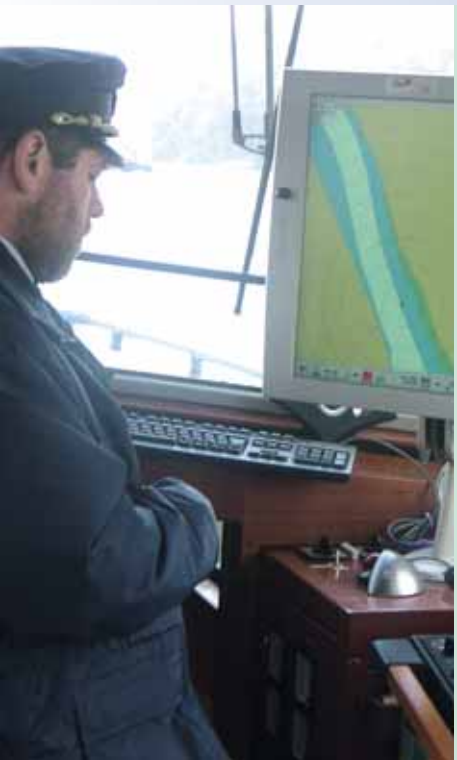
RIVER INFORMATION SERVICES

As policy implementation flows from research

Directorate-General for Energy and Transport
EUROPEAN COMMISSION

CONTENTS



This publication was produced by the EXTR@Web consortium for DG Energy and Transport. The information in this document has been collected by the partners in the project on the basis of material provided by via-donau, the development agency for inland navigation, which was involved in numerous research projects to foster infrastructure and services for the Danube navigation.

We would like to pass our grateful thanks to via donau - Österreichische Wasserstraßen-Gesellschaft mbH for their support and technical review of the manuscript.

Additional information on transport research programmes and related projects is available on the Transport Research Knowledge Centre web site on the European Commission's Europa server:
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Manuscript completed in November 2004.

Photo credits: via-donau (cover, (i), p. 5-8-9-12-17-19); digitalvision (cover, p. 1-13); FreeFoto.com (cover, p. 4-14-15); www.ecliptic.ch (cover).

Printed in Belgium

FOREWORD

Transport's main potential barriers for sustainable socio-economic development in the European Union (EU) are traffic congestion, environmental impacts, and economic costs. The EU Transport White Paper "Transport Policy for 2010: time to decide" proposed important measures to tackle these challenges, including developing inland waterway and inter-modal transport. The White Paper proposed shifting cargo from the heavily loaded road network onto the waterways. Through this proposal, by balancing the modal shares of transport systems, the existing infrastructure capacity can be fully used to accommodate future economic growth in the EU.

Inland waterway transport is seen as a reliable, economical, and environmentally-friendly mode of transport; it is recognised by the EU as a key means of transport in the European inter-modal transport system. The Commission aims to create favourable conditions for the further development of the sector and to encourage business to expand the use of this means of transport. Its future development requires the introduction of modern concepts, technologies and solutions, so as to adapt to new market needs and to inter-modal integration, thus providing an accessible, safe, and environmentally-friendly alternative to the congested road network.

Information and communication technologies provide an opportunity to transfer not only traditional bulk transport but also other goods, containers and even high priced just in time transport onto the inland waterway transport sector. This offers an intelligent, safe, and efficient method of transport with the information links to the rail, road, and short-sea systems. The advanced information and communication technologies applied on inland waterways will provide inland shipping with a competitive edge over other means of transport, together with an effective means of integration into logistic chains. In 1998, based on the results from several research projects and various applications, the EU officially defined the concept of River Information Services (RIS).

RIS is defined as a concept of harmonised information services to support traffic and transport management in inland navigation, including interfaces to other modes of transport.

Presenting the case for RIS

RIS is important for the entire European inland waterway sector. Through RIS, waterways can connect to the latest logistic developments, which offer reliable and predictable logistic supply chains. The further development of inland navigation, through the implementation of RIS, is of special interest to the inland waterway corridors. The recent enlargement of the EU, embracing Central and Eastern European countries, brings about a massive increase in freight transport demands. It is therefore necessary to modernise inland navigation and to make inland waterway transport more attractive, in competition and cooperation with road transport.

The expected "Harmonised River Information Services (RIS) on Inland Waterways in the Community" Directive will be an important policy document for establishing pan-European RIS. It will be a consequence of EU transport policy development and will help create the infrastructure of the trans-European transport network (TEN-T), required by the European Parliament and the Council[1].

Behind the policy statements, European research, especially within the Framework Research Programmes, has contributed significantly to the development and deployment of new RIS technologies. These research, demonstration and implementation activities have contributed at the levels of technology, organisation and policy, and have helped to clear the obstacles to effective realisation of RIS.

This brochure describes:

1. the policy background to the future RIS Directive;
2. the RIS information technologies and communication standards;
3. best-practice examples of RIS development;
4. the strategic and operational benefits of RIS research;
5. the contributions of RIS research activities to European transport policy development;
6-7. the way forward for implementing that policy.

Finally, references and a list of abbreviations and acronyms are also provided.

1. The Decision No. 1692/96/EC of the European Parliament and of the Council on Community guidelines for the development of the Trans-European Network (TEN) passed on 23 July 1996.

1 POLICY BACKGROUND

Europe has over 30,000 km of canals and rivers that link together hundreds of key industrial towns and areas. The core network of around 10,000 km connects The Netherlands, Belgium, Luxembourg, France, Germany, Austria, Slovakia and Hungary within the EU, with Switzerland, Poland, Croatia, Serbia and Montenegro, Romania, Bulgaria, Moldova and Ukraine outside of the Union. Although the backbone of this network is constituted by major rivers such as the Rhine and the Danube, many tributaries and canals connect a variety of smaller towns and industrial centres. A considerable number of ports along the network provide access to and links with other modes of transport.

