



DIWA Report

Sub-Activity 4.2: Rules and regulation

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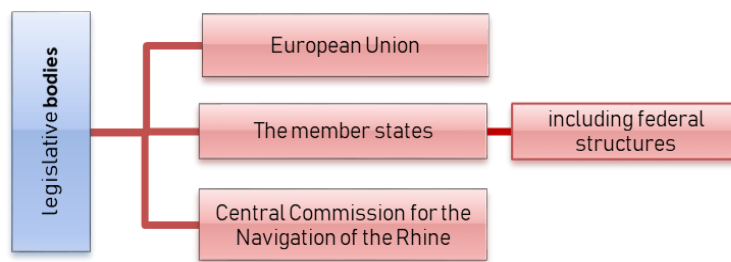


1 Executive summary

In the Sub Activity Rules & Regulation, an inventory of existing laws within the EU in the area of IWT was carried out and the new technologies or business models were checked for their compatibility with the existing rules.

A deliberate attempt was made to limit the work to technical and legal expertise and to distance itself from political will. Therefore, all proposals are either based on existing foundations or are inherent to the system.

1.1 Inventory – summary



Essentially, laws in IWT in the EU are created by the institutions listed above. Because DIWA is an international project within the EU, the following considerations are limited to the legal landscape of the EU. Moreover, a consideration of national laws would go beyond the scope and offer little added value.

At the EU level, the following topics are legally regulated in the IWT area:

- eFTI regulation
- Rules for promoting inland waterway transport in the EU
- Qualifications of crew members
- Inland transport of dangerous goods
- Inland navigation: access to the market
- Inland Waterways — Vessels
- Inland waterways — river information services (RIS)
- EU statistics of goods transport by inland waterways

In addition, there are also general rules at the EU level that are relevant for IWT:

- GDPR
- Open data directive

Looking at the overview above, it is noticeable that many areas are not regulated at the European level. For example:

- Traffic regulation
- Liability
- Crew requirements for vessels
- Smart shipping

There are also many different regulations for the exchange of data such as eFTI or RIS. In this respect, the legal structure is very confusing for the user.



1.2 Smart Shipping: recommendation

To enable Smart Shipping, existing rules have to be partially adapted and new rules have to be created. In order to understand the recommendations, the terminology is first explained in order to avoid misunderstandings. The following terms are used.

Assistance systems are systems that in some way facilitate or partially take over the work of the skipper. This includes, for example, the tracking pilot. Assistance systems are already in use today. They rarely cause legal problems as long as they are not intended to establish privileges. Therefore, they are only mentioned when they are expected to cause legal implications.

Remote operation allows the skipper to navigate the vessel by remote control. Accordingly, basically "only" the skipper's workplace is decoupled from the vessel.

Platooning involves a convoy. However, the convoy is not physically connected. Rather, one ship sails ahead and the ships behind automatically steer to the positions of the first ship. In contrast to a physically connected convoy, all ships are motorized.

In **autonomous sailing**, the ship can drive and move without human intervention. Human intervention is only required in case of malfunctions or similar.

Smart Shipping is a generic term and covers all the concepts above.

In the area of smart shipping, the legislature will not be able to avoid the decision to either introduce new rules to enable it or to counter smart shipping. In the overview below, it can be seen which areas would need to be changed for which smart shipping technology.

Adaptation or supplementation of the existing legal situation necessary?				
Topic	autonomous shipping	platooning	remote control	assistance systems
Technical requirements ship	yes	?	yes	partial
Crew requirements	yes	yes	yes	partial
Liability	yes	yes	yes	no
Qualification of crew	no	yes	yes	no
Traffic rules	?	yes	no	no
Police actions	yes	yes	yes	no
Responsibility	yes	yes	yes	no
Documents	yes	yes	yes	no

From the listed overview, the scope of the legislative challenge is presented. If the legislature is committed to enabling smart shipping, which is exclusively a political decision, then the following recommendations are proposed:

- General framework conditions must be established in a timely manner that are binding for smart shipping entities. No false incentives should be created here. Criteria for testing new technologies must also be created. These must illuminate the critical points of a technology.
- If a technology fulfils the legal requirements, entities in smart shipping should have a clear perspective, Therefore a clear procedure must be created, e.g. test phase, evaluation and final technical approval.
- New technologies are developing rapidly. Legislators should find a way to address these as quickly as possible. The new technologies will always represent a potential on the one hand and a possible security risk on the other. Therefore, the legislator will predictably and

regularly be confronted with a certain degree of uncertainty. General procedural structures should be developed to speed up the process. International cooperation should also be regulated to enable cross-border testing.

- Because inland navigation very often takes place across borders, the member states should at least agree on certain definitions in order to ensure easily comprehensible rules for shipping.

1.3 Privacy of employees

Ships are increasingly monitored with sensors. As a result, a vessel's employees are also monitored or can be monitored. The legislator is called upon to enable sufficient monitoring of vessels. However, the legislator must also intervene if employees are monitored to an inadmissible extent.

1.4 Documents in IWT

In IWT, the skipper must carry many documents on the vessel. The legislator is challenged to decide whether an online platform can be created on which the documents can be deposited and thus made available to the competent authorities. In this way, police checks could be made easier and more efficient. In addition, smart shipping technologies will increasingly be used to separate the skipper from the ship or to physically separate the skipper from the ship. However, this development is not legally mandatory. The decision is purely political.

