TRANS/SC.3/165

ECONOMIC COMMISSION FOR EUROPE
INLAND TRANSPORT COMMITTEE
Working Party on Inland Water Transport
Geneva

GUIDELINES AND RECOMMENDATIONS FOR RIVER INFORMATION SERVICES

Resolution No. 57

UNITED NATIONS
NEW YORK AND GENEVA, 2005

River Information Services

Resolution No. 57

(adopted on 21 October 2004 by the Working Party
on Inland Water Transport)

The Working Party on Inland Water Transport,

Considering the Declaration adopted by the Pan-European Conference on Inland Water Transport held in Rotterdam on 5 and 6 September 2001: "Accelerating Pan-European Cooperation towards a Free and Strong Inland Waterway Transport" (document TRANS/SC.3/2001/10, paragraph 10),

Conscious of the need to establish a single Pan-European approach to planning, implementation and use of information services in inland navigation aimed at ensuring a high level of safety, efficiency and fluidity of inland water traffic and the protection of the environment throughout the E waterway network,

Taking into account the Guidelines and Recommendations for River Information Services established by the International Navigation Association (PIANC),

Bearing in mind the report of the Working Party on the Standardization of Technical and Safety Requirements in Inland Navigation on its twenty-eighth session (TRANS/SC.3/WP.3/56, paragraph 25),

Recommends Governments, intergovernmental organizations, regional economic integration organizations, river commissions and private entities to base the planning, implementation and use of information services in inland navigation on the Guidelines and Recommendations for River Information Services annexed to this resolution,

Requests Governments to inform the Executive Secretary of the Economic Commission for Europe whether they accept this resolution,

Requests the Executive Secretary of the Economic Commission for Europe to place the question of the application of this resolution periodically on the agenda of the Working Party on Inland Water Transport.

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Annex

Guidelines and Recommendations for River Information Services (RIS Guidelines 2004)

SUMMARY

1. Traffic and transport services and systems for inland navigation should be harmonized by using the internationally approved approach for River Information Services (RIS).

2. Harmonized RIS should cover the rivers, canals, lakes and ports in a river basin over a wide area, often beyond national boundaries.

3. RIS are not dealing with internal commercial activities between one or more of the involved companies, but RIS are open for interfacing with commercial activities.

4. In the focus points of RIS coverage areas, Vessel Traffic Services (VTS) may be established locally with the emphasis on traffic organization. Reference is made to the Inland VTS Guidelines of IALA. However, RIS have not necessarily to include a VTS.

5. These RIS Guidelines describe the principles and general requirements for planning, implementing and operational use of River Information Services and related systems. These RIS Guidelines may be complemented by detailed guidelines and standards for applications in specific parts of the world.

6. In order to promote mutual understanding between all stakeholders in RIS, the terms and definitions given in these RIS Guidelines should be used in further standardization work and in application design (chapter 2).

7. Vessels should be equipped step by step with information systems appropriate to the information available (chapter 3).

8. The RIS architecture given in these RIS Guidelines should be applied in transforming policy objectives into the development of services, systems and applications (chapter 4).

9. The individual services should be supported in conjunction with currently available technical systems like VHF radio, mobile data communications systems, GNSS, Internet, Inland ECDIS and vessel tracking and tracing systems, such as Inland AIS (chapter 5).

10. In planning RIS, a systematic procedure as described in these RIS Guidelines should be followed. User groups should be consulted (chapter 6).

11. Taking full account of all factors (e.g. changes in transport activity, meteorological conditions and infrastructure), a step-by-step development of RIS from simple systems to highly sophisticated systems is recommended (chapter 7).

12. Standards should be further developed in cooperation with the maritime world and the standardization organizations (chapter 8).

13. The rapid development of information and communication technology will pave the way to new application possibilities for inland navigation world-wide, and in this way also call for updating these RIS Guidelines.

ABBREVIATIONS

ADN	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
ADNR	Regulations concerning the Carriage of Dangerous Goods on the Rhine
ADN-D	Regulations concerning the Carriage of Dangerous Goods on the Danube
AIGPRS	Automatic identification general packet radio service
AIS	Automatic identification system (transponder)
AVV	Transport Research Centre (in Dutch: Adviesdienst Verkeer en Vervoer)
BICS	Electronic Reporting System (in Dutch: Binnenvaart informatie en communicatie systeem)
CAS	Calamity abatement support
CCNR	Central Commission for the Navigation of the Rhine
CCTV	Closed circuit television
CEVNI	European Code for Inland Waterways
COMPRIS	Consortium Operational Management Platform River Information Services
DC	Danube Commission
D4D	Data Warehouse for the river Danube
DGPS	Differential global positioning system
ECDIS	Electronic chart display and information system
UNECE	United Nations Economic Commission for Europe
EDI	Electronic data interchange
ENC	Electronic navigational chart
ETA	Estimated time of arrival
ETD	Estimated time of departure
ETSI	European Telecommunications Standards Institute
FI	Fairway information
FIS	Fairway information service
GLONASS	Global orbiting navigation satellite system (Russian Federation)
GNSS	Global navigation satellite system
GPS	Global positioning system (USA)
GSM	Global system for mobile communication
HF	High frequency
HS Code	Harmonised commodity description and coding system of WCO
IALA	International Association of Maritime Aids to Navigation and Lighthouse Authorities
IEC	International Electrotechnical Commission

IHO	International Hydrographic Organisation
IMDG Code	International Maritime Dangerous Goods Code
IMO	International Maritime Organization
INDRIS	Inland Navigation Demonstrator of River Information Services
ISO	International Organization for Standardization
IT	Information technology
ITU	International Telecommunication Union
LAN	Local area network
LBM	Lock and bridge management
OFS	Official ship number
PIANC	International Navigation Association
PTM	Port and terminal management
RIS	River Information Services
RTA	Required time of arrival
SAR	Search and rescue
SIGNI	Signs and Signals on Inland Waterways
SMS	Short message service
SOLAS	International Convention for the Safety of Life at Sea
SOTDMA AIS	Self organising time division multiple access AIS
STI	Strategic traffic information (image)
TCP/IP	Transmission control protocol / Internet protocol
TI	Traffic information
TTI	Tactical traffic information (image)
UMTS	Universal mobile telecommunication system
UN/CEFACT	UN Centre for Trade Facilitation and Electronic Business
UN/EDIFACT	UN Electronic data interchange for administration, commerce and transport
UTC	Universal time co-ordinated
VDL	VHF data link
VHF	Very high frequency
VTC	Vessel traffic centre
VTMIS	Vessel traffic management and information services (maritime navigation)
VTS	Vessel traffic services
WAP	Wireless application protocol
WCO	World Customs Organization
WI-FI	Wireless fidelity

1 INTRODUCTION

(1) There is an increasing need for information exchange between parties in the inland navigation world. In particular, the exchange of traffic related information, dealing with safety, and transport related information mainly focused on efficiency, may benefit to actors involved in both types of activities.

(2) During the last decades, a significant number of services and systems, dealing with vessel traffic and transport management, have been developed and some are in operation. The inland waterborne transport sector is now faced with the challenge of integrating these building blocks into a common architecture that offers some degree of consistency and synergy across applications.

(3) Comprehensive and international guidelines for River Information Services (RIS Guidelines) are needed, in order that the already existing standards for particular river information systems and services can be harmonized by a common frame.

(4) These RIS Guidelines describe the principles and general requirements for planning, implementing and operational use of River Information Services and related systems.

(5) These RIS Guidelines are equally applicable to the traffic of cargo vessels, passenger vessels and pleasure craft.

(6) These RIS Guidelines should be used in conjunction with international regulations, recommendations and guidelines, such as :

(a) Guidelines and Criteria for Vessel Traffic Services in Inland Waters (Inland VTS Guidelines), (world-wide), IALA recommendation V-120, June 2001, 2001

(b) Regional Arrangement Concerning the Radiotelephone Service on Inland Waterways (Europe), 2000

(c) Inland ECDIS Standard of the CCNR, 2001 [1/] and of UNECE, 2002 [2/]

(d) Standard for Electronic Ship Reporting in Inland Navigation of the CCNR, 2003 [1/] (to be also adopted by UNECE).

(e) Standard for Notices to Skippers in Inland Navigation (to be adopted by the CCNR in 2004) [1/] (is to be also adopted by UNECE).

(f) Harmonized Commodity Description and Coding System of the WCO (world-wide)

(g) UN Code for Ports and other Locations UN/LOCODE (world-wide)

1/ Available on the CCNR homepage: www.ccr-zkr.org

2/ Available on the UNECE homepage: www.unece.org/trans/main/sc3/sc3/sc3fdoc.html.

(h) UN/EDIFACT Standard (world-wide)

(i) Standardized UNECE Vocabulary for Radio Connections in Inland Navigation (Europe), 1997

(j) Guidelines and Criteria for Vessel Traffic Services on Inland Waterways (Europe), UNECE resolution No.58.

(7) A number of concepts and standardization proposals for River Information Services have been developed in the research and development project INDRIS of the European Union [3/]. These are:

(a) Guidelines and recommendations for RIS, 1999 (used as starting point to the RIS Guidelines by PIANC)

(b) Functional definition of the RIS concept, 1998

(c) Standardization of data communication (AIS, GNSS, Internet), 1999

(d) Standards for tactical data exchange, communication and messages (Inland AIS), 1998

(e) Standardization of data, 1998

- Standards of codes (country, location, terminal, type of vessel, cargo)
- RIS scenarios (functions)
- Data-interchange standards (UN/EDIFACT, S-57 update mechanism)
- Reporting databases, 1999.

(8) The concept for Inland ECDIS has been developed in the German ARGO project in co-operation with INDRIS. [4/]

(9) The concept for RIS architecture has been developed by the WATERMAN thematic network, a research action under the 5th framework programme of the EU in the fields of VTMIS (maritime navigation) and RIS. Using these achievements, the RIS architecture has been elaborated comprehensively and in detail within the R&D-project COMPRIS of the European Union in 2003.

[3/] Available on CD from the Transport Research Centre (AVV), Rijkswaterstaat, P.O. Box 1031, NL-3000 BA Rotterdam, the Netherlands.

[4/] The final report of 15.02.03 on the ARGO test operation with depths information can be downloaded from the Web page www.elwis.de under the rubric “RIS-Telematikprojekte (ARGO)”

2 DEFINITIONS

The following terms are used in connection with River Information Services in these RIS Guidelines (see also some specific definitions in chapters 4 and 5).

2.1 River Information Services (RIS): River Information Services means the harmonised information services to support traffic and transport management in inland navigation, including interfaces to other transport modes. RIS aim at contributing to a safe and efficient transport process and utilizing the inland waterways to their fullest extent. RIS are already in operation in manifold ways.

Explanatory notes:

(1) RIS include interfaces with other transport modes on sea, roads and railways.

(2) *Rivers* in the context of RIS include all types of inland waterways, e.g. canals, lakes and ports, too.

(3) RIS is also the generic term for all individual information services to support inland navigation in a harmonized way.

(4) RIS collect, process, assess and disseminate fairway, traffic and transport information.

(5) RIS are not dealing with internal commercial activities between one or more of the involved companies, but RIS are open for interfacing with commercial activities.