Despite this network, inland waterways still have a huge capacity that is not fully exploited. Freight transport by inland waterways accounts for 6% of the total land transport (surface transport) of the EU-25 countries in 2002, nine of which have inland waterway transport of some importance, equal to 129 billion tonne-kilometres in 2002, whereas road and rail carry 72% and 16% respectively. Within the EU-15 countries (i.e. mainly in the Rhine corridor), the share of inland waterway transport in total surface transport has declined steadily from 12% in 1970 to 7% in 2000, although its traffic volume has increased in that period of 30 years from 102 billion to 125 billion tonne-kilometres (+18%). In the new Member States, a total of 7.2 billion tonne-kilometres were transported in 2000, in particular on the Danube.

Europe looks ahead

The European Commission recognises the great potential of inland navigation as an alternative transport mode for freight transport. Facing tremendous capacity and environmental problems in the land transport modes, in particular road transport, the European transport policy consequently has a great interest in developing inland waterway transport to become a real alternative whilst keeping the environmental burden to a minimum.

In its White Paper "European Transport Policy for 2010: time to decide",[2] the European Commission proposes to link inland waterways into rail and short sea transport systems, providing an accessible, economical, safe and environmentally-friendly alternative to the congested road network.

The White Paper prescribes "the installing of highly efficient navigational aid and communication systems on the inland waterway network" to make this mode of transport still more reliable, efficient and accessible. Likewise, the Declaration of European Ministers of Transport signed in Rotterdam in September 2001 called upon Member and Accession States to implement pan-European RIS by the year 2005.
The European Parliament resolution following the White Paper considered the creation of high-performance, geographically-comprehensive information systems on inland waterways to be extremely important in this connection and called on the Commission to submit a proposal for harmonised technical provisions towards the implementation of River Information Services (RIS). In the session of the Transport Council of 9th October 2003, The Netherlands, supported by other Member States, welcomed the Commission's initiative to put forward a proposal for a Directive on River Information Services. Meanwhile, this has resulted in a RIS Directive, which will create a European-wide harmonised framework for River Traffic Information Services in order to ensure compatibility and interoperability between

2. White Paper European transport policy for 2010: time to decide, European Communities 2001

current and new RIS systems and to achieve effective interaction between different information services on inland waterways of international importance. The Directive has already obtained the political accord of the Council in Autumn 2004 and will probably be passed on its first reading in the European Parliament in Spring 2005.

Harmony across Europe

The European Parliament and the Council Decision[3] on Community guidelines for the development of the trans-European transport network states that the inland waterway network and inland ports shall include the 'traffic management infrastructure'. According to the Decision, signalling, guidance and communication systems for inland waterway vessels shall be deemed as projects of common interest and thus be eligible for TEN funding (Trans European Network). In this framework, a feasibility study for implementing RIS on the Danube in Austria was co-funded in 2001.

The proposal for an amendment[4] by the European Parliament and the Council stipulates as priority in Article 5 (f) the "deployment of interoperable intelligent transport systems to optimise the capacity of existing infrastructure and improve safety".

In its report of 27 June 2003, the High Level Group on the trans-European transport network (TEN-T) welcomed the Commission's intention to propose a framework directive to ensure the interoperability of the communication systems on inland waterways and identified the development of RIS as a priority.

The development of RIS is also recognised and fostered by the River Commissions (CCNR Central Commission for Navigation on the Rhine, DC Danube Commission) and by the International Association for Navigation (PIANC). A number of important organisational and standardisation prerequisites have been developed. In 2002 PIANC compiled RIS Guidelines on the basis of the results of different European research and development projects. These RIS Guidelines 2002 were formally adopted by the Central Commission for the Navigation on the Rhine in May 2003 and the revised version 2004 of the PIANC Guidelines was adopted by CCNR in 2004.

The harmonised development of RIS has not only been fostered by European initiatives such as the TEN-T programmes, but also through the formulation of common RIS Guidelines, which have been adopted and updated by the Central Commission for Navigation on the Rhine.

The European Commission recognises the great potential of inland navigation as an alternative transport mode for freight transport. River Information Services are an important system component in order to exploit this potential. The publication of the White Paper on Transport and the future adoption of the RIS Directive reflects the strong political support for a European-wide and harmonised implementation of River Information Services.

3. The Decision No. 1692/96/EC of the European Parliament and of the Council on Community guidelines for the development of the Trans-European Network (TEN) passed on 23 July 1996.
4. Amendments on this Decision on 31 May 2001 further strengthening the environmental and intermodal aspects on trans-European transport (COM (2001) 544 final)

2 RIS EXPLAINED

What is RIS?

RIS does not deal principally with internal commercial activities between companies, but is available for interfacing with commercial processes.

RIS streamlines information exchange between public and private parties participating in inland waterborne transport. The information is shared on the basis of information and communication standards. The information is used in different applications and systems for enhanced traffic or transport processes.