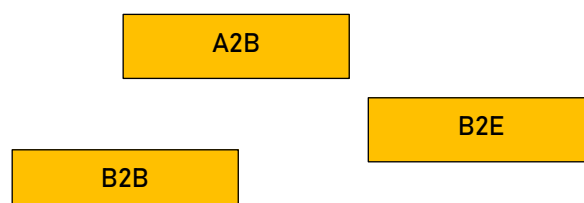
2 Introduction

Every technological development as well as new business models in IWT offer risks and opportunities. Legislators must rise to the challenge of minimizing risks and favouring potentials. In doing so, the legislator can enable new developments where these are not yet legally permissible, as well as intervene where developments are harmful.

The question of which potentials to promote and when to avoid risk are matters of political will. Politicians are responsible for setting goals and weighing up opportunities and risks. All recommendations are based on technical and legal expertise, not on personal views. Recommendations are based on systemic limits or other logical boundaries. Therefore, no technology such as the remotely operated ship in SuAc 2.1 or another technology of smart shipping is recommended in this report. The adjustments to the existing legal structures that would be required to implement the technology will be examined.

In terms of content, European law is the subject of this report. The great advantage of EU law is that it is equally effective for all states of the EU and in particular the countries of the project participants. European law offers the essential opportunity to regulate new developments uniformly within the EU. A look at national regulations may offer suggestions, but it goes beyond the scope of the project and also does not help to consider developments that have not been taken into account so far.

In order to illustrate the scope of the legal implications, it is worth taking a look at the different legal relationships¹:



¹ Authority to business (A2B); Business to employee (B2E); Business to business (B2B).

The overview shows that new technologies and business developments like those of Ac 2 and 3 can have an impact on very different legal relationships. These legal relationships can take very different forms, depending on the sector in which the party concerned operates. In the area of A2B, a considerable need for change by the legislator will be required, especially in the area of smart shipping. All legal structures, but also the (digital information about the) infrastructure of the waterways must be checked for compatibility and changed if necessary. The situation is different in the B2B area, where data is exchanged between commercial/business stakeholders. In this area, there are already regulations such as the GDPR. For the legislator, there is no immediate need for concrete action. However, it will be necessary to monitor the market within inland navigation and to counteract undesirable developments in IWT.

As mentioned at the beginning, all developments are judged against the existing rules. Often the technical and business developments are incompatible with existing rules. Although problems are pointed out, these should not give the impression that the developments are impossible. They are merely intended to identify the possible need for adaptation and recommendations. All specific recommendations are based on the principles of existing laws and logical development. Of course, legislators are free to depart from existing legal principles and establish entirely new structures and principles. Certainly, it is expedient to make new considerations. Thus, the legislator can, of course, depart from the existing safety standards in the field of IWT and establish new stricter or looser ones. However, these considerations have been avoided because they belong to the realm of private opinion and not to professional expertise. However, this circumstance must in no way be understood as discouraging new structures or principles. Fundamental changes are, of course, only possible if someone sets them in motion.

3 Objectives and work approach of SuAc 4.2 Rules and regulations

The objectives, tasks and expected results for this Sub-Activity are outlined in the following subchapters.

3.1 Objective

The objective of SuAc 4.2 is to give an overview of obligations and restrictions but also advise on measures to be taken to evolve the legal and regulatory framework in the context of the Masterplan Digitalisation of Inland Waterways.

3.2 Tasks

Following tasks were identified in order to meet the objective of SuAc 4.2:

- Make an inventory and study on EU RIS Directives, national and international rules and regulations as well as on national rules and regulations of the participating partners in relation to the business development, as defined in activity 2, and the technological developments, as defined in activity 3, that are under development or implemented and assess the effects on the digital transition in the period 2022-2032.
The party responsible for this is the SuAc leader GDWS.
- Execute an impact analysis on the effects for the digital transition in the period 2022-2032.
The party responsible for this is the SuAc leader GDWS.
- Draft the report (study) on the inventory and study on “the legal and regulatory framework” and proposals for measures to be taken in relation to the Masterplan Digitalisation of Inland Waterways.
The party responsible for this is the SuAc leader GDWS.



3.3 Expected Results

Intermediate report (study) on an inventory on EU Directives, rules and regulations that have an impact on the development of services and technologies. It will lead to an overview of obligations and restrictions but also advise on measures to be taken in the context of the Masterplan Digitalisation of Inland Waterways.

3.4 Work approach

This report was drafted during several meetings with the members of this Sub Activity. During the Kick-Off meeting a brainstorm session fed by ideas from the Work Program, SuAc Members and input for DIWA Activity 2 and 3 resulted in a list of interesting topics. These topics were investigated via Desktop Research, and the results were presented and discussed in workshops with members of the Masterplan DIWA program in the period of June 2022 to May 2023.

