible parties and initiate the necessary actions.
    - Who: DIWA Consortium
    - Until: Until the end and beyond the DIWA project

5. Identify relevant other initiatives and ensure appropriate cooperation and coordination in order to utilise synergies in the further development of RIS Corridor Management and to maximise the benefits for the stakeholders.
    - Who: Consortia of related initiatives and projects
    - Until: Continuous

6. Continue international harmonised cooperation, ideally in common projects
    - Who: Consortia of related initiatives and projects
    - Until: Continuous

This approach shall be accompanied by ***specific measures for continuous control and coordination***:

1. Maintain and communicate the big picture of RIS Corridor Management in order to optimise coordination and cooperation among related organisations and initiatives as well as for planning of future projects and initiatives. This big picture could be a kind of continuous maintained RIS Corridor Management Status Overview and Master Plan focusing on
    a. actual status of systems and provided services
    b. identified gaps and open issues
    c. proposed / planned developments

2. Keep close contact with the users and stakeholders of RIS Corridor Management in order to
    a. get their continuous feedback and input on the quality and potential gaps of the provided data and services
    b. ensure that the services and developments are optimised to their real needs and requirements
    c. create awareness and ensure proper usage of the provided services

3. Monitor the identified and potential future benefits towards their realisation and set appropriate measures to reach and utilise these benefits to their maximum extent. In that respect it might necessary to adapt planned or ongoing measures accordingly.

4. Keep an eye on the identified and potential future risks, set preventive actions and draft reactive measures for those risks.

5. Continuously maintain the identified and future requirements to further develop RIS Corridor Management and to reach the envisioned benefits and initiate appropriate actions to tackle and to realise these requirements which are often a precondition to implement the identified actions and to reach additional benefits.

6. Maintain coordination on the level of policy makers in order to ensure financial support for the further harmonised development and operation of River Information in Europe.

Within RIS COMEX Sub-Activity 4.5 five ***Guiding Principles*** were elaborated in order to give direction when thinking about the next steps to take in the development of Corridor Management. The Guiding Principles, for which specific individual actions are proposed within the COMEX SuAc 4.5 Report, shall be considered accordingly:

1. Harmonized multimodal CM Services: The focus on CM should be on supporting the optimal integration on IWT into the total supply chain.

2. Optimal support for sustainable decisions: CM information services on the inland waterway should enable skippers and service providers to make the most sustainable decisions and optimal choices and therefore contribute to lowering the emissions in the whole transport system.

3. Enhance predictability: The focus for the future is on further developing accurate and reliable forecasting of various types of information services to generate more harmonized and

reliable information and link it to services in other modes of transport to improve predictability of the situation for all modes of transport on a corridor.

4. Enable the full potential of digitalization: CM should make it possible for all interested users to make the most of digital possibilities for integrating transport in a transparent way.

5. Interaction with surrounding world: CM should develop so that safety and efficiency are maintained and enhanced in a sustainable way in accordance with the surrounding world.