The need for RIS

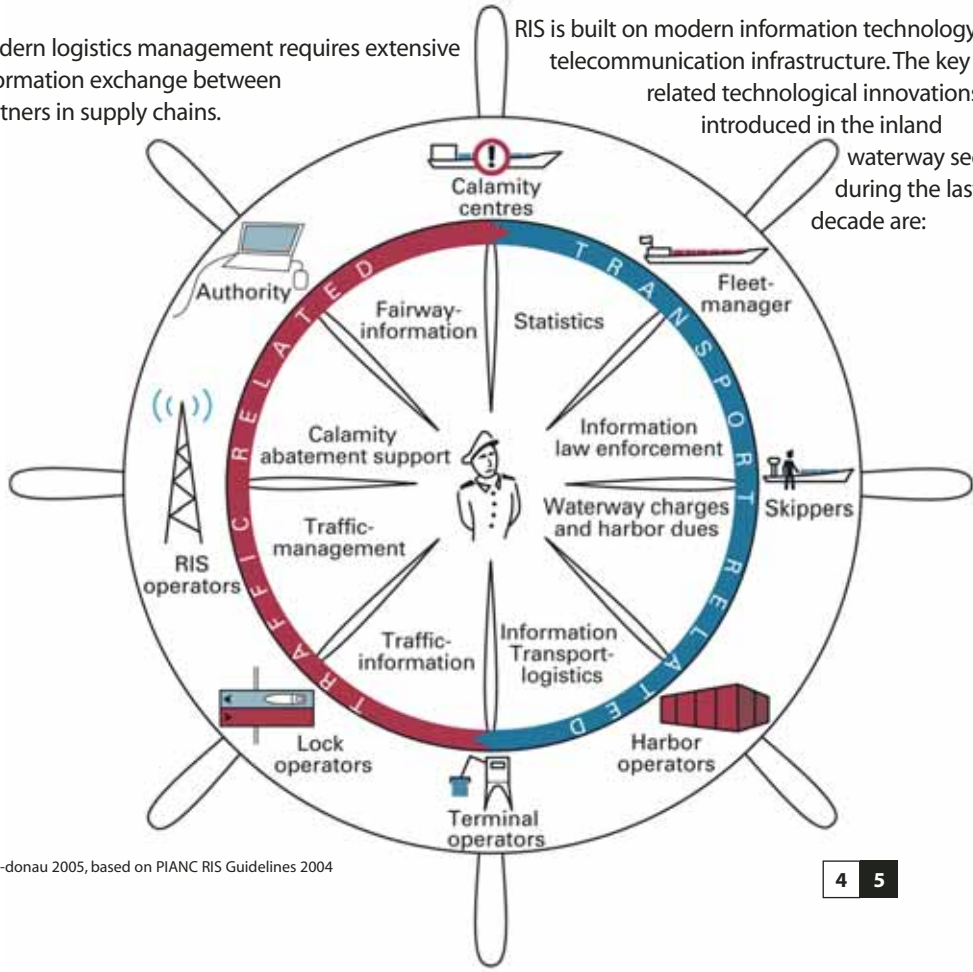
Modern logistics management requires extensive information exchange between partners in supply chains.

Implementation of communications and information technologies in organisational and operational processes is a crucial prerequisite to increase operational efficiency and safety in today's market.

RIS facilitates the inland waterway transport organisation and management. Through effective information exchange, transport operations (such as trip schedules and terminal/lock operation plans) could easily be optimised, providing advantages for inland navigation and enabling it to be integrated into the intermodal logistic chains.

How does RIS work?

RIS is built on modern information technology and telecommunication infrastructure. The key RIS-related technological innovations introduced in the inland waterway sector during the last decade are:



- Inland Electronic Navigational Charts (IENC) and Inland Electronic Chart Display Information System (Inland ECDIS) for visualisation of fairway and ship position information.
- The European standard Inland ECDIS is based on maritime ECDIS. IENCs are already available for large parts of the European inland waterway network.
- Internet applications for Notices to Skippers in 11 languages and machine readable format.
- Electronic ship reporting systems for information collection and distribution on voyage-related data (ship and cargo).
- Vessel tracking and tracing technologies such as Automatic Identification System (AIS) for automatic reporting of the position of ships and other safety relevant data.
- Radar systems with ENC underlay for navigation and traffic monitoring.
- Route and voyage planning applications.
- Applications for optimising fuel consumption.

Lending support to services

These new information technologies support (according to the RIS-Guidelines 2004):

Fairway Information Service (FIS)

FIS contains geographical, hydrological and administrative data that are used by skippers and fleet managers to plan, execute and monitor a journey. FIS provides dynamic information as well as static information about the use and status of the inland waterway infrastructure, and thereby supports tactical and strategic navigation decision-making. FIS contains data on the waterway infrastructure only – excluding data on vessel movements – and therefore consists of one-way information from shore to ship/office. Traditionally these services are provided through nautical paper charts and one or more of the following services in national formats and in the national language: Notices to Skippers, TV and radio broadcasts, internet, VHF nautical information radio, e-mail subscription services and fixed telephones situated on locks. RIS will provide standardised electronic charts and standardised Notices to Skippers in a machine readable format and in eleven languages.

Traffic Information Service (TI)

- The information provided in a *Tactical Traffic Image (TTI)* supports the ship's master in the immediate navigation decisions in the actual traffic situation. The TTI allows skippers also to make navigational arrangements with other vessels. The TTI contains information on the position of vessels, speed, heading and specific vessel information of all targets identified by radar and – if available – AIS or compatible automatic vessel tracking and tracing systems. The TTI is displayed on a standardised electronic chart; the Inland ECDIS.
- *The Strategic Traffic Image (STI)* on the other hand provides a general overview of the traffic situation over a relatively large area. The STI is used mainly for planning and monitoring. The STI will provide the user with information about intended voyages of vessels, (dangerous) cargo and Requested Times of Arrival (RTA) at defined points (e.g. locks, terminals).

Traffic Management (TM)

TM is carried out by waterway administrations aiming at optimal utilisation of the infrastructures and assurance of safe navigation by:

- *Local Traffic Management*: Vessel Traffic Service (VTS), whose centres are currently installed at some critical points along the European waterway network, are implemented by a Competent Authority to improve the safety and efficiency of vessel traffic, and to protect the environment. The service has the capability to interact with the vessel traffic and to respond to traffic situations developing in the VTS area. The information required by VTS centres is basically gathered by means of permanent shore-based radar stations. AIS could, in the future, provide additional information, such as the vessel's identity and main dimensions.
- *Navigational Support*: Vessel tracking technology, such as AIS, provides individual skippers with the information needed to take navigational decisions.

- *Lock and Bridge Management (LBM)*: RIS facilitates the planning of lock and bridge operations. RIS supports lock/bridge operators in their medium-term decisions by providing a strategic traffic image. RIS thereby assists the operators in the calculation of ETAs/ RTAs (Estimated/ Requested Time of Arrival) of vessels. By means of optimal planning of locking operations, the smooth passage of vessels through the locks and bridges, which are considered as inland waterways' bottlenecks, can be realised. Lock planning can reduce waiting times significantly. In turn, lock operators can inform the individual skipper of his RTA, enabling him to adapt his speed and possibly save on fuel.

Calamity Abatement service (CA)

CA registers vessels and their transport data at the beginning of a journey and updates the data during the voyage. In the event of an accident, the authorities are capable of providing data immediately to the rescue and emergency teams. The electronic charts and the traffic image provide the basis for the coordination of rescue forces and nautical measures.