3.5 Interdependencies with other sub-activities

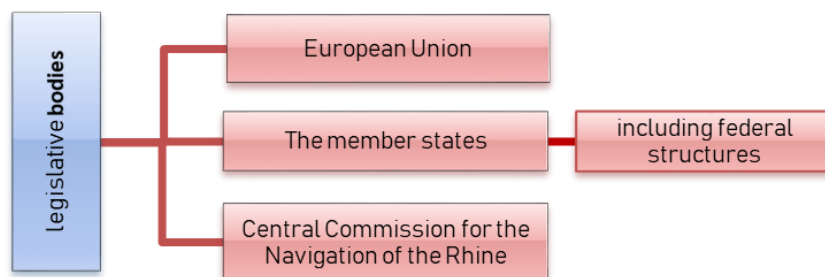
In activity 2 (business developments) and activity 3 (technological developments) a number of legal challenges and issues were identified that are addressed in this report. Noticeable is the large number of topics on Smart Shipping as this development causes the most legal challenges.



4 Inventory

Digitalisation is change. Before change, it is essential to take a look at the status quo. The inventory is intended to illustrate the legal architecture. On this basis, it can then be considered which development can be implemented, how and where.

4.1 Legislative bodies



Essentially, laws are created by three types of institutions: EU, member states and by virtue of international agreements.

The EU can introduce regulations or directives in the field of IWT. A regulation has direct effect. This means that it can directly establish obligations or claims. This is different with a directive. A directive obliges the member states to transpose certain legal regulations into national law themselves. Each state therefore has leeway as to how the rules are to be implemented in national law, like the RIS directive². In principle, the directive itself does not create any claims or obligations. This effect only takes place when the directive is transposed into national law. Technically, the EU can also delegate certain regulations to committees. In those cases, a directive stipulates that a committee sets technical standards. In the field of IWT, the CESNI committee was authorized, for example, to issue regulations in the area of crew members' qualifications or technical standards. The main legal basis of the EU for directives or regulations is Art. 91 TFEU.

To the extent that the EU does not make any regulations, the member states can establish rules for the waterways themselves. It should be noted that the member states can be organized very differently. For example, a state can be organized centrally or federally.

Germany, for example, is organized on a federal basis. Very basically, there are three levels in Germany:

- Federal Administration ("Bundesverwaltung")
- State Administration ("Verwaltung der Bundesländer") and
- Local government ("Kommunalverwaltung").

² Direction EU 2005/44.

Depending on which territorial authority an inland waterway is assigned to, different rules may exist. For example, the Rhine is partially assigned to the federal state of Baden-Württemberg and the federal administration.

In addition, legislation can be transferred to an institution by virtue of an international agreement. The most prominent transfer of legislative competence in the IWT is the CCNR. It can create laws for the Rhine.

4.2 Legislative competence

In principle, legislative competence lies with the member states of the EU. However, the EU member states are not completely free to legislate. The legislative competence is limited by existing regulations of the EU.³ Therefore, national laws must be compatible with, for example, fundamental freedoms or the European Convention on Human Rights. There are also general laws such as the GDPR that must be observed. The EU can enact laws in the area assigned to it. In principle, laws of the EU enjoy priority of application over national laws.

4.3 Existing regulations in IWT

In this section the existing rules of the EU in the field of IWT are presented. A distinction can be made between rules that apply exclusively to the IWT area and general EU rules that exert a significant influence. In view of the fact that the need for legal adaptation varies considerably, not all SuAcs were addressed in equal detail. Nevertheless, many essential issues were addressed.

In order to provide a comprehensive overview of the existing regulations, all relevant EU regulations in IWT have been described. Even though individual regulations may not be relevant to the desired digitalisation at first glance, they can become relevant at a second glance, for example, when it comes to the introduction of new regulations.

4.3.1 eFTI regulation

eFTI (Electronic Freight Transport Information) is one of the interesting initiatives concerning (decentralized) data sharing and information exchange. The Regulation on electronic Freight Transport Information (eFTI)⁴ aims to encourage the digitalization of freight transport and logistics to reduce administrative costs, improve enforcement capabilities of competent authorities, and enhance the efficiency and sustainability of transport. The eFTI Regulation establishes the legal framework for electronic communication of regulatory information between the economic operators concerned and competent authorities in relation to the transport of goods on the territory of the Union.

The eFTI regulation is extensively explained in DIWA SuAc 3.2 report. A short summary is added in this report.

4.3.1.1 Overview of the content of the regulation

The European Parliament and the Council of the European Union (EU) approved the Regulation on electronic freight transport information (eFTI) 2020/1056, which has been published in the Official Journal of the EU on the 15th of July 2020 and entered into force in August 2020. As of 21st of August 2024 it will become fully applicable (see Figure 1).

³The EU was empowered in advance by the member states under the TEU and the TFEU to adopt these priority rules.

⁴ Regulation (EU) 2020/1056 of the European Parliament and of the Council of 15 July 2020 on electronic freight transport information