2.2 RIS system : For the purpose of RIS, modern river information systems consist of one or more harmonized IT systems. An IT system (information technology system) is the totality of human resources, hardware, software, communication means and regulations in order to fulfil the task of processing information.

2.3 RIS area : The RIS area is the formally described area, where RIS are active. A RIS area may comprise the waterways in a geographical river basin, including the territories of one or more countries (e.g. in a situation where a waterway forms the borderline between two countries) (figure 2.3).

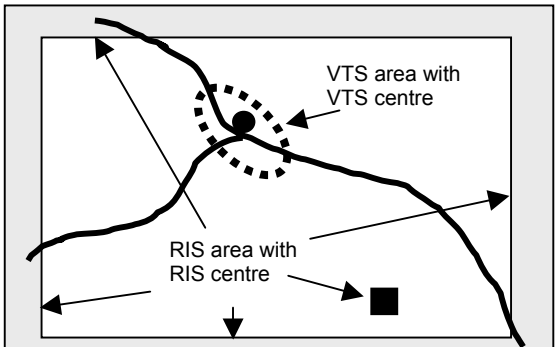


Fig. 2.3. Relation between RIS area and VTS area

2.4 RIS centre : A RIS centre is the place, where the services are managed by operators. A RIS may exist without a RIS centre (e.g. an Internet service, a buoys service). When ship/shore interaction in both ways (e.g. by VHF service) is intended, one or more RIS centres are needed. If a VTS centre or a lock exists in a RIS area, they may also be used as RIS centres. It is recommended to concentrate all services in a RIS area into one single RIS centre.

2.5 Inland VTS : Inland Vessel Traffic Service is a service, implemented by a competent authority, designed to improve the safety and efficiency of vessel traffic and to protect the environment. The service should have the capability to interact with the traffic and to respond to traffic situations developing in the VTS area.

VTS should comprise at least an information service and may include others, such as navigational assistance service, or a traffic organization service, or both, defined as below:

- An *information service* is a service to ensure that essential information becomes available in time for on-board navigational decision-making.

- A *navigational assistance service* is a service to assist on-board navigational decision-making and to monitor its effects. Navigational assistance is especially of importance in reduced visibility, or difficult meteorological circumstances or in case of defects, or deficiencies affecting the radar, steering or propulsion. Navigational assistance is given in due form of position information at the request of the traffic participant or in special circumstances when deemed necessary by the VTS operator.

- A *traffic organization service* is a service to prevent the development of dangerous vessel traffic situations by managing of traffic movements and to provide for the safe and efficient movement of vessel traffic within the VTS area (chapters 4.5 and 5.3.1).

Where present, Inland VTS are part of River Information Services (figure 2.3). Within RIS, Inland VTS belongs to the group of traffic management services with the emphasis on information service and traffic organization (chapter 4.5 and 5.3.1).

2.6 VTS area : A VTS area is the delineated, formally declared service area of a VTS. A VTS area may be subdivided in sub-areas or sectors.

2.7 VTS centre : A VTS centre is the centre from where the VTS is operated. Each sub-area of the VTS may have its own sub-centre.

2.8 Competent authority : The competent authority is the authority made responsible for safety, in whole or in part, by the government, including environmental friendliness and efficiency of vessel traffic. The competent authority usually has the tasks of planning, arranging funding and of commissioning of RIS.

2.9 RIS authority : The RIS authority is the authority with the responsibility for the management, operation and co-ordination of RIS, the interaction with participating vessels, and safe and effective provision of the service.

2.10 RIS users : The users of the services can be described in a number of different groups: skippers, RIS operators, lock/bridge operators, waterway authorities, terminal operators,

operators in calamity centres, fleet managers, cargo shippers, consignors, consignees, freight brokers, and supply forwarders.

2.11 Levels of RIS information : River Information Services work on the basis of different information levels. Fairway information contains the data of the waterway only. Traffic information has the information on vessels in the RIS area. Traffic information can be divided in tactical traffic information and strategic traffic information. Traffic information is provided by traffic images.

There are three levels of information:

(1) *Fairway information (FI)* contains geographical, hydrological, and administrative information regarding the waterway (fairway) in the RIS area that is required by the RIS users to plan, execute and monitor a voyage. Fairway information is a one-way information: shore to ship or shore to office (users' office).

(2) *Tactical traffic information (TTI)* is the information affecting the skipper's or the VTS operator's immediate decisions with respect to navigation in the actual traffic situation and the close geographic surroundings. A tactical traffic image contains position information and specific vessel information of all targets detected by a radar and presented on an electronic navigational chart (annex 1), and – if available – enhanced by external traffic information, such as the information delivered by an AIS (annex 4). TTI may be provided *on board* of a vessel or *on shore*, e.g. in a VTS centre.

(3) *Strategic traffic information (STI)* is the information affecting the medium and long-term decisions of RIS users. A strategic traffic image contributes to the planning decision capabilities regarding a safe and efficient voyage. A strategic traffic image is produced in a RIS centre and delivered to the users on demand. A strategic traffic image contains all relevant vessels in the RIS area with their characteristics, cargoes and positions, stored in a database and presented in a table or on an electronic map. Strategic traffic information may be provided by a RIS/VTS centre or by an office.

2.12 Vessel tracking and tracing : *Vessel tracking* means the function of maintaining status information of the vessel, such as the current position and characteristics, and – if needed – combined with information on cargo and consignments.

Vessel tracing means the retrieving of information concerning the whereabouts of the vessel and – if needed – information on cargo, consignments and equipment.

Part of this service can be fulfilled for example by Inland AIS as given in annex 4. Other parts can be fulfilled by a ship reporting system as given in annex 2.

3 PARTICIPATING VESSELS

(1) Vessels navigating in a RIS area shall make use of mandatory services and are recommended to make use as far as possible of the information provided by RIS and relevant services.

(2) Decisions concerning the actual navigation and the manoeuvring of the vessel remain within the responsibility of the skipper. Any information provided by the RIS cannot replace any decision made by the skipper.

(3) Depending on the level of information available and on the requirements of the competent authority, the vessels (except pleasure craft) are recommended to be equipped step by step with (see chapter 4.9):

(a) A radio equipment for the simultaneous reception of inland navigation radio on two VHF channels (ship/ship and ship/shore)

(b) A radar for the presentation of the traffic in the close surroundings of the vessel

(c) A PC with mobile communication facilities (GSM) for the reception of e-mail and Internet, and for electronic reporting

(d) An Inland ECDIS device with electronic navigational charts (ENCs), (annex 1)

- In information mode
- In navigation mode (with radar overlay)

(e) A vessel tracking and tracing system, such as AIS, with position receiver (GNSS) and radio transceiver using Inland ECDIS for visualisation (annex 4).

4 RIS ARCHITECTURE

4.1 General

The idea of WATERMAN (chapter 1(9)) behind the development of a framework architecture for RIS was to translate the policy *objectives* into specifications for *application* design. The RIS architecture should be defined in such a way that RIS applications will be produced to be efficient, expandable and able to interact with other RIS applications or applications for other modes of transport. RIS architecture development should lead to an integrated environment of RIS applications in a way that the performance, usefulness and efficiency of the applications will be enhanced.

River Information Services may be developed and redesigned according to figure 4.1.

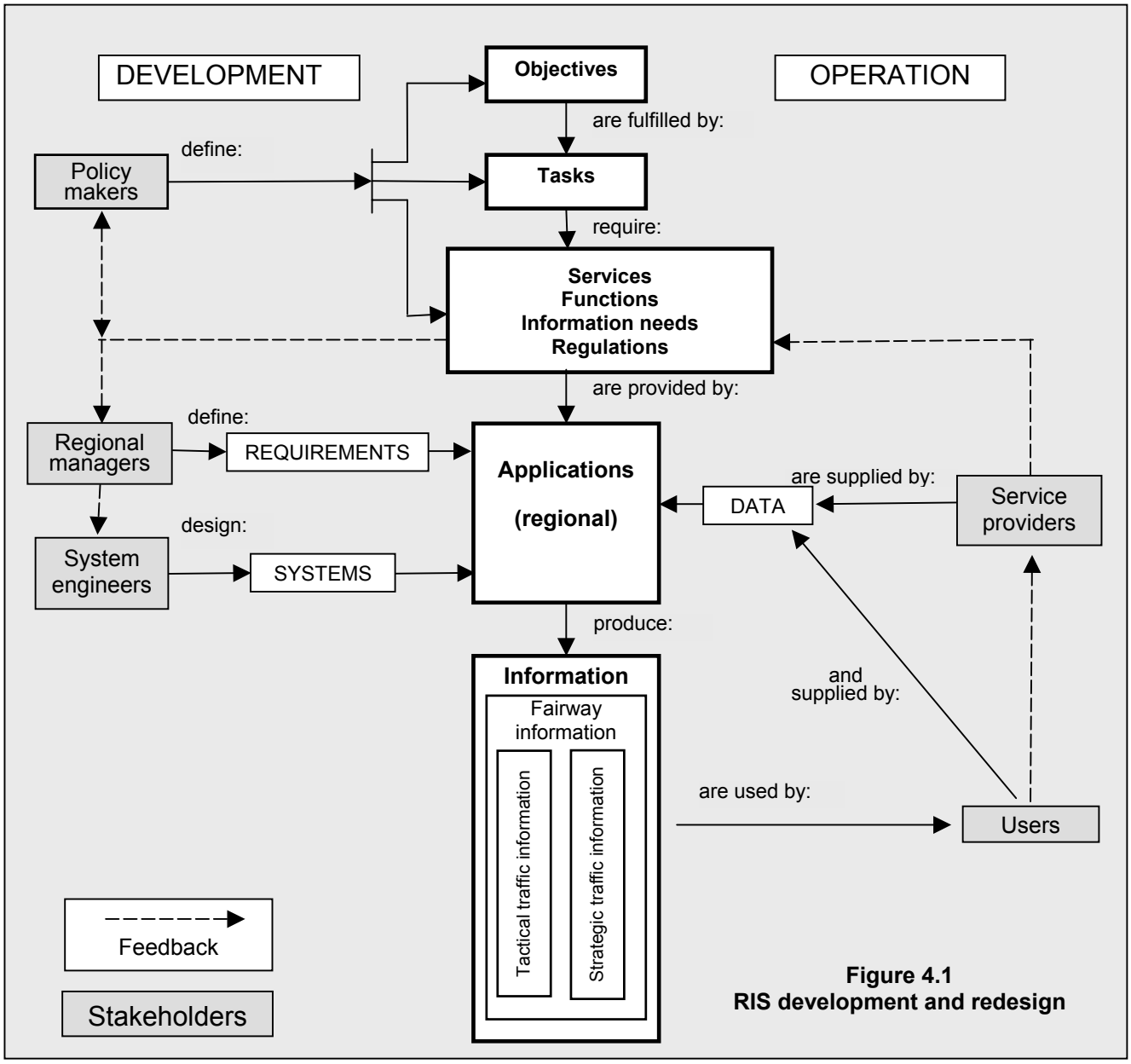


Figure 4.1
RIS development and redesign

4.2 RIS stakeholders

RIS will be realized and kept operational by a set of co-operating stakeholders. The most important of them are:

4.2.1 Policymakers : These want the RIS to solve (or diminish) traffic and transport problems. One party of policymakers are the authorities responsible for safety on the waterways. Other policymakers, e.g. organizations of ship owners, want to provide transport/logistical information services to cargo shippers and terminal operators. The different groups of policy makers have their own policy *objectives, tasks* and ideas about the *required* services to achieve its objectives. Once the services have been selected, the *functions and information needs* with their restrictions and interactions for providing these services should be determined.