Information for Transport Logistics

- *Voyage Planning (VP)*: VP includes the planning of the optimal route, the draught and the ETA of the vessel. Skippers and fleet managers need fairway information for these planning activities.
- *Transport Management (TM)*: TM means the management of the transport chain beyond the scope of the navigation, and is driven by freight brokers and transport service quality managers. It is aimed at improving the overall performance of the contracted fleet and terminals , at controlling the progress of the contracted transports, at monitoring unexpected threats to the reliability of these transports, and at finalising the transport (delivery and invoice).
- *Intermodal Port and Terminal Management (PTM)*: Terminal and port operators need ETA information in order to plan resources for terminal operations. ETA information of approaching vessels supports the overall terminal utilisation and allows smooth passage of vessels through the terminal facilities. As a result, the trans-shipment time can be reduced. In situations when there is insufficient terminal capacity, the terminal operator can inform the individual skipper of his RTA. Better slot management is possible as a result of the exchange of ETA and RTA data.
- *Cargo and Fleet Management (CFM)*: CFM is based on information on the loaded and the available empty vessels; the fleet including the actual vessel positions and their RTAs and ETAs; detailed information on the cargo transported and the cargo to be shipped and information on the terminals.

Information for Law-enforcement (ILE)

Law enforcement ensures that people within a given jurisdiction adhere to the laws of that jurisdiction. RIS supports law enforcement in inland navigation in the fields of cross-border management (e.g. the movement of people controlled by the immigration service, customs), compliance with the requirements for traffic safety, and compliance with the environmental requirements. It will also reduce waiting times at borders.

Statistics (ST)

RIS can be used to collect relevant inland waterway freight statistics. Since data already collected for other services can be used, then skippers, terminal and lock operators no longer need to provide special statistics. Electronic data collection will facilitate the process for data providers and statistical offices. The statistics are of interest to the waterway authorities, international organisations and companies engaged in inland navigation for strategic planning and monitoring.

Waterway Charges and Harbour Dues (CHD)

RIS can assist in levying charges for the use of infrastructure tolls. The travel data of the ship can be used to automatically calculate the charge and initiate invoicing, thus facilitating the process for waterway users and authorities.

Applications at work across Europe

The developments of national stand-alone telematics services, which vary in functions, standards, and architectures, brought challenges to the current service regime. Some of the existing applications are:

- ***ARGO*** (Advanced River Navigation), a German navigation system for inland waterway skippers. It provides data on the fairway conditions and actual water levels in real time.
- ***BICS*** (Barge Information and Communication System) is a voyage and cargo (especially dangerous cargo) reporting system used in The Netherlands, Germany and other countries. The main aim of BICS is to support the reporting duties of the skipper/fleet operator towards the authorities.
- ***BIVAS*** (Inland Navigation Intelligent Demand and Supply System) is an internet-based interactive freight transport virtual marketplace.
- ***DoRIS*** (Donau River Information Services) is an Austrian system that can automatically generate traffic information by means of AIS transponders. The tactical traffic image is currently being tested for use by waterway authorities and skippers. In 2005 the roll-out of the DoRIS systems will be performed on the Austrian section of the Danube.
- ***ELWIS***, a German Electronic Waterway Information System, which provides a series of (fairway) information services.
- ***IBIS*** (Informatisering Binnenscheepvaart), a Flanders centralised database system, allows administrations to deliver navigation licences, locate ships within their territory and collect data on inland navigation.
- ***GINA*** (Gestion Informatisée de la Navigation), a reporting application for Wallonia dedicated to the invoicing of navigation fees and the generation of statistics.

IVS90, a ship reporting system used by Dutch waterway authorities supporting lock planning, vessel traffic services, calamity abatement and statistics.

- ***NIF*** (Nautischer Informations-Funk), a German service to transmit messages related to water levels, high-water notifications, water level predictions, ice and mist messages, and police messages.
- ***VNF2000***, a French information network used to invoice navigation tolls and to produce traffic statistics.

These differing operational practices and facilities in Member States reflect the current incompatibility of information systems, standards, and installations. Legislative and technical support for harmonised information services at a pan-European level become more and more necessary to guarantee the efficiency and safety for cross-border navigation and logistics. This was one of the principal motivating factors in the development of RIS.

Tactical Traffic Image: this enables DoRIS to give the user a precise overview of the current traffic situation. Data such as the ship's name and type, dimension of the convoy, depth, position, speed and so on is registered with DoRIS electronically and is automatically processed. Ships are displayed on the digital map as symbols. The relevant data can be viewed by clicking on the icon.

3 RESEARCHING AND DEVELOPING RIS

European research, particularly through EU research programmes, has played a very important role in the development of RIS.

RIS at source

In 1994 the research project ***COST 326***, an EC co-funded international cooperation scientific research project started to analyse maritime ECDIS at international and European level. By investigating European ECDIS user requirements, and the feasibility of linking national databases to European (or international) networks, the constraints on data supply, and on the production and updating of ENCs were identified. Due to different standards, communications, and administrations, the implementation of ECDIS on harbour approach systems and VTS met with interoperability difficulties. ***COST 326*** called for institutional support at EU level by proposing a strategic measure: the establishment and operation of a single European Regional Electronic Navigational Chart Coordinating Centre (RENC).

Developing RIS

The RIS concept was further developed in a number of research projects, which achieved technological solutions in:

RIS system architecture

A common system architecture is the fundamental requirement for harmonised information services. Many research projects

were devoted to the construction of a full-function and open-system architecture. The ***INVITE*** project, was established to study pan-European open system architecture of communications, with the participation of Central and Eastern European Countries. ***INCARNATION*** designed a full VTS system architecture after studying policy requirements on safety, capacity, environment protection, calamity abatements and different management options regarding inland waterways. ***COMSINE I*** established an open communications architecture with MARSAT (marine satellite) communications services as the backbone infrastructure. ***RINAC*** defined the functional architecture that manages the information flows aboard a vessel and provides the skipper with the appropriate applications to operate in a RIS environment. The results of the research activities helped to define the general RIS elements, which evolved rapidly with the emergence of new information products and which led to the formulation of the RIS technical guidelines that are the key technical documents for planning and designing RIS.