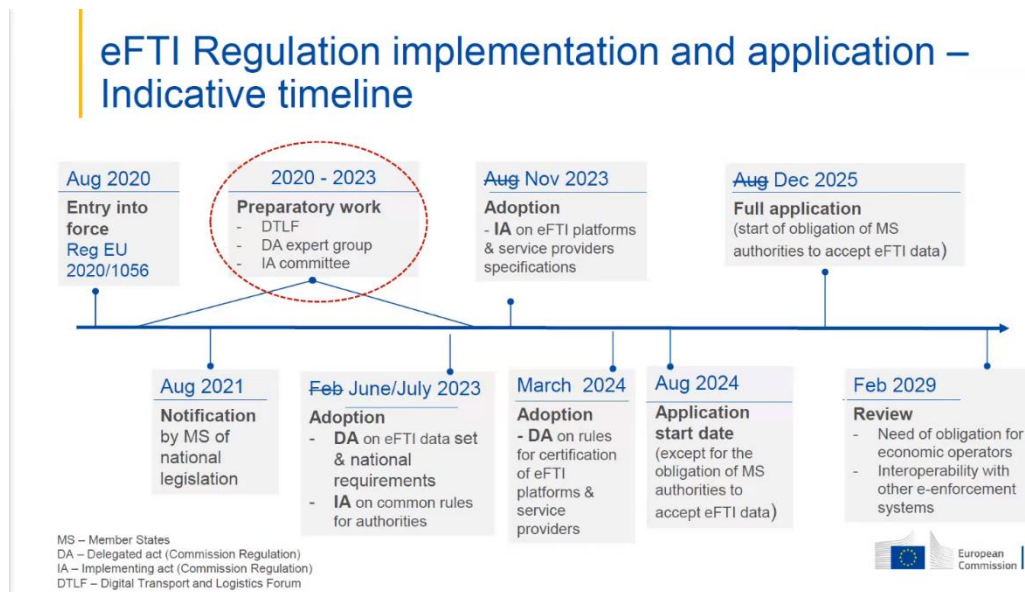


Figure 1: Detailed timeline of eFTI implementation –23/3/2023⁵

The movement of goods, including waste, is accompanied by a large amount of information which is often still exchanged in paper format among businesses, and between businesses and competent authorities. The use of paper documents represents a significant administrative burden for logistics operators and an additional cost for logistics operators and related industries (such as trade and manufacturing), in particular for small and medium-sized enterprises, and has a negative impact on the environment.

The aim of the new Regulation (EU) 2020/1056 is to encourage the digitalization of freight transport and logistics to reduce administrative costs, improve enforcement capabilities of competent authorities, and enhance the efficiency and sustainability of transport.

Therefore, the eFTI Regulation establishes the legal framework for electronic information exchange/provision between the economic operators and the related authorities on the movement of cargo in the European Union. The information concerned is that required by specific EU and national legislation to prove compliance with EU and national rules on the movement of goods by rail, road, inland waterways and air.

The current legal framework requires some transport documents to be on board in an analog form or in PDF format in case of control activities by respective authorities. In the eFTI approach this transport information shall be made available by a pull mechanism accessible at any time and location via an access point (but only to the persons with the proper authorization).

4.3.1.2 Overview of the content of the regulation

Essential elements of this legal framework are the functional requirements applicable to an eFTI platform, which should be used by economic operators to make regulatory freight transport information available to competent authorities in electronic form in order to meet the conditions for the mandatory acceptance of this information by competent authorities.

This eFTI-platform can be foreseen as a new building block to be developed by the economic operator in its existing inhouse system. But it is expected that most economic operators shall make use of a “ready-to-use” eFTI platform put in place by a service provider. This eFTI platform can also be based on an existing IT platform that is enriched to become eFTI compliant.

The legal framework also includes requirements for third-party platform service providers (eFTI service providers).

⁵ Source: EU Commission, Presentation about EU Regulation on eFTI & DTLF; unece.org

All those requirements shall ensure that all eFTI data can be processed solely in accordance with a comprehensive rights-based access-control system that provides assigned functionalities, that all competent authorities can have immediate access to that data in accordance to their respective regulatory enforcement competences.

To build confidence and ensure EU-wide compatibility, eFTI platforms have to be certified by an accredited external body.

The European Commission is empowered to adopt delegated acts to supplement Regulation (EU) 2020/1056 by laying down rules:

- on the certification of eFTI platforms
- on certification of eFTI service providers

The Commission shall also adopt delegated acts no later than 21 February 2023⁶ to supplement this Regulation by establishing and amending the eFTI common data set and eFTI data subsets in relation to the respective regulatory information requirements referred to in Article 2(1), including corresponding specifications on the definition and technical characteristics for each data element included in the eFTI common data set and eFTI data subsets.

4.3.1.3 Understanding what an eFTI platform is

An eFTI platform is an approved electronic portal that can be accessed by a national authority to retrieve information made available by an economic operator. eFTI platforms need to comply with certain functional requirements to ensure, among others, data authenticity, integrity and cybersecurity. The related service providers must meet a set of requirements (keep data for a certain period of time, provide access to authorities, secure data) and receive certification.

Each economic operator may use an eFTI (certified) platform of its choice. The certification of these platforms is conducted by competent bodies accredited in the different member states on the basis of the common requirements set out by the regulation.

The economic operator is encouraged to use an eFTI platform but has no obligation to do so. If it does not use an eFTI platform, it can continue to behave “the old way”. However, if it uses a certified eFTI platform, the receiving authority will not be authorized to refuse to receive the data this way once the regulation is fully applicable 30 months after the date of entry into force of the first of the delegated and implementing acts on the eFTI common data set and eFTI data subsets, and the common procedures and rules for access (which will be December 2025 under the current timeline from the EU).