4.2.2 Regional managers : These control the RIS applications, e.g. waterway managers of the competent authority, traffic control managers, managers of search and rescue services, ship owners, and cargo shippers. They define requirements for *applications* with more detailed and accurate descriptions of the services and the functions, regarding local aspects or aspects of man/machine interface.

4.2.3 System engineers : These prepare system specifications and integrate hardware and software components into system components. RIS and VTS suppliers, system integrators, and telecommunication operators will combine the system components into complete systems which enable RIS services.

4.2.4 Service providers : These make and keep RIS operational and therefore they develop, maintain and operate the RIS applications. They control the autonomous applications and, where necessary, they provide the main input into the applications either by themselves or by RIS users.

4.2.5 Users : These can be described in a number of different groups: skippers, RIS operators, lock/bridge operators, waterway authorities, terminal operators, operators in calamity centres, fleet managers, cargo shippers, consignors, consignees, freight brokers, supply forwarders.

4.3 RIS objectives

An objective is the description of intention. The objective may also be called the goal or aim. RIS have three main objectives:

(1) Transport should be *safe*:

- Minimize injuries
- Minimize fatalities
- Minimize voyage incidents

(2) Transport should be *efficient*:

- Maximize throughput or effective capacity of waterways
- Maximize the carrying capacity of vessels (length, width, draught and height)
- Reduce travel time
- Reduce workload of RIS users
- Reduce transport costs
- Reduce fuel consumption
- Provide efficient and economical link between transport modes
- Provide efficient harbours and terminals

(3) Transport should be *environmentally friendly*:

- Reduce environmental hazard
- Reduce polluting emissions and spills due to accidents, illegal actions or normal operations

These objectives should be met under the constraints that all RIS are supplied in a manner that is reliable, cost efficient and legally sound.

4.4 RIS tasks

River Information Services support a number of management tasks in inland shipping. These tasks are related to the objectives (chapter 4.3) and performed in three different "arenas":

- *Transport logistics* where parties that cause the transport co-operate with parties that organise the transport (e.g. consignors, consignees, shippers, supply forwarders, freight brokers, fleet owners)
- *Transport* where parties that organize the transport co-operate with parties that execute the transport (e.g. fleet owners, terminal operators, customers)
- *Traffic* where parties that execute the transport (e. g. ship masters and navigators) co-operate with parties that manage the resulting vessel traffic (e.g. traffic manager, competent authorities).

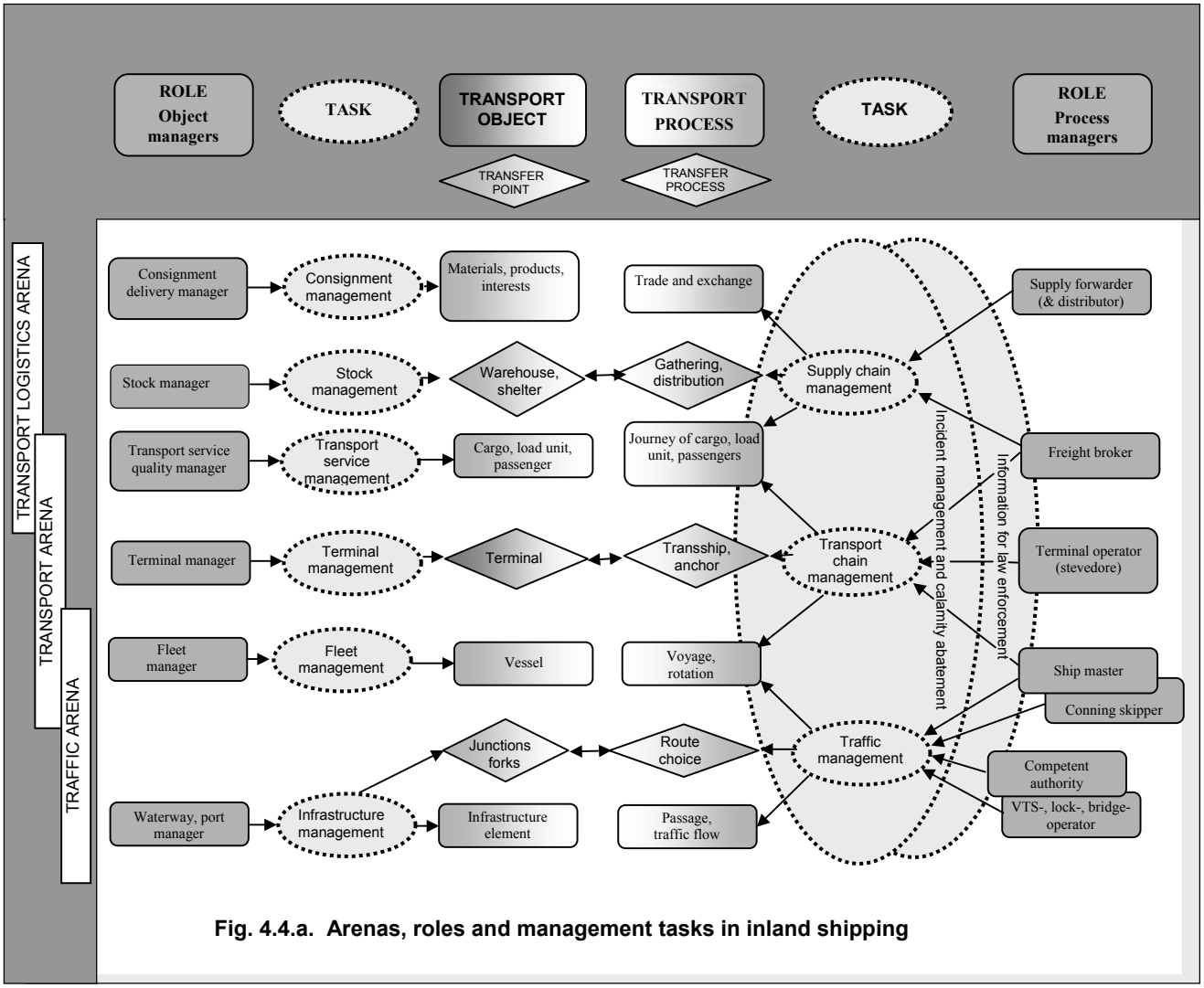


Fig. 4.4.a. Arenas, roles and management tasks in inland shipping

The tasks are performed by different *actors* playing their *role* and being involved in *transport objects* and *transport processes*. One actor can be a stakeholder in one or more arenas at the same time. The activities of the actors are combined at *transfer points* and *transfer processes*. Figure 4.4.a gives an overview of all the relevant roles (and thus the stakeholders fulfilling these roles) responsible for traffic, transport and transport logistics in inland shipping. The tasks in figure 4.4.a are also called *communal task* in the sense that *individual tasks* of the involved roles have to be tuned to each other by mutually informing each other, by negotiation or - in some cases - by passing on directions. This overview is the basis for defining RIS services (Source: COMPRIS, RIS architecture, reference model).

The management tasks allow deriving the following RIS services in relation to the objectives, where one RIS service can fulfil one or more management tasks (table 4.4.b):

Table 4.4.b. Derivation of RIS Services

Objectives (chapter 4.3) →	**Management tasks (figure 4.4 a) →**		**RIS services (table 4.5)**
Efficiency	Transport **object** related	Consignment management	ITL cargo management (5.d)
		Stock management	
		Transport service management	ITL outside the scope of RIS
		Terminal management	ITL terminal management (5.c)
		Fleet management	ITL cargo and fleet management (5.d)
Safety, environmental friendliness, efficiency		Infrastructure management	Fairway information service (1)
			Statistics (7),
			Waterway charges and harbour dues (8)
Efficiency	Transport **process** related	Supply chain management Transport chain management	ITL Cargo and fleet management (5.d)
			ITL Transport management (5.b)
			ITL Inter-modal port and terminal management (5.c)
			ITL Voyage planning (5.a)
Safety, efficiency	Traffic **process** related	Traffic management	Traffic information (2)
			Traffic management (3)
Safety, environmental friendliness Efficiency	**All** objects and processes	Incident management and calamity abatement	Calamity abatement support (4)
		Law enforcement	Information for law enforcement (6)

ITL = Information for transport logistics, ( ) = numbering in table 4.5

The tasks of all RIS arenas are performed by the actors in cycles as shown in figures 4.4.c and d. Moreover, the tasks may happen on an operational, tactical or strategic level (good examples are the tactical and strategic traffic information levels, defined in chapter 2.11). This concept allows to draw for each individual task an *information processing loop* including the actions of the different actors. Every step in the information processing loop can be supported by RIS services, which help the actor in his observations, evaluations, decisions, and actions. The information processing loop can be used to define the RIS services (chapter 4.5) and RIS functions

(chapter 4.6). An example for an information processing loop is given in annex 5 (COMPRIS, RIS architecture, information architecture).

4.5 RIS services

A service provides and uses information. It supports the user in achieving an improvement in performance. Services are developed by projects (driven by stakeholders or by technology push). Services are the means for the user to achieve the objectives. The execution of a task can be enhanced by using one or more services.

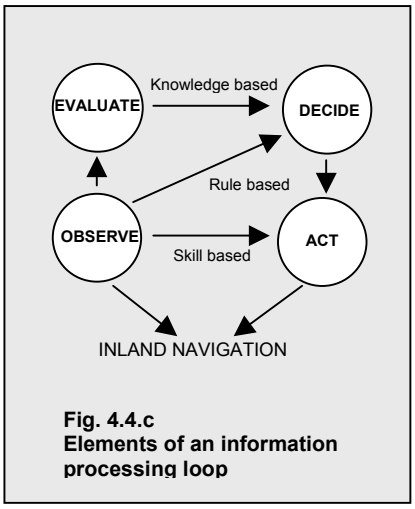


Fig. 4.4.c
Elements of an information processing loop

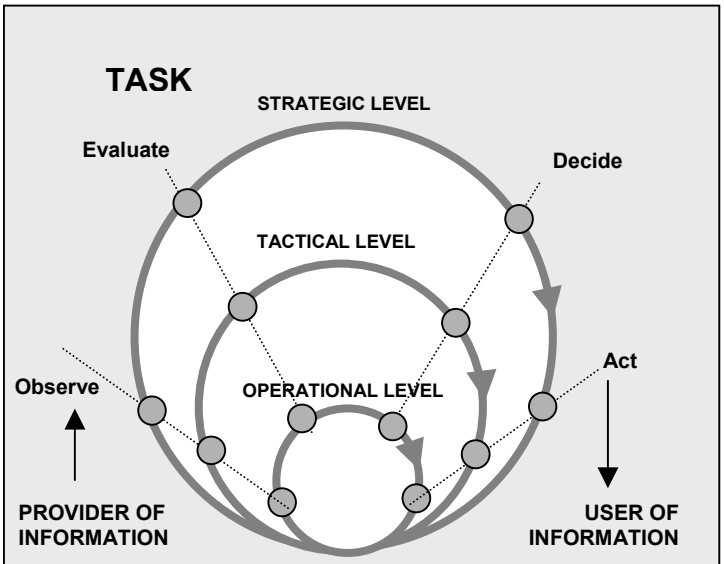


Fig. 4.4.d. Information processing loop

RIS services of chapter 4.4 are rearranged and subdivided according to table 4.5.