Communications and Data exchanges

Standardised communications protocols are essential elements of RIS. Due to the existence of different communications means (VHF, mobile phone, internet, SMS, etc.), different operational systems (VTS, VTMS, etc.), and different intervening parties (VTS operators, skippers, administrations, commercial users, etc.), advanced communications methods and processes were needed to integrate all of these elements together in a functional system. The ***COMFORTABLE*** project developed new tools, which included the traffic situation display, risk evaluation, and short-term traffic prediction, for VTS to help operators recognise and assess traffic situations so as to enhance operational safety. ***MOVIT*** achieved a complete mobile version of VTMS (vessel traffic management system). ***VTMS-NET*** created pan-European integration methods to link the services, which had already been used independently at the local, national, or EU level, for information exchanges within the VTS and VTMS. A new generation of VTMS has been developed with strong capacity for monitoring traffic, predicting nautical conditions, and exchanging data as well as images in real-time.

ECDIS and VTS

Geo-related information is transferred with the aid of Inland ECDIS in the form of TTI and STI frequently used by VTS and FIS. Inland ECDIS has become a basic technology in modern RIS. After ***COST 326*** ECDIS was improved continually in subsequent research projects. On the basis of the research, an Inland ECDIS standard was suggested in the ***INDRIS*** research project and later accepted by the international institutions (UN/ECE, CCNR, DC). ***COMPRIS*** further enhanced the RIS standards on Inland ECDIS, reporting and VTM data exchange for common acceptance.

RIS matures

The RIS initiative became mature after research in ***INDRIS***. The concepts, functions and scale of RIS were officially defined in this research project. Through a joint-venture of national public authorities, the transport industry, the ICT-industry and research institutes, ***INDRIS*** developed a methodology and guidelines to harmonise communications and reporting procedures on the European inland waterways network. Through subsequent demonstrations the technical feasibility of RIS was proven for (1) the provision of shore-based or shore-made traffic images on-board inland vessels; (2) the provision of tactical traffic images without shore-based infrastructure within the VHF range of the vessels; (3) the use of STI supported by databases using ship-based electronic reporting procedures for VTM; (4) the

application of Inland ECDIS technology as platform upon which safety systems are built; (5) the support of FIS to users in planning their voyages.

Enhanced RIS

Adoption of new information and communication (NIC) technologies enhanced the original initiatives and concepts, providing updated functions and operations. The recent RIS developments focus on:

Vessel tracking and tracing technologies

These are a very important means to obtain real-time static and dynamic vessel data, which then can be communicated between shore stations, ships and users. Inland AIS is currently developed to a sophisticated level that can be applied practically and can be connected to maritime AIS. This development is of highest importance for vessels navigating in mixed traffic areas but also suitable for all other inland waterways. The application of dGPS (differential Global Positioning System) was tested in different research projects, such as ***ALSO DANUBE***, ***DoRIS***, ***D4D***.

Cross-border data exchanges

The crossing of borders is a crucial part in the whole inland waterway transportation process. As information is accompanying the vessel on its whole journey, RIS should not be limited by national borders with their traditional barriers for the information flow between authorities. Therefore suitable framework conditions for the international exchange of RIS related information are to be established. The INTERREG project ***D4D*** (Data Warehouse for the Danube Waterway) set a first milestone in the exchange of waterway related data between the responsible authorities. In the ***COMPRIS*** project another aspect of cross-border data exchange was investigated: the electronic reporting of voyage and cargo related information to authorities like customs, immigration and statistics. The provision of information across borders thus facilitates procedures like border controls or vessel dispatching and makes them more efficient. Provided that legislative issues in cross-border data exchange are solved, RIS will bring benefits for governmental users as well as for commercial users.

RIS comes of age

In the path from concept to implementation, ***COMPRIS*** research configured the last stepping stone towards implementation across Europe. ***COMPRIS*** deals with pan-European standardisation and harmonisation of RIS by linking existing and future initiatives in the participating European countries (The Netherlands, Belgium, France, Sweden, Germany, Austria, Slovakia, Hungary, Romania, Bulgaria, Ukraine). To enhance the existing concept of RIS and to make it feasible throughout Europe, ***COMPRIS*** developed a technical, organisational and functional architecture for RIS on a pan-European level. To be implemented directly in all participating countries, ship-based, shore-based, traffic-oriented, and transport-oriented systems and applications were designed and tested. On the basis of previous development ***COMPRIS*** further enhanced RIS standards on Inland ECDIS, Electronic Reporting, VTM data exchange, and tracking and tracing. An environment in which RIS applications and systems can be tested was designed and developed, and international procedures for seamless border crossings were improved. Additionally the project prepared the steps for implementing RIS on Europe's most important waterways.

European research is contributing to new technical standards and guidelines, taking into account the rapid technology development, and the interfaces with other transport modes and applications. The future standards will focus on the technologies of Vessel Tracking and Tracing, and Cross Border Data Exchange.

Standardising RIS

The findings of the EU research provided a knowledge base for the establishment of RIS-related standards. A number of important organisational prerequisites and standards have been developed in the research projects. Many standards have been established in cooperation with international institutes.
A standard concerning an Electronic Chart Display and Information System for Inland Navigation (Inland ECDIS) was drafted by an Expert Group in the context of ***INDRIS*** and was formally adopted in 2001 by the Central Rhine Commission and the Danube Commission.

In 2002 the UN/ECE Working party on Inland Waterway Transport adopted a Recommendation[5] on Inland ECDIS, which has considered the establishment of common principles and technical requirements for pan-European RIS.

In 2002 PIANC compiled RIS Guidelines on the basis of the results of different European research and development projects. These RIS Guidelines 2002 were formally adopted by the Central Commission for the Navigation on the Rhine in May 2003 and the RIS Guidelines 2004 in 2004.