One of the most important features of the eFTI platform is the access-right management. On the one hand, the data shall be made available at any time to any third party⁷ that has the right to access it. This is also called the “pull” mechanism, meaning that the competent authority does not “receive” the data but needs to fetch the data from the correct eFTI platform using the identifying link (URI) provided by the economic operator. It is worth mentioning that neither the economic operator nor the eFTI platform needs to intervene when the data is accessed. But on the other hand, the eFTI platform shall also block any unauthorized access to data. In other words, not ALL competent authorities can access ALL the data, and the eFTI platform needs to implement who can access what.

The following **requirements** apply for **eFTI platforms** (article 9 (1)):

- a) personal data can be processed in accordance with Regulation (EU) 2016/679;
- b) commercial data can be processed in accordance with Article 6;

⁶ Directive set the deadline on February 21st 2023, but that deadline was postponed by the EU

⁷ In particular the national authorities, but not only. However, this platform is only intended for B2A (Business to Administration)



- c) competent authorities can access and process data in accordance with the specifications adopted by means of delegated and implementing acts referred to in Articles 7 and 8;
- d) the economic operators concerned can make information available to competent authorities in accordance with Article 4;
- e) a unique electronic identifying link can be established between a shipment and the related data elements, including a structured reference to the eFTI platform where the data is made available, such as a unique reference identifier;
- f) data can be processed solely on the basis of authorized and authenticated access;
- g) all data processing is duly recorded in operation logs in order to allow, as a minimum, the identification of each distinct processing operation, the natural or legal person having made the operation and the sequencing of the operations on each individual data element; if an operation involves modifying or erasing an existing data element, the original data element shall be preserved;
- h) data can be archived and remain accessible for competent authorities in accordance with the relevant EU legal acts and national law laying down the respective regulatory information requirements;
- i) the operation logs referred to in point (g) of this paragraph are archived and remain accessible for competent authorities for auditing purposes for the period of time specified in the relevant EU legal acts and national law laying down the respective regulatory information requirements and, for monitoring purposes, for the periods of time referred to in Article 17;
- j) data is protected against corruption and theft;
- k) the data elements processed correspond to the eFTI common data set and to eFTI data subsets as established by the delegated acts referred to in Article 7, and can be processed in any of the official languages of the EU as provided for by the relevant EU legal acts and national law laying down the respective regulatory information requirements.

The following **requirements** apply for **eFTI operators**:

- a) data is processed only by authorized users and according to clearly defined user role and processing rights within the eFTI platform, in accordance with the relevant regulatory information requirements;
- b) data is stored and accessible for an appropriate period of time, in accordance with the relevant regulatory information requirements;
- c) authorities have immediate access to regulatory information concerning a freight transport operation processed by means of their eFTI platforms, when this access is given to the authorities by an economic operator concerned;
- d) data is appropriately secured, including against unauthorized or unlawful processing and against accidental loss, destruction or damage.

4.3.1.4 Certification of an eFTI platform

Before it can be used by an economic operator, an eFTI platform needs to be certified. The member states decide the conformity assessment bodies that are accredited to conduct the certification assessments.

Article 9 of the Regulation gives the functional requirements for eFTI platforms. There is a set of general functionalities that are described (including the access-right management), but for the details, the Regulation stipulates that the European Commission shall adopt implementing acts “*taking into account relevant existing technical solutions and standards*” before 21 August 2023.



4.3.1.5 Applicability to IWT

During the evaluation of the eFTI regulation by the IWT authorities, it became clear that the co-existence of eFTI and ERI⁸ was not self-evident. Indeed, in the inland waterway transportation domain a significant part of the reporting of freight transport information is already performed via electronic means using the ERI messages sent from the economic operator towards the competent authority, i.e. a “push” mechanism. As the eFTI regulation requires that all relevant electronic reporting of freight transport information is done via eFTI certified platforms, there was a risk of conflict between the eFTI Regulation on the one hand and the RIS Directive and ES-RIS on the other if the eFTI regulation would also apply for ERI. As a result, it was decided to exclude ERI from the eFTI regulation (by not including ERI related national legislation in Annex I PART B of the eFTI regulation), ensuring that no conflict is created when the eFTI regulation becomes fully applicable.

While this approach solves the immediate issues concerning eFTI and ERI, it does diminish the potential of eFTI to increase the efficiency of freight transport and logistics, especially for multimodal transport including an inland navigation leg. Therefore, the EU decided to elaborate a path towards the harmonization of eFTI and ERI in the revision of the RIS directive and in future updates of eFTI. One example of such harmonization being that ERI messages could be extracted from/constructed by eFTI certified platforms in the future.

4.3.2 Rules for promoting inland waterway transport in the EU

Together with Regulation (EC) No 181/2008 and Regulation (EU) No 546/2014, Regulation (EC) No 718/1999 lays down the rules for a policy on EU fleet capacity. They seek to encourage the development of sustainable and competitive inland waterway transport in the EU.⁹

Regulation (EC) No 718/1999:

- The regulation covers vessels that transport goods commercially. There are several exemptions, such as for vessels that operate on the Danube or that are used exclusively for storing goods or for dredging.
- EU countries that have fleet tonnage of over 100,000 tonnes, and with waterways connected with other EU countries, were required to set up an Inland Waterways Fund (with separate reserve funds for dry cargo carriers*, tankers* and pusher vessels*).
- These funds were to be administered by national authorities and could be used in 2 situations: in the event of ‘serious market disturbance’ in the inland waterway transport market (within the meaning of Directive 96/75/EC); and if unanimously requested by the organisations representing inland waterway transport – as of early 2014, these reserve funds had never been used.
- The regulation originally contained an old-for-new rule. This meant that any owner who wanted to bring a new vessel into the fleet had to either scrap old vessel tonnage or pay money. This rule came to an end under Regulation (EC) No 411/2003 (since repealed and replaced by Commission Regulation (EC) No 181/2008 — see below), and could only be reactivated, accompanied or not by structural improvement measures, in the event of a serious market disturbance of the kind referred to in Directive 96/75/EC.