Abbreviations in table 4.5 are used only to provide the connection to table 4.6.

Table 4.5
RIVER INFORMATION SERVICES

Mainly traffic related

1 Fairway information service (FIS)
- a) Visual aids to navigation
- b) Radiotelephone service on inland waterways
- c) Internet service
- d) Electronic navigational chart service

2 Traffic information (TI)
- a) Tactical traffic information (TTI)
- b) Strategic traffic information (STI)

3 Traffic management (TM)
- a) Local traffic management (vessel traffic services - VTS)
- b) Navigational support (NS)
- c) Lock and bridge management (LBM)

4 Calamity abatement support (CAS)

Mainly transport related

5 Information for transport logistics (ITL)
- a) Voyage planning (VP)
- b) Transport management (TPM)
- c) Inter-modal port and terminal management (PTM)
- d) Cargo and fleet management (CFM)

6 Information for law enforcement (ILE)

7 Statistics (ST)

8 Waterway charges and harbour dues (CHD)

4.6 RIS functions and information needs

A RIS function is understood to be a contribution to a service. The functional decomposition of River Information Services (RIS) allows the allocation of information supply to user demand. Table 4.6 shows the connections between services (4.5), functions (4.6), users (4.2.5) and information levels (2.11). It also shows that in many cases the same function serves many participants in the transport process. Table 4.6 gives an example as a guide to anybody else and may remind the reader in making his/her own list.

Table 4.6. Functional decomposition of River Information Services

No.	**RIS service** *RIS sub-service* RIS function	Information level	User							
			Ship master	VTS operator	Lock/ bridge operator	Waterways authority	Terminal operator	Calamity Centre	Fleet manager	Cargo shipper
FIS	**Fairway information service**									
	Provision of information on:									
FIS.1	Geography of the navigation area and their updates	FIS	X	X	X	X		X	X	X
FIS.2	Navigation aids and traffic signs	FIS	X	X	X	X		X		
FIS.3	Water depths contours in the navigation channel	FIS	X	X	X	X	X	X		X
FIS.4	Long time obstructions in the fairway	FIS	X	X	X	X		X	X	X
FIS.5	Actual meteorological information	FIS	X	X		X		X		
FIS.6	Temporary obstructions in the fairway	FIS	X	X		X		X		X
FIS.7	Present and future water levels at gauges	FIS	X	X		X		X	X	X
FIS.8	State of the rivers, canals, locks and bridges in the RIS area	FIS	X	X	X	X		X		X
FIS.9	Restrictions caused by flood and ice	FIS	X	X	X	X		X	X	X
FIS.10	Malfunctions of aids to navigation	FIS	X	X		X				
FIS 11	Short term changes of lock and bridge operating times	FIS	X	X	X	X				X
FIS 12	Short term changes of aids to navigation	FIS	X	X		X				
FIS.13	Regular lock and bridge operating times	FIS	X	X	X	X		X	X	X
FIS.14	Physical limitations on waterways, bridges and locks	FIS	X	X	X	X		X	X	X
FIS.15	Navigational rules and regulations	FIS	X	X	X	X		X	X	
FIS.16	Rates of waterway infrastructure charges	FIS	X			X			X	X
FIS.17	Regulations and recommendations for pleasure navigation	FIS	(X)			X		X		
TI	**Traffic information**									
TTI	*Tactical traffic information (short term related)*									
TTI.1	Presentation of own vessel's position	TTI	X		X					
TTI.2	Presentation of other vessels´ positions	TTI	X	X						
STI	*Strategic traffic information (medium and long term related)*									
STI.1	Presentation of fairway information (=FIS)	FIS	X			X		X	X	
STI. 2	Presentation of vessel's positions in large surroundings	STI	X		X	X		X		
STI.3	Medium and long term assessment of traffic situation	STI	X			X				
STI.4	Presentation of vessel's characteristics	STI	X		X	X	X	X		X
STI.5	Presentation of cargo's characteristics	STI	X		X	X	X	X		X

Table 4.6. Functional decomposition of River Information Services

No.	**RIS service** *RIS sub-service* RIS function	Information level	User							
			Ship master	VTS operator	Lock/ bridge operator	Waterways authority	Terminal operator	Calamity Centre	Fleet manager	Cargo shipper
STI.6	Presentation of intended destination	STI	X	X	X	X	X	X	X	X
STI.7	Presentation of information on incidents/accidents in the coverage area	STI	X	X		X		X		
STI.8	Organization and regulation of traffic flow	STI	X	X		X				
TM	**Traffic management**									
VTS	*Vessel traffic services (local)*									
VTS.1	Presentation of vessel's positions in large scale	TTI		X						
VTS.2	Monitoring of passing and manoeuvring arrangements	TTI		X						
VTS.3	Short term assessment of traffic situation	TTI		X						
VTS.4	Organization and regulation of traffic flow in RIS coverage area	TTI		X						
NS	*Navigational support*									
NS.1	Information to pilots (navigational support)	TTI	X	X						
NS.2	Information to tug boats (navigational support)	STI	X							
NS.3	Information to bunker boats, waste oil removal boats, vessel equipment firms (vessel support service)	STI	X						X	
LBM	*Lock and bridge management*									
LBM.1	*Lock/bridge operation*									
LBM.1.1	Presentation of actual status of lock/bridge process	TTI	X		X					
LBM.1.2	Presentation of short term planning of lock/bridge (ETAs / RTAs of vessels, waiting places, lock/bridge positions)	TTI	X	X	X					
LBM.2	*Lock/bridge planning*									
LBM.2.1	Provision of ETAs of approaching vessels	STI			X					
LBM.2.2	Provision of information on medium and long term schedule of lock/bridge process	STI			X	X				
LBM.2.3	Provision of medium and long term RTAs of vessels	STI	X		X					
CAS	**Calamity abatement support**									
CAS.1	Information on incidents focused on traffic situation	TTI	X			X		X		
CAS.2	Assessment of the traffic situation in the situation of an incident	TTI				X		X		
CAS.3	Co-ordination of the assistance of patrol vessels	TTI		X		X		X		
CAS.4	Assessment of the possible effects of the accident on environment, people and traffic	TTI				X		X		
CAS.5	Presentation of information to patrol vessels, police boats, fire squad boats	TTI				X		X		
CAS.6	Initiation and co-ordination of search and rescue activities	TTI	X			X		X		
CAS.7	Taking measures on traffic, environmental and people protection	TTI				X		X		
ITL	**Information for transport logistics**									
VP	*Voyage planning*									
VP.1	Provision of information on port of destination, RTA at final destination, type of cargo	STI	X						X	X

Table 4.6. Functional decomposition of River Information Services

No.	**RIS service** *RIS sub-service* RIS function	Information level	User							
			Ship master	VTS operator	Lock/ bridge operator	Waterways authority	Terminal operator	Calamity Centre	Fleet manager	Cargo shipper
VP.2	Provision of information on and presentation of the fairway network at different scales	STI	X						X	X
VP.3	Presentation of lock and bridge opening times and general waiting times	STI	X						X	X
VP.4	Presentation of long term weather information	STI	X						X	X
VP.5	Presentation of mid and long term prediction of water levels	STI	x						X	X
VP.6	Presentation of information on route characteristics with RTAs, ETAs, ETDs at waypoints	STI	X						X	X
VP.7	Presentation of information affecting travel information	STI	X							
TPM	*Transport management*									
TPM.1	Provision and presentation of ETA´s of vessels	STI	X	Ship supplier organization Bunker organization Repair organization						X
TPM.2	Provision and presentation of voyage plans of vessels	STI	X							X
TPM.3	Provision of information on free loading space	STI	X							X
TPM.4	Monitoring of the performance of contracted transports and terminals		Freight brokers Transport service quality managers							
TPM.5	Monitoring unusual threats (like strikes, fall in water level) for the reliability of transport									
TPM.6	Match the transport and terminal performance with service levels agreed on									
TPM.7	Define adjustments to methods for voyage planning									
PTM	*Inter-modal port and terminal management*									
PTM.1	*Presentation of actual terminal or port status*									
PTM.1.1	Presentation of vessels waiting, being loaded/unloaded	TTI					X			X
PTM.1.2	Presentation of actual status of terminal process	TTI					X			X
PTM.1.3	RTAs of vessels, waiting places, positions	TTI	X				X			X
PTM.2	*Port or terminal planning*									
PTM.2.1	ETAs of approaching vessels	STI					X			
PTM.2.2	Medium and long term schedule terminal process	STI					X			
PTM.2.3	Medium and long terms RTAs of vessels	STI	X				X			
CFM	*Cargo and fleet management*									
CFM.1	Information on fleet of vessels and their transport characteristics	STI							X	X
CFM.2	Information on the cargo to be transported	STI							X	X
ILE	**Information for law enforcement**									
ILE.1	Cross-border management (immigration service, customs)					X				
ILE.2	Compliance with requirements for traffic safety					X				
ILE.3	Compliance with environmental requirements					X				
ST	**Statistics**					X				
ST.1	Transit of vessels and cargo at certain points (locks) of the waterway					X				
CHD	**Waterway charges and harbour dues**		X		X	X				X

4.7 RIS regulations

As an important aspect of the policy level, national and local authorities have the responsibility and the possibility for issuing regulations on how to implement and use the systems as part of ensuring that the objectives of the society as a whole, for which the systems were created, are met. Special issues in this field are the rules and regulations with respect to the protection of the confidentiality of personal and commercial information. For cross-border inter-operability, the international authorities may also issue regulations, as well as standards and recommendations.

4.8 RIS applications

RIS applications are regional or dedicated users of systems under specific requirements: local, functional, process-oriented. A single application can use one or more systems to provide a service.

4.9 RIS systems

A wide range of technical systems has been developed for RIS, most of them used for more than one service, function or application (table 4.9):

Table 4.9 : Relation between Services and Systems

SYSTEM	SERVICE													
		Traffic nformatior		Traffic management				Information for transport logistics						
	Fairway information	Tactical	Strategic	Vessel traffic services	Navigational support	Lock and bridge management	Calamity abatement support	Voyage planning	Transport management	Inter-modal port and terminal management	Fleet and cargo management	Information for law enforcement	Statistics	Waterway charges and harbour dues
Visual aids to navigation	x													
Radar reflecting aids to navigation	x			x										
Light signals	x			x		x								
Mobile phone (voice and data)	x				x	x	x	x	x	x	x	x		x
GNSS for vessel positioning		x	x				x	x	x	x				
VHF radio	x	x	x	x	x	x	x	x		x		x		
Internet	x				x		x	x	x	x	x			x
Vessel based radar	x	x					x							
Shore based radar		x		x		x	x							
Shore based CCTV cameras		x		x		x								
Electronic navigational chart	x	x		x		x	x	x						
Vessel tracking and tracing system		x	x	x		x	x	x	x	x	x	x		x
Ship reporting system			x				x	x	x	x	x	x	x	x

5 RECOMMENDATIONS FOR INDIVIDUAL SERVICES

Because technology changes fast, the emphasis is laid more on *services* and less on technology dependent *systems* in this chapter.