Technical studies in the European research projects provided rich data and technologies to support the formulation of new RIS standards and guidelines. These include:

- 'Standard for Electronic Ship Reporting in Inland Navigation' established by the Electronic Reporting International Working Group (ERI).
- 'International Standard for Notices to Skippers' established by the Notices to Skippers Expert Group.
- The Inland ECDIS standard established by the Inland ECDIS Expert Group.
- The Inland AIS Standard, which was established by the Expert Group for Tracking and Tracing and which is currently under investigation by the CCNR.

RIS ready wheelhouse with information and communication systems

5. Resolution N° 48, a Recommendation on Electronic Chart Display and Information System for Inland Navigation (Inland ECDIS)

4 THE BENEFITS OF RESEARCH

RIS facilitates the organisation of inland waterway transport, and increases its operational efficiency and safety. The improvements in the operational and organisational aspects of inland waterway transport are:

- improved information to provide reliable time schedules for trips;
- improved interfaces to connect with other transport modes;
- improved information to plan terminal/lock resources and operations;
- real-time monitoring of fairway and fleet conditions to guarantee safety and security;
- up-to-date overview of the traffic situation for timely control of manoeuvres;
- automation of cross-border operations to facilitate international trade;
- effective dangerous goods monitoring for transport safety;
- automation of statistical data collection for strategic monitoring and planning.

Consequently, RIS, via these operational improvements, produces strategic benefits for the inland waterway transport sector and improves the efficiency of the current transport system.

Increasing competitiveness

RIS permits the establishment of competitive inland waterway transport services. It provides up-to-date information that can be used to plan voyages and calculate more reliable time schedules. Based on the current and expected positioning data of the various vessels that are under way in the network, lock/bridge/terminal operators can calculate and communicate the Required Times of Arrival to individual skippers. While approaching the lock/terminal the skipper can decide to adjust cruising speed (more homogeneous travel speeds), which in the end results in a reduction of waiting times at locks and terminals and minimisation of fuel consumption and therefore environmental impacts.

In this sense, RIS complies with the information needs of modern supply chain management, since it allows optimised use and monitoring of resources and possibilities for flexible reactions in case of any deviation from the original planning.

RIS enables information interfaces with all supply chain members as well as with other transport modes. These interfaces, which eliminate breaks in the information chain, allow the integration of inland navigation into inter-modal supply chains.

RIS enables real-time monitoring of the inland navigation fleet and the changing fairway conditions en route. This improves fleet management (optimised deployment of personnel and fleet based on up-to-date information), and allows more detailed trip planning and draught management based on up-to-date information on fairway conditions. Real-time information can be used to load ships according to the current navigational conditions.

RIS contributes to the transparency of freight transport. Transparency is a prerequisite for enhanced security of transport operations. It requires a continuous information flow which advances or accompanies the material process. By using harmonised interfaces, RIS supports the generation of comprehensive and transparent information, and the smooth exchange of data between relevant partners in a transport chain.

Optimised use of public infrastructure and funds

Terminal and lock operators are capable of producing better planning of terminal resources through receipt of ETA and additional information (e.g. stowage plans, vessel dimensions) of approaching vessels. These pre-announcement data allow a proactive approach towards terminal or lock scheduling: before the vessel enters the port or lock, the operator can prepare and schedule the handling activities. For skippers this reduces waiting times and optimises the chain of processes for the entire voyage. Public infrastructure benefits through better utilisation rates.

Additionally, RIS enables the automated collection of statistical and customs data.

Traditionally paper-based, which is time-consuming and prone to data errors. RIS makes the automatic collection of required data possible in an efficient way, which ultimately results in lower public expenditure and less workload for the skipper. RIS makes transport more reliable.

Safer transport

With the introduction of RIS, skippers have up-to-date and complete overviews of traffic situations. Skippers can then make well-informed navigational decisions, consequently leading to fewer incidents and injuries/fatalities. Traditionally, ship masters had, for instance, to rely on information shown on the radar and verbal information provided by VTS centres and other vessels to take navigational decisions. RIS has dramatically improved this picture: skippers use electronic charts, which are necessarily up-to-date, receive precise positioning data on approaching vessels, and are informed about current fairway and weather conditions electronically, which helps to prevent accidents. Moreover, RIS enables detailed monitoring of dangerous goods transports, which helps to improve calamity abatement after shipping accidents. These and other data allow safe navigation. Additionally, automated, and more efficient customs procedures and security checks – supported by RIS – also contribute to increased safety and security in inland navigation.

Environmental protection

RIS leads to a reduction of fuel consumption as a consequence of better voyage planning and more reliable time scheduling. In addition, RIS contributes to a modal shift of cargo from road to waterway, leading to a reduction of exhausts such as CO_2 and NO_x and also of noise. RIS therefore supports the reduction of emissions caused by transport activities in a direct and indirect way.

Finally, RIS provides the possibility to monitor the transport of dangerous goods. This allows timely responses in the event of accidents and potential environmental calamities. Since data on all traffic movements can be stored in a database, reconstruction of incidents can be helpful in the analysis of causes of the accident.

Who stands to gain?

Clearly, the direct beneficiaries of implementing RIS are the inland waterway transport sector and its users. However, the strategic benefits of improved transport safety, efficiency, and environment protection are of value to the European Community and its citizens.

*Even though at present there is no study available for quantifying the global benefits of the RIS implementations all over Europe, an assessment on a RIS demonstrator (a stretch on the Dutch part of the Rhine) was carried out within the **INDRIS** project. The results of the assessment indicated that the rates of the benefits against the costs reaches 3.5 for the skippers, 1.0 for the waterway authority, and 5.0 for the society as whole. They affirmed the society benefits of RIS implementations.*

5 EUROPEAN **POLICY DEVELOPMENTS**

Public awareness is an important factor to the success of implementing RIS throughout the European waterway network. Gaining support from regional governments, Member States, non-governmental organisations, the private sector, and the EU requires a series of campaigns to demonstrate the benefits of the new technologies and hence accelerate their acceptance.

The research activities of the EU framework programmes made full use of their limited financial resources to:

- Open channels to exchange experiences, communicate opinions, and transfer technologies so as to promote harmonised information services.
- Bridge the gaps between academics, researchers, and users to unify the support for RIS development.
- Link with international organisations, such as PIANC, CCNR, and DC, to enhance technical and administrative cooperation.