Regulation (EC) No 181/2008:

It lays down rules for implementing Regulation (EC) No 718/1999. It sets the rate of the special contributions referred to in Regulation (EC) No 718/1999 (Article 7), the ratios for the old-for-new rule, and the practical arrangements for implementing the Community fleet capacity policy.

⁸ Electronic Ship Reporting in Inland Navigation, a RIS Technical Service (formerly referred to as a RIS Key Technology) to support the provision of Voyage and Cargo information. As referred to and defined in the RIS Directive (2005/44/EC) and ES-RIS.

⁹ <https://eur-lex.europa.eu/EN/legal-content/summary/rules-for-promoting-inland-waterway-transport-in-the-eu.html>



Amending Regulation (EU) No 546/2014:

Under amending Regulation (EU) No 546/2014, the scope of the measures available under Regulation (EC) No 718/1999 was extended. The measures now include:

- help (such as information) for workers on inland waterway carriers leaving the industry to obtain an early retirement pension or transfer to another job;
- vocational training or retraining schemes for crew members leaving the industry;
- improvement of skills in inland navigation and knowledge of logistics to safeguard the development and future of the profession;
- encouraging owner-operators to join trade associations and strengthen the organisations representing inland waterway transport at EU level;
- encouraging upgrading of vessels to improve working conditions and safety;
- encouraging innovation in respect of vessels and their improved environmental performance;
- encouraging the use of the reserve funds together with financial instruments such as Horizon 2020 and the Connecting Europe Facility.¹⁰

4.3.3 Qualifications of crew members

Directive (EU) 2017/2397 creates a new harmonised system for qualifications of deck crew members working on European Union (EU) inland waterways. It aims to remove barriers to labour mobility, to improve safety, to develop the skills and employability of young people, to offer better career prospects to all crew members and to facilitate the transition of experienced workers from other sectors.¹¹

The Directive applies to the following vessels:

- (a) vessels having a length of 20 meters or more;
- (b) vessels for which the product of length, breadth and draught is a volume of 100 cubic meters or more;
- (c) tugs and pushers intended for: (i) towing or pushing vessels referred to in points (a) and (b); (ii) towing or pushing floating equipment; (iii) moving vessels referred to in points (a) and (b) or floating equipment alongside;
- (d) passenger vessels;
- (e) vessels required to have a certificate of approval pursuant to Directive 2008/68/EC of the European Parliament and of the Council (1);
- (f) floating equipment.

The Directive defines the structures of the licenses of skippers and other crew members. General criteria such as health fitness standards for the crew as well as certificates for special activities, e.g. passenger shipping or the transport of liquefied natural gas, have been defined.

In addition, the structure of licenses for skippers has been defined at the EU level. The basic license is the Union license. In addition to the so-called Union patent, special authorizations are issued for

- Large convoys
- Sailing with radar
- Waterways with special risks as well as
- Waterways with maritime character

are defined. Also, the committee "CESNI" was authorized to set further standards.

¹⁰ Summary available: <https://eur-lex.europa.eu/EN/legal-content/summary/rules-for-promoting-inland-waterway-transport-in-the-eu.html>

¹¹ <https://eur-lex.europa.eu/EN/legal-content/summary/recognition-of-professional-qualifications-in-inland-navigation.html>



4.3.4 Inland transport of dangerous goods

Directive 2008/68/EC lays down common rules for the safe and secure transport of dangerous goods within and between EU countries by road, rail or inland waterway. It also covers aspects such as loading and unloading, the transfer to and from another mode of transport, as well as the stops in the course of the transport process. It extends the application of international rules to national transport of dangerous goods.¹²

4.3.5 Inland navigation: access to the market

There are a number of regulations and directives that govern the access to the market for IWT:

- Regulation (EC) No 169/2009 sets out EU competition rules applying to transport by road, rail and inland waterways.
- Regulation (EC) No 718/1999, together with amending Regulation (EU) No 546/2014, lays down the rules for a policy on EU fleet capacity.
- Directive 96/75/EC outlines steps to achieve freely negotiated chartering contracts and pricing in the EU.
- Regulation (EC) No 1356/96 aims to ensure that operators who transport goods or passengers by inland waterway are free to provide these services between EU countries.
- Regulation (EEC) No 3921/91 lays down the conditions under which non-EU carriers are free to operate inland waterway transport services in the EU.
- Directive 87/540/EEC aims to establish uniform access conditions to the occupation of carrier, facilitating mutual recognition of diplomas and other qualifications.
- Regulation (EEC) No 2919/85 lays down the conditions for accessing arrangements under the Revised Convention for the navigation of the Rhine relating to vessels belonging to the Rhine navigation.
- EEC Council Regulation No 11 aims to eradicate discrimination in transport rates and conditions.¹³