5.1 Fairway information service (FIS)

5.1.1 General

(1) Traditional means to supply FIS are e.g. visual aids to navigation, notices to skippers on paper, broadcast and fixed telephone on locks. The mobile phone using GSM has added new possibilities of voice and data communication, but GSM is not available in all places and at all times. Tailor-made FIS for the waterways can be supplied by

(a) Radiotelephone service on inland waterways
(b) Internet service
(c) Electronic navigational chart service (e.g. Inland ECDIS with ENC).

These three FIS categories are dealt with in this chapter 5.1. They are mainly based on the current situation, but for example notices to skipper may be supplied also via ENC service in the future.

(2) Types of fairway information are listed in table 4.6.

(3) Fairway information contains *static* and *dynamic* as well as *urgent* information regarding the fairway. Static and dynamic information should be communicated on a scheduled basis. The urgent information needs to be updated very frequently and/or should to be communicated on a real time basis (e.g. by voice VHF or electronic data interchange, Internet, WAP).

(4) Safety related fairway information should be provided by or on behalf of the competent authority.

(5) Fairway information for an international river area should be given by one single dissemination point provided with data from the concerned competent authorities.

(6) Provided safety related data should be certified by the competent authority as much as possible.

(7) Values should only be given with an indication of the accuracy that can be attached to it.

(8) Fairway information services should be provided through the approved communication tools (e.g. notices to skippers via the Internet or by VHF) and be given tailor-made as much as practicable.

(9) In order to enable navigation in poor visibility by means of radar, the fairway should be equipped with radar reflecting top marks on buoys and beacons and with radar marks in front of

bridge piles. The equipment of the fairway for radar navigation is the infrastructure task of *radar reflecting aids to navigation*. This task is related to, but not part of RIS. Therefore, it is not dealt with in these RIS Guidelines.

5.1.2 Radiotelephone service on inland waterways

(1) The radiotelephone service on inland waterways enables the establishment of radio communication for specific purposes by using agreed channels and an agreed operational procedure (service categories). The radiotelephone service comprises five service categories:

(a) Ship-to-ship
(b) Nautical information
(c) Ship-to-port authorities
(d) On-board communications
(e) Public correspondence (service on a non-mandatory basis).

Of these five categories, only the first three are important for RIS. The radiotelephone service enables direct and fast communication between skippers, waterway authorities and port authorities. It is best suited for urgently needed information on a real time basis.

(2) The radiotelephone service is based on the following rules and regulations:

(a) Radio Regulations of the International Telecommunication Union ITU (world-wide)
(b) Regional Arrangement Concerning the Radiotelephone Service on Inland Waterways (Europe, 06.04.2000)
(c) Standardized UNECE Vocabulary for Radio Connections in Inland Navigation (UN Economic Commission for Europe, Resolution No. 35, 1997)
(d) National inland waterway rules for navigation.

(3) In the service categories ship-to-ship, nautical information and ship-to-port-authorities, the transmission of messages should deal exclusively with the safety of human life, and with the movement and the safety of vessels.

(4) Fairway information by voice in the nautical information (shore/ship) service category is recommended to be implemented:

(a) For urgent information needing to be updated frequently and having to be communicated on a real time basis
(b) For dynamic information having to be communicated on a daily basis.

(5) The urgent and dynamic information to be communicated by voice radio could concern for example:

(a) Temporary obstructions in the fairway, malfunctions of aids to navigation
(b) Short term changes of lock and bridge operation times

(c) Restrictions in navigation caused by flood and ice
(d) Present and future water levels at gauges.

(6) The RIS area should be fully covered by the range of the VHF base stations for nautical information.

(7) In the nautical information service category, notices to skippers may be transmitted "to all users" as:

(a) Scheduled reports on the state of the waterways incl. water level reports at the gauges at fixed times of the day
(b) Urgent reports at special events (e.g. traffic regulations after accidents)

(8) It should be possible for the operator in the RIS centre to answer specific questions of skippers on demand and to receive reports from skippers.

5.1.3 Internet service

(1) An Internet service is recommended to be established for the following types of fairway information:

(a) Dynamic nautical information on the state of the waterways that needs to be communicated not more often than on a daily basis. This information may have the form of notices to skippers.
(b) Dynamic hydrographical information, as actual water levels, water level predictions, navigation channel depths (if available), ice and flood predictions and reports. This information may be presented in the form of dynamic tables and diagrams.
(c) Static information (e.g. physical limitations of the waterway, regular operating times of locks and bridges, navigational rules and regulations). This information may be presented in the form of static Internet pages.

(2) A standard vocabulary should be used for the notices to skippers in order to enable easy or automatic translation into other languages.

(3) For a dense and/or extended waterway network, the dynamic information may be organized in interactive databases (*content management system*) in order to enable easy access to the data.

(4) In addition to the Internet presentation, the notices to skippers may be mailed by

(a) E-mail subscription to computers on board of vessels and in offices
(b) SMS subscription to mobile phones
(c) WAP pages to mobile phones.

(5) In order to facilitate route planning by the skipper, all fairway information needed for a route from port of departure to port of destination may be presented on one page on demand by

the user.

(6) Notices to skippers via the Internet or via data exchange between authorities should be communicated in an agreed format in order to enable automatic translation in other languages.

(7) The requirements of the standard for notices to skippers should be fulfilled (see annex 3).

5.1.4 Electronic navigational chart service (Inland ECDIS)

(1) Electronic navigational charts (ENC) as a means of presenting fairway information should at least fulfil the regulations for the *information mode* of the Inland ECDIS Standard (see annex 1).

(2) The chart information to be used in Inland ECDIS should be the latest edition of information.

5.2 Traffic information service

5.2.1 General

Information concerning the traffic situation may be provided in two ways (chapter 2.11):

(a) As *tactical* traffic information (TTI) using radar and – if available – a vessel tracking and tracing system with underlain electronic navigational charts

(b) As *strategic* traffic information (STI) using an electronic ship reporting system (e.g. database with ship and cargo data, reports by VHF or other mobile communication facilities - voice and data).

5.2.2 Tactical traffic information (TTI) service

(1) Vessels should be equipped with radar in order to monitor all other ships in the close navigational surroundings to the skipper in poor visibility.

(2) A tactical traffic image on board (chapter 2.11 (2)) should be enhanced at least by displaying the radar information and - if available - AIS vessel information on an electronic navigational chart (ENC).

(3) The integrated display should be in accordance with the requirements for the *navigation mode* of the Inland ECDIS standard (see annex 1).

(4) In the navigation mode of Inland ECDIS, the vessel’s position should be derived from a continuous positioning system of which the accuracy is consistent with the requirements of safe navigation.

(5) In the navigation mode of Inland ECDIS, at least the safety relevant geo-objects should be included into the ENC. The competent authority should verify the safety relevant information in the ENC.

(6) It is recommended to include all geo-objects of the object catalogue of the Inland ECDIS Standard (see annex 1) into the ENC.

(7) It is recommended to include the water depths to the ENC (depths contours) for shallow river stretches that determine the draught of the vessels. The water depths may be related to a reference water level or to the actual water level.

(8) The use of a vessel tracking and tracing system (such as AIS) as an additional position sensor for detection of surrounding vessels should fulfil the requirements of the relevant standard [5/]. The vessel information should be identified on the tactical traffic image, and other additional information on these vessels should be available.

(9) Tactical traffic information on shore is used also in local traffic management (e.g. VTS centres) (chapter 5.3.1).

5.2.3 Strategic traffic information (STI)

(1) Strategic traffic information (chapter 2.11 (3)) should be established, when a permanent survey of the shipping situation in the RIS area is needed for medium term and long term decisions (e.g. for the emergency management at flood and ice).

(2) Strategic traffic information can be helpful to the following services:

(a) Lock and bridge management (calculation of estimated time of arrival - ETA - and required time of arrival - RTA)

(b) Voyage planning

(c) Calamity abatement support (vessel and cargo data)

(d) Terminal management (calculation of ETA and RTA)

(3) For strategic information a *ship reporting system* (e.g. in connection with a RIS centre) should be established by the competent authority. The system has the task of collecting, verifying and disseminating the reported data.

(4) The STI should be delivered to RIS users (chapter 2.10) on demand (chapter 5.5 (7)) taking into account privacy regulations.

(5) Vessel and cargo data should be collected in a database. The database can be filled up by:

[5/] The full requirements on vessel tracking and tracing will be defined in the standard for vessel tracking and tracing in inland navigation to be developed by the European expert group on vessel tracking and tracing in 2004.

(a) Voice reporting via mobile phone

(b) Voice reporting via VHF (chapter 5.1.2 (6))

(c) Electronic reporting via on-board computer (e.g. BICS application) and mobile communication facilities (e.g. mobile phone data) for initial reports (vessel identity and cargo).

(d) Vessel tracking and tracing (e.g. by Inland AIS, see annex 4) for *progress* reports (vessel's position and ETA).

(6) Reports from inland vessels should fulfil the requirements of the Standard for Electronic Ship Reporting (see annex 2).

(7) A possible composition of data sets for different services like lock and bridge management, calamity abatement support or terminal management is given as an example in table 5.2.3.

(8) A strategic traffic image on shore may be restricted to special types of vessels (e.g. extraordinarily big vessels, vessels with dangerous cargo, special transports, and special tug combinations).

(9) Data interchange should be established between neighbouring authorities. Depending on the number of vessels involved, this should be done by telephone, fax, e-mail or electronic data interchange.

Table 5.2.3. Data set for ship reporting (example)

Static data of vessels in composition	
Type	MV
Name	Arcona
Official vessel no (for sea vessels IMO-No.)	4,620,004
Length	110 m
Width	11.40 m
Variable data	
No. of crew on board	3
Position (by waterway and km)	Emmerich, km 857.0
Sailing direction	upstream bound
Number of vessels in composition	2
Length of composition	187 m
Width of composition	11.40
Draught	3.20 m
Next reporting point (lock/bridge, terminal)	Meiderich lock
ETA at reporting point with accuracy	17:30 ± 0.30
For each partial cargo	
Category of cargo	Chemical product
Harmonized system code of cargo	310210
Loading point (UN location code)	Rotterdam
Destination point (UN location code)	Dortmund
Amount of cargo (tons)	2,800
Only if dangerous cargo	
Name of cargo	Na-Nitrit
Code of cargo	ADN, ADNR, ADN-D
Class	5.1
Package code	III
UN-no. (if available)	1,500
Quantity of blue cones / lights	1

5.3 Traffic management

5.3.1 Local traffic management (vessel traffic services, VTS)

(1) Reference is made to the Inland VTS Guidelines of IALA (chapter 1, no. 6.a).

(2) A VTS centre for local traffic management by means of a tactical traffic image on shore (chapter 2.11) should be established for the safety of navigation in difficult local situations and the protection of the surrounding human population and infrastructure from potential dangers of shipping. It emphasises on traffic organisation. The difficult local situations may be:

(a) Narrow fairway and/or shoals

(b) Narrow bends

(c) Narrow and/or many bridges

(d) Fast water currents and/or cross currents

(e) Fairway with traffic regulations, e.g. one-way-traffic

(f) Conjunction of waterways

(g) High traffic density.