Two landmarks of European cooperation and networking in RIS development were:

The Rotterdam Declaration

In September 2001, a declaration of European Ministers of Transport was signed in Rotterdam during the Pan-European Conference on Inland Waterway Transport. This declaration stated that on the basis of recommendations of the European Commission, Member States and Accession Countries are encouraged to implement pan-European RIS by 2005. Several activities have since been undertaken to stimulate the implementation of RIS on a European scale.

The European RIS Platform

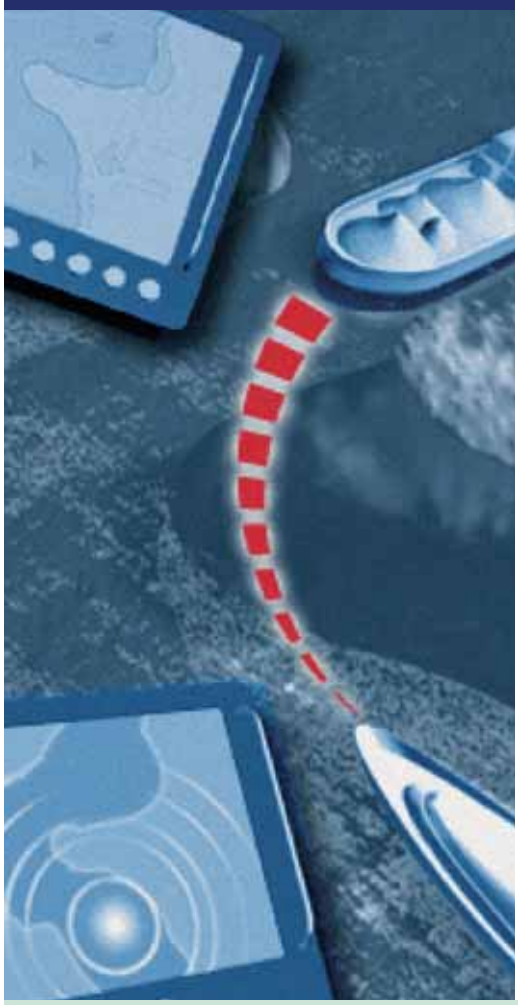
The RIS Platform was set up for participation by all European (EU and non-EU) national authorities actively involved in the development and implementation of RIS within the interlinked Rhine-Danube inland waterway network. The Platform involves representatives of competent authorities and is open for participation by CCNR Danube Commission and national authorities responsible for RIS on other inland waterways.

The platform's objectives are to extend mutual knowledge on RIS by exchanging the available knowledge, experiences and expertise on RIS. It also aims to foster RIS harmonisation by developing an overview of all RIS-relevant activities and by giving guidance and advice on the further development of RIS in research and development, standardisation, and implementation.

The platform has relationships with other bodies involved in the development of RIS, such as the platform of European Waterway Authorities, the European Commission, CCNR, Danube Commission, PIANC, IALA and the European thematic network consortia.

Building bridges

Building on the results of previous research carried out in the fields of VTMIS and RIS, ***WATERMAN-TS*** offers a platform for reaching a common understanding of the concepts of VTMIS and RIS. Its objective is to identify the prerequisites that should be met for the actual implementation of such services. Its activities bring together representatives of the end users of multimodal transport services to analyse the major results coming from the research projects. It facilitates the wider dissemination of facts, ideas, results, and actions to European audiences.
Another project concentrates on technical harmonisation and cooperation across modes.



For example, ***THEMIS-TS*** focused on coordinating research and development in European multimodal transport information systems, and provided a forum for disseminating the results among members. Aiming at the integration of IT technologies that contribute to a sustainable European freight transport system, ***THEMIS-TS*** defined the position of Freight Transport within the future European ITS and suggested the best way of organising the Freight ITS components (or modules), which are composed of EATMS (European Air Traffic Management Systems), ERTMS (European Rail Traffic Management Systems), RTM (Road Traffic Management), VTMIS, and e-commerce/ standardisation, to achieve the most effective benefits to users and society.

To enhance the social and political conversations between Member States, EC, industries, research and European organisation, ***SPIN-TN*** focused on the promotion of common European strategies and actions. This thematic network targeted both key industrial stakeholders and policy makers to achieve the objectives of sustainable transport and mobility. In a series of so-called RIS Roadshows across Europe, the SPIN network included an information exchange and discussion platform to inform key stakeholders from the public and private sector about the current status and opportunities created by the implementation of RIS.

Helping shape policy and strategy

In addition to the technological developments, European research is involved in the development of transport policy and strategy, offering policy recommendations for RIS development. After analysis of RIS technologies and their benefits, ***PINE***, a study in 2004, prepared an overview of the current status of RIS and its relevant systems, and recommended further developments which were considered in the preparation of the RIS Directive.

Policy in the making

The future Directive on "Harmonised River Information Services (RIS) on Inland Waterways in the Community" will be the first legislative instrument for RIS. It requires the establishment of RIS on the waterways in Member States based on the RIS technical guidelines. Within the context of the White Paper "Transport policy for 2010: time to decide", the proposal for the new RIS directive was put forward to realise the policy objectives for the development of waterway and inter-modal transport. The new directive is in line with the European Parliament's Decision[6] concerning the deployment of interoperable intelligent transport systems to optimise the capacity and safety of existing infrastructure.

6. Decision N° 1692/96/EC

6 LOOKING TO **THE FUTURE**

The fast development of River Information Services in the last decade showed that the inland waterway system has made maximum use of the opportunities offered by new communication technologies such as mobile communication, web-based applications, and satellite communication. Through RIS, the inland waterway sector will be able to make a quantum leap forward: inland navigation is linking up with modern logistics management, navigation has become even more efficient. The young history of RIS has convincingly showed that RIS is no longer just a theoretical and promising concept. On the contrary, RIS applications are ready for implementation and bring immediate benefits in real-life operations.

Harmonisation and coordination are a core requirement for the further implementation of RIS at the pan-European level. Only through the creation of compatible systems, will the inland waterway sector – and subsequently society as a whole – be capable of reaping the full benefits of RIS. Technical harmonisation of RIS is pursued within the various research programmes and not least by the RIS Directive and its technical annexes.