4.3.6 Inland Waterways — Vessels

The Directive 2016/1629 sets technical standards for inland vessels. The CESNI Committee was authorized by delegated act to adapt or amend technical standards (so-called ES-TRIN).¹⁴

The legislation establishes a system of technical requirements for inland navigation vessels and sets up an inspection system. It aims to make the requirements for navigation certificates on inland waterways identical across the EU, simplifying the rules and contributing to better safety. It introduces specific rules for transporting pressure equipment and dangerous goods, pollutant emission limits for engines, reciprocal arrangements for license recognition and the European Hull Data Base (EHDB).¹⁵

4.3.7 Inland waterways — River Information Services (RIS)

Directive 2005/44/EC establishes River Information Services (RIS). EU countries are responsible for its implementation, including establishing RIS centres and designating authorities to oversee its application and the exchange of international data. The European Commission is responsible for

¹² <https://eur-lex.europa.eu/EN/legal-content/summary/inland-transport-of-dangerous-goods.html>

¹³ <https://eur-lex.europa.eu/EN/legal-content/summary/inland-navigation-access-to-the-market.html>

¹⁴ Art. 31 EU 2016/1629

¹⁵ <https://eur-lex.europa.eu/EN/legal-content/summary/inland-waterways-vessels.html>



setting out technical guidelines for RIS planning, implementation and operations in a series of implementing acts.

RIS are the harmonized information services to support traffic and transport management in inland navigation, including interfaces with other transport modes. RIS may interface with commercial activities other than those happening internally between companies. River Information Services comprise services, such as:

- Geographical, hydrological, and administrative information about the waterway (fairway information),
- Traffic information,
- Traffic management,
- Calamity abatement support,
- Information for transport management,
- Statistics and customs services,
- Waterway charges and port dues.

The directive outlines a framework to develop technical requirements and specifications to:

- Achieve a harmonized exchange of information between different actors providing RIS;
- Improve the interaction with other traffic management systems of other transport modes, in particular maritime vessel traffic management and information services;
- Develop interoperable systems for inland waterway transport services;
- Set up a framework to develop guidelines and specifications.

Annexes specify minimum data requirements and principles covering RIS guidelines and technical specifications. The Commission can adopt implementing acts amending the annexes in the light of experience and technical progress.

Regulation (EC) No 414/2007 defines guidelines for RIS planning, implementation and operations, including:

- Participating vessels;
- RIS architecture, including stakeholders, service providers, users, objectives, tasks and applications;
- Recommendations for individual services, including
 - o A radiotelephone service,
 - o An internet service,
 - o The electronic chart display and information system for inland navigation (inland ecdis),
 - o Traffic information,
 - o Traffic management,
 - o Navigational support,
 - o Lock and bridge management,
 - o Calamity abatement support,
 - o Information for transport logistics,
 - o Information for law enforcement;
- RIS planning, including training;
- Stepwise development of RIS;
- RIS standardisation procedures.



Regulation (EC) No 416/2007, as amended by Implementing Regulation (EU) 2018/2032, defines the technical specifications for notices to skippers. Fairway information services (FIS) are used by boat-masters and fleet managers to plan, execute and monitor a voyage. The terms 'boat-master', 'skipper' and 'shipmaster' are considered equivalent in RIS.

FIS provides dynamic information (such as water levels and water-level predictions) as well as static information (such as the operating times of locks and bridges), thereby helping users to make tactical and strategic navigation decisions.

Implementing Regulation (EU) No 909/2013, as amended by Implementing Regulation (EU) 2018/1973, defines technical specifications for the electronic chart display and information system for inland navigation (Inland ECDIS). Its annex includes detailed specifications for:

- Performance standards,
- Data standards,
- Codes for producers and waterways,
- Presentation standards,
- Operational and performance requirements, methods of testing and required test results,
- Measures to ensure software quality,
- System configurations.

Implementing Regulation (EU) 2019/838 repeals Regulation (EC) No 415/2007 and outlines detailed technical specifications for vessel tracking and tracing systems in inland waterway transport, including rules related to aids to navigation in inland navigation.

Implementing Regulation (EU) 2019/1744 repeals Regulation (EU) No 164/2010 and outlines detailed technical specifications for electronic ship reporting in inland navigation, including:

- A message implementation manual convention for electronic ship reporting in inland navigation, based on the United Nations rules for Electronic Data Interchange for Administration, Commerce and Transport (UN/EDIFACT)*
 - o (dangerous) goods reporting,
 - o Passenger and crew lists,
 - o Response and receipt message (an automatic response sent using the EDIFACT protocol indicating the receipt of a message),
 - o Berth management port notification (where a vessel needs to unload its cargo, it notifies the relevant port in advance; this allows the port to manage how it allocates berths);
- Codes and references used in electronic ship reporting for inland navigation.¹⁶

The RIS directive is currently under revision. The new version is expected to become adopted by the Commission in the fourth quarter 2023.¹⁷

4.3.8 EU statistics of goods transport by inland waterways

Regulation (EU) 2018/974 sets out the rules for the production of comparable EU-wide statistics on inland waterways freight transport. It seeks to provide a picture of the volume and performance of

¹⁶ <https://eur-lex.europa.eu/DE/legal-content/summary/inland-waterways-river-information-services-ris.html>

¹⁷ https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13135-River-information-services-revision-of-EU-rules_en



freight transport on the EU inland waterway network. It codifies and repeals Regulation (EC) No 1365/2006 which had been substantially amended several times.¹⁸

4.4 Excursus: Regulations of the CCNR

The CCNR has issued very detailed rules for the Rhine. In practice, the laws, although they only apply to the Rhine, have a greater significance. The CCNR legislation has fully mapped the essential areas of inland navigation. Therefore, rules of the CCNR are adopted in full or in part, or at least form a basis for discussion in other waterways.