(3) The tactical traffic image (TTI) is produced by collecting shore based radar and vessel tracking and tracing information, and displaying the vessel information on an Inland ECDIS. The standards for Inland ECDIS and inland vessel tracking and tracing should be used. For a long river stretch and heavy traffic, the TTI may be enhanced by target tracking.

5.3.2 Navigational support

Navigational support is the generic term for some services to assist inland navigation.

In the traffic arena (see chapter 4.4), *navigational support* is provided by pilots to prevent the development of dangerous vessel traffic situations on board or in special circumstances on shore. *Nautical support* is provided by tug boats or boatmen to assist in safe navigation and mooring.

In the transport arena, *vessel support services* are services given to the skipper by e.g., bunker boats, waste oil removal boats, vessel equipment firms, and repair organisations.

5.3.3 Lock and bridge management

(1) RIS should optimize the traffic flow by:

(a) Support of the lock/bridge master in short term decisions for planning of the lock and bridge cycle by presentation of an electronic lock diary, by a database, and by registration of waiting times

(b) Support of the lock/bridge master in medium term decisions by data exchange with the neighbouring locks

(c) Support of the skipper by transmission of waiting times

(d) Optimising of lock circles by calculation of ETAs/RTAs for a chain of locks, transmission of RTAs to skippers.

(2) A vessel tracking and tracing system with a database and appropriate means of communication (e.g. VHF, GSM - voice and data) is recommended to be established (chapter 5.2.3) in order to enhance lock and bridge planning.

5.4 Calamity abatement support

(1) Calamity abatement support registers the vessel and transport data at the beginning of a voyage in a RIS centre and updates the data during the voyage. In case of an accident, the RIS centre delivers the data without delay to the emergency services.

(2) Depending on the risk assessment (table 6.4. no. B.2.a), a calamity abatement service may register only certain types of vessels and compositions (chapter 5.2.3 (8)) or all vessels.

(3) It should be the responsibility of the skipper to report the required data (table 5.2.3).

(4) A ship reporting system with a database and appropriate means of communication should be established (see chapter 5.2.3).

(5) Position and sailing direction of the vessel should be reported:

(a) When entering or leaving the area of a RIS centre

(b) At specified reporting points within the area of the RIS centre

(c) When the data has been changed during the voyage

(d) Before and after stops of longer than a specific period.

5.5 Information for transport logistics

(1) Logistic applications of RIS comprise:

(a) Voyage planning

(b) Transport management

(c) Inter-modal port and terminal management

(d) Cargo and fleet management.

(2) *Voyage planning* is the task of the skipper and the vessel owner. Voyage planning comprises the planning of the loading and the draught of the vessel, as well as the planning of the ETA and of possible loadings or unloadings during the voyage. RIS should support voyage planning by :

(a) Fairway information service (chapter 5.1)

(b) Strategic traffic information (chapter 5.2.3)

(c) Lock and bridge management (chapter 5.3.3).

(3) *Transport management* means the management of the transport chain beyond the scope of navigation driven by freight brokers and transport service quality managers. It is aimed at:

(a) Controlling the overall performance of the contracted fleet managers/skippers and terminal operators

(b) Controlling the progress in the contracted transports

(c) Monitoring unexpected threats for the reliability of these transports

(d) Finalizing the transport (delivery and invoice).

(4) The competent authorities should design their information systems in a way that the data flow between public and private partners is possible. The standards according to chapter 1 nos. 6.d to i should be used.

(5) Communication and information exchange between private and public partners in RIS for logistic applications should be carried out according to the procedures and standards that are being agreed for RIS.

(6) The competent authorities should provide ample room for logistics applications within the bounds of their possibilities, such as:

(a) The exchange of information between users and customers relating to vessels and terminals

(b) Fleet planning support

(c) ETA/RTA negotiations between vessels and terminals

(d) Vessel tracking and tracing

(e) Electronic market places

(f) Movement of people (for immigration services).

The competent authorities should indicate the data structure in use to application builders.

(7) Confidentiality of data exchange in a RIS needs to be ensured. In cases where logistic information is provided by systems operated by a competent authority, this authority should take the necessary steps to ensure the protection of confidentiality of commercial information. When confidential data are provided to third parties, privacy regulations have to be taken into account.

5.6 Information for law enforcement

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:

(a) Cross-border management (e.g., the movement of people controlled by the immigration service, customs)

(b) Compliance with the requirements for traffic safety

(c) Compliance with the environmental requirements.

6 PLANNING OF RIS

6.1 General

The need for RIS should be carefully assessed, based on a benefit/cost analysis and a consultation of the user groups. In those cases :

- where RIS are deemed to be necessary, or
- when the information provided is thought to be essential
  - for the safety of traffic flow,
  - to reduce environmental pollution, and
  - to contribute to the efficiency of transport,

the concerned competent authority usually should provide the necessary expertise and arrange funding to provide the desired levels of technology and expertise to meet the objectives.

6.2 Responsibilities

(1) The competent authority has the responsibility - as far as RIS are traffic related - to plan RIS, to commission RIS and to arrange funding of RIS. In case of existing RIS, the competent authority should change the scope of the RIS if circumstances dictate so.

(2) Where two or more governments or competent authorities have a common interest in establishing RIS in a particular area, they may decide to develop common RIS.

(3) Attention should be paid to the possibilities of monitoring and maintaining the desired level of reliability and availability of RIS.

(4) During the planning of RIS, the concerned competent authority should:

(a) Have a legal basis for the actions of the RIS and assure that the RIS are in conformity with national and international laws

(b) Determine the objectives of the RIS

(c) Appoint a RIS authority

(d) Describe the area of coverage of the RIS

(e) Determine the services and functions which will be rendered

(f) Define the requirements for the applications

(g) Provide the equipment necessary to carry out the tasks given to the RIS

(h) Provide and train sufficient and competent personnel

(i) Harmonize the demands of traffic and transport management by co-operation with the organizations of cargo shippers, fleet owners and port owners.

6.3 Liability

The liability element of compliance with RIS guidance is an important consideration which can only be decided on a case-by-case basis in accordance with national law. Consequently, a RIS authority should take into account the legal implications in the event of a shipping accident, where RIS operators may have failed to carry out their duty competently.

6.4 Planning Process

The need for RIS should be carefully assessed, using the process laid down in table 6.4.

Table 6.4. The planning process for RIS

A PRELIMINARY INVESTIGATION

1. Description and analysis of the existing and future situation in the area

a) Hydrographical, hydrological and meteorological conditions

b) Waterway conditions
e.g. dimensions of waterways (locks, bridges, fairways), visibility along fairways, specific constraints (bends, narrows, shoals, narrow and low bridges), navigation patterns, bottlenecks, operating times of locks)

c) Current and future traffic and transport situation
number of passengers, tons of cargo, kind of cargo, composition of fleet

d) Number, type and impact of accidents including analysis of consequences

e) Legal situation
authorities, incident/calamity regulations

f) Regional management and organisational situation
e.g. lock operators, harbour and terminal companies

g) Existing RIS systems

h) Other problems in the area
e.g. delays

2. Objectives see chapter 4.3

3. Tasks see chapter 4.4

4. Services and functions to be provided see chapter 4.5 and 4.6

a) Selection of potential future services

b) Selection of potential future functions

5. Regulations to be provided

6. Requirements for the applications

7. Proposal for decision on further procedure

B APPLICATION DESIGN

1. Design of one or more potential future RIS applications
short description, representation of performance and cost estimation of the potential IT systems

a) Design on a functional basis
external and internal functions dependant on the local situation

b) Translation of the functional design into a technical design (systems)

c) Definition of equipment needed on vessels and on shore

2. Evaluation of potential future RIS applications

a) Risk assessment
e.g. types of risks and weighing of risks by pair wise comparison

b) Efficiency of transport by benefit/cost analysis
reduction of waiting times for vessels, higher reliability, shorter voyage duration, costs of incidents, accidents and delays

c) Environmental impact study
if appropriate, for urban areas and the river

3. Choice and decision on implementation

4. Organizational structure of the future RIS application

a) Liability in the legislation and regional legal basis

b) Competent authority for planning and construction

c) RIS authority for operation
authority that is carrying out the task

d) Personnel facilities
eventually fully automated, training aspects

6.5 Training

The successful delivery of RIS depends upon competent and experienced personnel to fulfil the responsibilities of a RIS authority. The recruitment, selection and training of suitable personnel are a pre-requisite to the provision of professionally qualified personnel capable of contributing to safe and efficient vessel operations. Such personnel will help to ensure that full regard is given to the diverse tasks inherent in RIS activities.

7 STEPWISE DEVELOPMENT OF RIS

(1) The need to implement the desired service level of RIS depends on the outcome of the preliminary investigation in the planning process (chapter 6.4).

(2) An overview of the possible step-by-step development of the different parts of RIS is given in table 7.

(3) Because of the widely varying parameters, it is not possible to give general recommendations on RIS solutions for certain circumstances.

Table 7. Possible stepwise development of the different parts of RIS
(in italics: system tested, but not implemented yet)

Type of service		Step	System configuration	Chapter
1 Fairway information services	1.1 Voice communication shore/ship	1	Local nautical information by VHF at locks and bridges	5.1.2 (8)
		2	Central nautical information by VHF system with RIS centre	5.1.2 (8)
	1.2 Internet	1	Internet homepage with notices to skippers and water levels, static pages without content management system	5.1.3 (1)
		2	As no. 1, but additionally dynamic pages with content management system	5.1.3 (3)
		3	E-mail subscription of notices to skippers and water levels	5.1.3 (4)
		4	On demand, presentation of all fairway Information from port of departure to port of destination for route planning on one web page	5.1.3 (5)
	1.3 Electronic navigational chart	1	Electronic raster chart (scan from paper chart)	
		2	Inland ECDIS in information mode	5.1.4 (1)
2 Traffic information	2.1 Tactical traffic information (TTI) on board by radar, Inland ECDIS, and vessel tracking and tracing	1	TTI by radar	5.2.2 (1)
		2	TTI by radar and Inland ECDIS in navigation mode, only safety relevant objects in the ENC	5.2.2 (2)-(5)
		3	As no. 2, all objects in ENC	5.2.2 (6)
		4	Inland ECDIS as no. 3, additionally with water depths	5.2.2 (7)
		5	Inland ECDIS as no. 1, additionally with vessel tracking and tracing	5.2.2 (8)
	2.2 Strategic traffic information by ship reporting system	1	Database at RIS centre, reports via voice GSM, input in RIS centre manually	5.2.3 (5a)
		2	Database at RIS centre, reports via voice VHF, input in RIS centre manually	5.2.3 (5b)
		3	Database at RIS centre, initial reports via electronic ship reporting (data GSM), input in RIS centre automatically, position reports via voice VHF	5.2.3 (5c)

Table 7. Possible stepwise development of the different parts of RIS
(in italics: system tested, but not implemented yet)

Type of service		Step	System configuration	Chapter
		4	*As no. 3, add. reports on positions and ETAs via vessel tracking and tracing systems , input in RIS centre automatically*	5.2.3 (5d)
		5	Database at RIS centre, add. electronic data interchange between RIS centres	5.2.3 (9)
3 Traffic management	3.1 Vessel traffic services (VTS)	1	Shore based radar stations, VTS centre, Inland ECDIS with radar overlay	5.3.1 (1)
		2	As no. 1, Inland ECDIS with radar overlay and target tracking	5.3.1 (3)
		3	Inland ECDIS with vessel tracking and tracing information	5.3.1 (3)
	3.2 Lock and bridge management	1	Database for lock diary, registration of waiting times, local	5.3.3 (1a)
		2	As no. 1, add. data exchange with other locks	5.3.3 (1b)
		3	*As no. 2, add. transmission of waiting times to skippers (support of voyage planning)*	5.3.3 (1c)
		4	*Optimizing of lock circles by calculation of ETAs/RTAs for a chain of locks, emission of RTAs to skippers, input of positions of vessels by vessel tracking and tracing system*	5.3.3 (1d)
4 Calamity abatement support	4.1 Ship reporting system for certain types of vessels and compositions	1 - 5	System configurations as no. 2.2	5.4 (2)
	4.2 Ship reporting system for all vessels	1 - 5	System configurations as no. 2.2	5.4 (2)
5 Voyage planning	5.1 Fairway information	1	System configurations as nos. 1.1 – 1.3	5.5 (2)
	5.2 Lock/bridge management, transmission of RTAs and waiting times	2	*System configurations as no 3.2.4*	

8 RIS STANDARDIZATION PROCEDURES

(1) Standardization of RIS is needed because:

(a) Inland navigation does not stop at borders of countries.