Another major issue will be to enhance awareness and acceptance of River Information Services among a broad range of potential users. Such acceptance is needed to create economies of scale and a critical mass. Every new user will lead to lower average system costs and more synergies between various applications and services. Therefore, efforts need to be made in order to raise awareness on the opportunities of RIS.

A main policy instrument to promote harmonisation and acceptance is formed by the ***Masterplan for Implementation of RIS in Europe*** (IRIS), which will provide a framework for the coordinated implementation of RIS in Europe. ***The Masterplan IRIS*** is a study – co-funded within the TEN-T programme – which will work out proposals for financial measures and work plans to support the realisation of RIS in different European countries. The results of the Masterplan IRIS will then need to be followed up by a full-scale infrastructure project within the TEN-T framework fostering the RIS implementation in Europe.

Effective system management will become increasingly important after RIS enters into operation. The near future policy and strategy developments might be:

- *financial*: studying the means of financing RIS infrastructure, board equipment and training, and the policy for services usages and charges.

- *strategic*, looking at areas such as:
  - inter-modal transport
  - data collection and application
  - training and education
  - RIS technology updates
  - organisation and coordination.

- *legislative*: proposing the legislative adoption of charges for data access, data exchange, and utilisation of data for logistic applications, which is not already provided for nautical purposes, taking into account privacy regulations.

Simultaneously, during RIS implementation, technologies need to be updated; emerging problems need to be resolved; and knowledge needs to be disseminated. The forthcoming actions are likely to include:

- updated interfaces and links with other transports modes and users
- deployment of the developed system in Short-Sea Shipping
- user training and education
- knowledge and experiences exchanges.

7 CONCLUSIONS

The RIS concept aims at implementing information services to support the planning and management of traffic and transport operations. Implementing RIS will not only improve traffic safety and environmental protection but also will simultaneously enhance the efficiency and security of transport operations and increase competitiveness. Although waterway users and administrative authorities are considered as the direct beneficiaries from operational improvements, the implementation of RIS will significantly benefit society by the ways of traffic shifts, safe navigation, decreased pollution, and lower transport costs.

European research support can be found in every stage of RIS progress. Starting from the RIS initiatives, the research worked continually on the technological developments, system integrations and renewals, standardisation, strategic elaborations, and international cooperation and networking.

Looking ahead, the proposed RIS Directive paves the way towards the future framework of TEN-T for inland waterways; however, the work does not end there. RIS development and implementation require the continued application of research, to update the concepts/technologies, to explore potential applications, and to solve emerging problems.

European research requires public understanding and support for its work. The political and financial commitments from Regions, the Member States and the EU are greatly appreciated, together with their support for the future activities of European research, in the development and implementation of RIS throughout Europe.

At an institutional level, further regulations need to be developed to support future RIS operations. These might include: legislative adoption of data confidentiality; data accessibility; data exchanges; and usage charges. European research, international institutes, Member States, waterway authorities, regional governments, and the European Commission will continue their commitment to future RIS development and implementations.

Following implementation of RIS over European waterways, future inland navigation will be more intelligent, transparent and safer. Inland navigation in the enlarged Europe will continue to develop, effectively supported by RIS. Transport by inland waterways will become an even more user-friendly and environmentally-friendly mode of transport that will facilitate modern logistic integration and inter-modal transport. It will play a vital role in avoiding the gridlock forecast for Europe's road system and in helping build Europe's economy in the 21st century.

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LIST OF **ABBREVIATIONS** AND **ACRONYMS**

AIS	Automatic Identification System
ARGO	Advanced River Navigation
BICS	Barge Information and Communication System
BIVAS	Inland Navigation Intelligent Demand and Supply System
CA	Calamity Abatement Service
CCNR	Central Commission for Navigation on the Rhine
CFM	Cargo and Fleet Management
CHD	Waterway Charges and Harbour Dues
COMPRIS	Consortium Operational Management Platform River Information Services
DC	Danube Commission
DG TREN	Directorate-General for Transport and Energy
dGPS	Differential Global Positioning System
DoRIS	Donau River Information Services
EATMS	European Air Traffic Management Systems
EC	European Commission
ECDIS	Electronic Chart Display and Information System
ELWIS	Electronic Waterway Information System
ENC	Electronic Navigational Charts
ERTMS	European Rail Traffic Management Systems
ETA	Estimated Time of Arrival
EU	European Union
FIS	Fairway Information Services
GINA	Gestion Informatisée de la Navigation
GIS	Geographic Information Systems
GPS	Global Positioning System
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IBIS	Informatisering Binnenscheepvaart
ICT	Information and Communication Technologies
IENC	Inland Electronic Navigational Charts
IMO	International Maritime Organisation
INDRIS	Inland Navigation Demonstrator for River Information Services
ITS	Intelligent Transport Systems
NIC	New Information and Communications
NIF	Nautischer Informations-Funk
PIANC	International Navigation Association
PTM	Port and Terminal Management
RENC	Regional Electronic Navigational Chart Coordinating Centre
RIS	River Information Services
RTA	Requested Time of Arrival
RTM	Road Traffic Management
SMS	Short Messages Services
ST	Statistics
STI	Strategic Traffic Images
TEN-T	Trans-European Network – Transport
TI	Traffic Information Service
TM	Traffic Management
TTI	Tactical Traffic Images
UN/ECE	United Nations Economic Commission for Europe
VHF	Very High Frequency
VP	Voyage Planning
VTM	Vessel Traffic Management
VTMIS	Vessel Traffic Management Information System
VTMS	Vessel Traffic Management System
VTS	Vessel Traffic Services

The expected "Harmonised River Information Services (RIS) on Inland Waterways in the Community" Directive will be an important policy document for establishing pan-European RIS. This booklet describes the RIS and their developments in Europe. The contributions of research activities to European transport policies are illustrated by best-practice examples of RIS development. The values of EU research programmes are demonstrated through their support in formulating the development of transport policy, and in assisting the implementation of that policy.