(b) New IT developments in other modes of transport should be adopted in inland navigation in order to enable an integration of transport (multimodal transport on road, rail and waterway).

(c) The different RIS systems reach their full benefit only when they are harmonised.

(d) Suppliers of equipment will not start producing hardware and software for RIS, if the standards are not drawn up.

(2) RIS may be developed and operated, following internationally agreed standards, such as:

(a) These RIS Guidelines as a framework

(b) IALA Inland VTS Guidelines

(c) Inland ECDIS Standard

(d) Standard for Electronic Ship Reporting,

(e) Standard for Notices to Skippers,

(f) Standard for vessel tracking and tracing

(g) Inland radar requirements (future ETSI standard),

(h) Regional Arrangement Concerning the Radio Telephone Service on Inland Waterways.

(3) These standards should be developed in compatibility with the maritime world in order to enable mixed traffic in the estuaries of rivers.

(4) For each standard, world-wide working organizations (e.g. IHO, ITU, IEC, IALA, PIANC, UNECE) should be asked to undertake the workload of the development and maintenance of the standards and to work together in this field as it already happens.

(5) Organizations being already involved in maritime standardization should be asked to extend their activities to inland navigation, such as:

(a) IHO, IEC to Inland ECDIS

(b) IALA to Inland VTS

(c) PIANC to River Information Services

(d) ITU, IEC, IALA to Inland AIS,

(e) ITU to Inland VHF

(f) UNECE to special standards to be used in electronic ship reporting (e.g. UN/EDIFACT, UN/CEFACT).

(6) The international bodies like UNECE, EC, CCNR, DC and similar bodies in other parts of the world, are asked to adopt these standards.

(7) The national governments are asked to certify the equipment produced according to these standards.

(8) In the meantime, the national governments should co-operate in a bilateral or multilateral way to achieve the greatest amount of harmonization using all existing draft standards.

* * *

Annex 1
Inland ECDIS (electronic navigational chart)

(1) Inland ECDIS means Electronic Chart Display and Information System for inland navigation.

(2) Inland ECDIS (Edition 1.02, 2003) is the European standard for electronic navigational charts for inland navigation, adopted by the Central Commission for the Navigation on the Rhine, the Danube Commission, and the UN Economic Commission for Europe.

(3) The Inland ECDIS standard has five sections corresponding to the maritime ECDIS Standard:

1 Performance standard (according to IMO A.817(19))

2 Data standard (additions to IHO S57)

3 Presentation standard (additions to IHO S52)

4 Operational and performance requirements, methods of testing and required test results (according to IEC-1174)

5 Glossary of terms

(4) Inland ECDIS is compatible with maritime ECDIS, that means:

(a) Inland vessels sailing in maritime waters with Inland ECDIS equipment get all maritime ENC information.

(b) Sea going vessels sailing in inland waters with maritime ECDIS equipment get all information being equal to marine information (e.g. river banks), but they do not get the additional inland information (e.g. inland notice marks).

(5) Sea-river vessels are recommended to use the additional Inland ECDIS software libraries in order to get full Inland ENC information.

(6) Inland ECDIS should use chart information (ENC) as specified by the IHO S57 Standard (edition 3.0) with the additions of the Inland ECDIS Standard.

(7) The presentation should be in accordance with the IHO S52 Standard (edition 3.0) and with the amendments of the Inland ECDIS Standard.

(8) Inland ECDIS may be used in *navigation mode* or in *information mode*.

(9) *Navigation mode* means the use of Inland ECDIS with traffic information by radar overlay. Inland ECDIS in navigation mode may be operated in three configurations:

1 Separate installation of Inland ECDIS and radar equipment; the latter sending the radar signal to the Inland ECDIS computer

2 As before, but only one monitor used

3 Radar equipment with integrated Inland ECDIS functionality. It is recommended to develop and use this configuration in the future.

(10) *Information Mode* means the use of Inland ECDIS without traffic information by radar overlay. For an Inland ECDIS application designed for Information Mode only, the requirements of navigation mode are to be understood as recommendations.

(11) In the navigation mode, an Inland ECDIS (operating system software, application software and hardware) should have a high level of reliability and availability at least of the same level as other means of navigation.

(12) Inland ECDIS equipment for navigation mode should be certified by the competent authority.

* * *

Annex 2
Electronic ship reporting in inland navigation

(1) The Standard for Electronic Ship Reporting in inland navigation has been adopted by the Central Commission for the Navigation of the Rhine, and is also to be adopted by UNECE.

(2) Ship reporting is needed for strategic traffic information service, traffic management and calamity abatement support. Being an alternative to paper or voice reporting, electronic reporting facilitates the data interchange between vessels and traffic centres. Moreover, the regulations of electronic ship reporting enable the traffic centres of different authorities to exchange the data electronically.

(3) The standard provides rules for the interchange of electronic messages between partners in the field of inland navigation. Authorities and other parties concerned (ship owners, skippers, shippers, ports, terminal operators) shall exchange data in conformity with the standard.

(4) In electronic ship reporting, information is exchanged using messages. The standard describes the following messaging procedures:

1 Ship-to-authority messaging
   (a) Transport notification
   (b) Arrival notification and position report (not dealt with in detail)
2 Authority-to-authority messaging
3 Authority-to-ship messaging.

(5) All message definitions are based on the UN/EDIFACT standard.

(6) The ERINOT message (*Electronic reporting international notification*) is used for transport notification (1.a) and for authority-to-authority messaging (2) in inland navigation. ERINOT is derived from the UN/EDIFACT *International forwarding and transport dangerous goods notification (IFTDGN 98B)* message. It is compatible with the PROTECT 1.0 message used by North European ports. This procedure ensures that conformity between maritime and inland navigation is granted for dangerous and polluting goods. Using some liberties of the IFTDGN message, the ERINOT message has been extended to allow non-dangerous goods to be notified. This feature allows putting all data of the transport or voyage notification in one single message.

(7) The ERI response message ERIRSP is used for authority-to-ship messaging. ERIRSP is derived from the UN/EDIFACT APERAK message.

(8) In order to minimize interpreting work to be done by the receivers of messages, classifications and code lists should be used to the highest possible extent. Existing codes should be used in order to avoid special work to be done for the assembling and maintenance of new code lists. The following classifications can be used in inland ship reporting:

1 UN codes for types of means of transport (UN/CEFACT, Recommendation No. 28)
2 CCNR official ship number (official ship number also is to be established by UNECE)
3 IMO ship identification number (IMO resolution A.600/15), SOLAS chapter XI, reg 3)
4 AVV electronic reporting number (ERN, used for ship identification)
5 WCO harmonized commodity description and coding system 2002 (HS Code, for goods description)
6 EUROSTAT combined nomenclature (CN code, for goods description)
7 EUROSTAT standard goods classification for transport statistics/revised (NST/R) (for goods description) [6/]
8 UN dangerous goods number (UNDG)
9 IMO international maritime dangerous goods code (IMDG)
10 UNECE ADN, CCNR ADNR and DC ADN-D (for dangerous goods)
11 ISO country code (ISO ALPHA-2 Code, International Standard ISO 3166-1)
12 UN codes for ports and other locations (UN/LOCODE) (UN/CEFACT, Recommendation No.16)
13 Fairway section code (National administrations of waterways)
14 Terminal code (National administrations of waterways)
15 ISO freight container size and type code (International Standard ISO 6364, chapter 4 and annexes D and E)
16 ISO container identification code (International Standards ISO 668, ISO 1496, ISO 8323)
17 UN codes for passengers, types of cargo, packages and packaging materials (UN/CEFACT, Recommendation No.21)

(9) The location is given in the following subfields:

1 ISO country code (2 characters),
2 UN location code (3 characters),
3 Fairway section code (5 characters),
4 Terminal code (5 characters),
5 Fairway section hectometre (5 characters).

The subfields are not needed all the time. But the location must be given unique which can happen in different ways depending on the purpose of reporting and the local situation.

(10) The standard recommends that every authority should accept messages in accordance with the message specification as plain text or as an attachment of an e-mail.

* * *

[6/] Since the 4-digit NST/R codes of the different countries are not compatible, it is recommended to use the common HS code of the World Customs Organization for cargo description.

Annex 3
Notices to skippers by electronic data transmission in inland navigation

(1) Fairway information is given by voice report via the radiotelephone service on inland waterways (VHF) or by data transmission using the TCP/IP protocol (Internet, e-mail, SMS).

(2) The European Standard for Notices to Skippers provides rules for the fairway information by data transmission. Using a standard vocabulary in combination with code lists, the standard enables the automatic translation of the messages into other languages to a high extent.

(3) The message language is Extended Markup Language (XML), enabling easy handling by the receiver of the message. The XML message specification has four sections:

1 Message identification
2 Fairway and traffic related messages
3 Water level related messages
4 Ice messages.

(4) In order to enable a broad applicability, the XML message definition contains a wide range of data elements. The message is structured in entities (tags), such as sections, groups, subgroups and data elements. Not all of the entities will be needed at any waterway or can be delivered with reasonable manpower. Therefore, it is distinguished in the XML message specification between mandatory and conditional groups and data elements. Mandatory are entities that are needed:

- For the definition and interchange of the message (section 1)
- For a minimum of information (sections 2 to 4).

At least one of the above-named sections 2 to 4 has to be used in a message. In section 2 the messages can be related to a waterway section or to an object (e.g. bridge, lock).

(5) In section 2, the message contains one conditional data element for free text (string) in the original language that will not be translated automatically. The use of free text should be restricted to a minimum. All other data elements are encoded.

(6) The defined codes are (examples for values in brackets)

1 Barrage code (barrage closed, barrage opened, ...)
2 Communication code (telephone, VHF, ...)
3 ISO country code, ISO 3166-1 (CH, AU,.....)
4 Direction code (all directions, upstream, ...)
5 Ice condition (light solid ice, medium spread floating ice to 40% covered.....)
6 Ice accessibility (low traffic, no navigation without breaking, ...)

7 Ice classification (navigable, fairly navigable, ...)

8 Ice situation (no limitation, limitation, no navigation allowed)

9 Interval code (continuous, daily, ...)

10 Language code (see ISO 639)

11 Limitation code (blockage, partial obstruction, ...)

12 Measure code (discharge, water level, vertical clearance.....)

13 Position code (all, left, ...)

14 Reason code (event, work, dredging, high water, ...)

15 Reference code (WGS84, NAP, Adria, NN, GlW, RNW .....)

16 Regime code (normal, high, ...)

17 Reporting code (information, regular duty to report, ...)

18 Subject code (dredging; work,.....)

19 Target group code (commercial vessels, pleasure craft)

20 Type code (river, lock, ...).

(7) The full texts to the codes are given in English and several other European languages.

(8) The competent authorities should provide notices to skippers in XML format downloadable in the Internet. Internet services shall provide a possibility to select data sets for the download by waterway section and time of validity. In addition, the participating parties (authorities) can agree on the procedures of transmitting the XML messages by push and pull services directly from the XML server.

* * *

Annex 4

Inland AIS (transponders)

being one of the systems that can be used in vessel tracking and tracing [7/]

(1) The Automatic Identification System (AIS) is a ship borne radio data system, exchanging static, dynamic and voyage related vessel data between equipped vessels and between equipped vessels and shore stations. Ship borne AIS stations broadcast the vessel's identity, position and other data in regular intervals. By receiving these transmissions, ship borne or shore based AIS stations within the radio range can automatically locate, identify and track AIS equipped vessels on an appropriate display like radar or Inland ECDIS. AIS systems are intended to enhance safety of navigation in ship to ship use, surveillance (VTS), vessel tracking and tracing, and calamity abatement support. Several types of AIS stations can be distinguished:

(a) Class A mobile stations to be used by all sea going vessels falling under the IMO SOLAS chapter V carriage requirements,

(b) Class B mobile stations with limited functionality to be used by e.g. pleasure crafts,

(c) Class A derivatives, having full class A functionality on VDL level, may deviate in supplementary functions and can be used by all vessels not falling under IMO carriage requirements (e.g. tugs, pilot vessels, inland vessels (to be called *Inland AIS* in this document),

(d) Base stations, including shore based simplex and duplex repeater stations.

(2) An Inland AIS station consists in general of the following components:

(a) VHF transceiver (1 transmitter/2 receivers)

(b) GNSS receiver

(c) Data processor.

(3) Universal ship borne AIS, as defined by IMO, ITU and IEC, and recommended for the use in inland navigation, uses self-organized time division multiple access (SOTDMA) in the VHF maritime mobile band. AIS operates on the internationally designated VHF frequencies AIS 1 and AIS 2.

(4) A characteristic of AIS is the *autonomous mode*, using SOTDMA without any need for an organizing master station. The radio protocol is designed in a way that vessel stations operate autonomously in a self-organized manner by exchanging link access parameters. Time is divided into 1 minute frames with 2,250 time slots per radio channel which are synchronized by GNSS. Each participant organizes its access to the radio channel by choosing free time slots considering the future use of time slots by other stations. There is no need for a central intelligence controlling the slot assignment.

[7/] The requirements will be defined within the standard for vessel tracking and tracing by the European expert group in 2004.

(5) System regulations for maritime AIS are:

(a) IMO Resolution MSC.74(69) annex 3: Recommendation on performance standards for AIS

(b) ITU Recommendation ITU-R M1371: Technical characteristics for an universal ship borne automatic identification system, using time division multiple access in the VHF maritime mobile band

(c) IALA Technical clarifications on recommendation ITU-R M.1371-1

(d) IEC 61993-2 Automatic identification systems (AIS) part 2: class A ship borne equipment of the universal ship borne automatic identification system (AIS)

(e) IALA Guidelines on the automatic identification system (AIS).

(6) For seagoing vessels, AIS became a carriage requirement in July 2002, according to the SOLAS Convention.

(7) Vessel tracking and tracing systems in inland navigation shall be compatible with maritime AIS, as defined by IMO. Therefore, AIS messages should contain:

(a) Static information, such as official ship number, call sign of vessel, name of vessel, type of vessel

(b) Dynamic information, such as vessels position with accuracy indication and integrity status

(c) Voyage related information, such as length and beam of vessel combination, hazardous cargo on board (blue cones/lights according to ADN/ADNR/ADN-D), estimated time of arrival (ETA).

(8) For moving vessels an update rate for the position information on tactical level should be similar to the update rate of the radar. For vessels at anchor it is recommended to have an update rate of several minutes, or if information is amended.

(9) The following modes of operation can be distinguished:

(a) Ship – ship operation: All AIS equipped vessels are able to receive static and dynamic information from all other AIS equipped vessels within the radio range.

(b) Ship – shore operation: Data from AIS equipped vessels can also be received by AIS base stations connected to the RIS centre where a traffic image (TTI and/or STI) can be constructed.

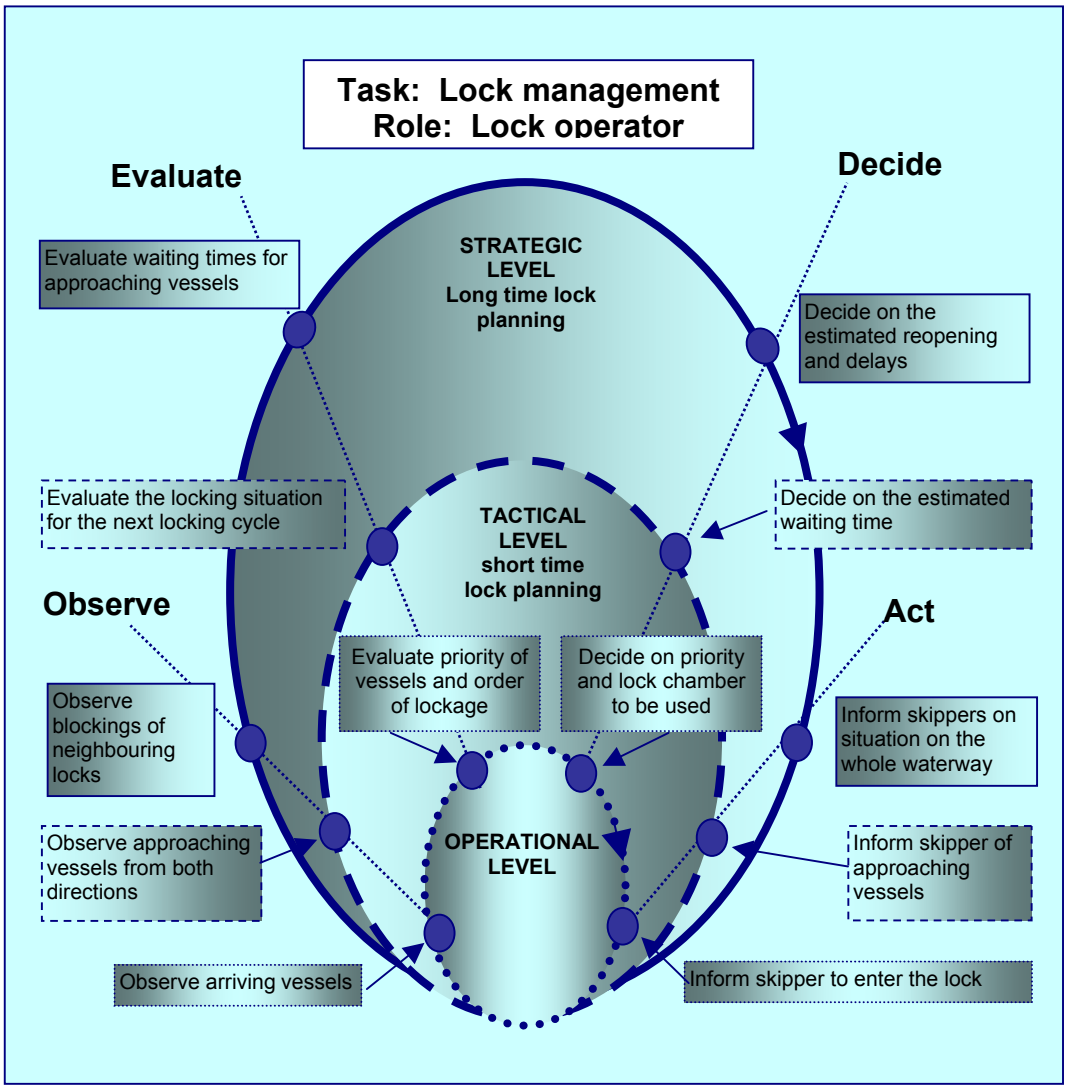
(c) Shore – ship operation: safety related data from shore to vessel can be transmitted.

(10) AIS is an additional source for navigational information. AIS does not replace, but supports navigational services such as radar target tracking and VTS. AIS has its strength as a means of surveillance and tracking of vessels equipped with it. Due to their different characteristics, AIS and radar complement each other.

* * *

Annex 5

Example of an information processing loop to chapter 4.4



* * *

Annex 6

SOME RIS RELATED WEB SITES

- Administratie Waterwegen en Zeewezen, Belgium, Flanders: www.awz.be
- Central Commission for the Navigation of the Rhine: http://www.ccr-zkr.org
- C-Map Norway AS (Inland ENC production): www.c-map.no
- COMPRIS (Consortium operational management platform RIS of the EU 5th Framework Programme): www.euro-compris.org
- Danube Commission: www.danubecom-intern.org
- Danube RIS in Austria: www.doris.bmvit.gv.at
- Electronic Waterway Information System, Germany: www.elwis.de
- Federal Waterway Authority, Germany: http://www.wsv.de
- Finnish Maritime Administration: www.fma.fi
- International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA): www.iala-aism.org
- International Navigation Association (PIANC): http://www.pianc-aipcn.org
- Ministerie Verkeer en Waterstaat, The Netherlands: (http://www.minvenw.nl)
- NoorderSoft (route planner): http://noordersoft.com
- Office de promotion des voies navigables, Belgium: http://www.opvn.be
- Open ECDIS Forum on the development of Inland ECDIS: www.openecdis.org/discussion/InlandECDIS/
- Österreichisches Bundesministerium für Verkehr, Innovation und Technologie: http://www.bmvit.gv.at
- Promotie Binnenvaart Vlaanderen, Belgium: http://www.binnenvaart.be
- Rijkswaterstaat, The Netherlands (RIZA): http://www.waterland.net/bericht/scheepv
- SevenCs AG & Co. KG (ECDIS tools, ECDIS applications, Inland ENC production): http://www.sevencs.de
- Transas Data Co Ltd. (electronic charts): http:///www.transas.com
- Tresco Engineering (ECDIS applications, Inland ENC production): http://www.tresco.be
- Tresco Navigation Systems (ECDIS applications, Inland ENC production): http://www.tresconavigationssystems.com
- UN/CEFACT: http://www.unece.org/cefact/
- UN/EDIFACT: http://www.unece.org/trade/untdid/welcome.html
- United Nations Economic Commission for Europe (Working Party on Inland Water Transport): http://www.unece.org/trans/main/sc3/sc3/sc3fdoc.html
- US Army: www.usace.mil
- US Coast Guard: www.uscg.mil
- via donau, Austria: www.via-donau.org
- Voies Navigables de France: http://www.vnf.fr
- Waterman Thematic Network of the EU 5th Framework Programme: www.waterman-ts.net

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