The CCNR has the following main regulations for the Rhine:

- Police regulations for the navigation of the Rhine
- Radio communication guide for inland navigation
- Regulations for Rhine navigation personnel
- Rhine vessel inspection regulation

4.5 Excursus: other relevant regulations in EU

The above mentioned regulations are all specifically directed to the field of IWT. In addition to these laws, the general rules of the EU can of course also have an influence on IWT. Thus, national rules as well as the relations of private persons can find limits of the permissible in the law of the EU.

Within the EU, there are very many different rules that can become relevant in individual cases. The subject of the DIWA project is digitalisation. From a structural point of view, all new technologies presuppose data exchange or data processing. Therefore, the general EU regulations on data protection or data exchange are briefly addressed below.

4.5.1 GDPR

The General Data Protection Regulation (GDPR) standardizes the basis for the protection of personal data within the EU and establishes rules on how companies, governments and other entities can process the personal data of EU citizens and residents. The regulation primarily sets out standards concerning the

- Legality of the processing of personal data
- Information obligations as well as
- The right to erasure and rectification

In addition, general rules and responsibilities for the data controllers¹⁹ and data processors²⁰ are regulated.

While the GDPR obviously applies to any processing of the personal data of (registered) users on IWT portals (e.g. the EuRIS portal), it also applies to, for example, the processing of AIS²¹ data, making the GDPR a very relevant regulation for (digitalisation in) IWT.

¹⁸ <https://eur-lex.europa.eu/EN/legal-content/summary/eu-statistics-of-goods-transport-by-inland-waterways.html>

¹⁹ A Controller determines, alone or jointly with others, the purpose and the means of the processing of personal data.

²⁰ A Processor performs the actual processing of the personal data on behalf of the controller.

²¹ AIS stands for Automatic Identification System, which provides information on a vessel's properties, position, voyage characteristics, ... via VHF.

4.5.2 Open-data directive

The open data directive lays down the legal framework for the reuse of public-sector information. It is based on the general principle that public and publicly funded data should be reusable for commercial or non-commercial purposes. The directive promotes the use of open data. Public-sector bodies and public undertakings must make their documents available in any pre-existing format or language and, where appropriate, by electronic means in formats that are open, machine readable, accessible, findable and reusable, complete with their metadata.

- Public-sector bodies must, through electronic means where appropriate, process requests for document reuse, making them available within a reasonable time.
- At the same time, they should make necessary arrangements to facilitate the online search and discovery of the documents they keep.
- EU countries must also facilitate effective reuse of documents, in particular by supplying information on the rights outlined in the directive and by offering assistance and guidance.

Dynamic data must be made available for reuse immediately on collection via an application programming interface (API) and, where relevant, as a bulk download.²²

E.g. Most of the information about the inland waterways is shared by the Fairway authorities via the EuRIS portal as open data.

5 Developments

The legal landscape is subject to constant changes, adaptations and additions. Especially the new technologies as described in Activity 2 and 3 require new or amended laws. To provide a comprehensive overview, some legal developments are presented.

5.1 CESNI: crew requirements

At the EU level, there are still no uniform manning rules for inland vessels. Uniform rules are being discussed in CESNI. Ultimately, the basis for a draft law is to be created. However, no work result is known yet.

5.2 Cyber Resilience Act: Proposal COM(2022) 454

The purpose of the directive is to make digital products or products with a digital connection more secure in terms of their cybersecurity. To this end, it proclaims two goals:

First, to create conditions for the development of secure products with digital elements by ensuring that hardware and software products are brought to market with fewer vulnerabilities and that manufacturers take security seriously throughout a product's lifecycle.

The second is to create conditions that enable users to consider cybersecurity when selecting and using products with digital elements. Four aspects will be emphasized: ensuring that manufacturers improve the security of products with digital elements at the design stage and throughout their lifecycle; creating a coherent cybersecurity framework that makes it easier for hardware and software manufacturers to comply; increasing the transparency of security features of products with digital elements; and enabling businesses and consumers to use products with digital elements safely.

The directive aims to grant a high level of cybersecurity for services provided by essential and important entities. It requires Member States to ensure that said entities, such as healthcare providers or cloud services and public administration entities, adopt appropriate and proportionate technical, operational and organizational cybersecurity measures. This includes, among other things, the

²² <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=LEGISSUM:4405374&qid=1678609934114>

requirement to ensure security in the procurement, development and maintenance of networks and information systems, including the handling of vulnerabilities and their disclosure.

To this end, a "horizontal regulatory action" has been taken at the European level to introduce cybersecurity requirements for a wide range of tangible and intangible products with digital elements, including non-embedded software.

Chapter 1 of the Regulation sets out the general provisions. The purpose of the directive and its scope are explained in detail, and the basic terms are defined. It also standardizes which cybersecurity requirements the so-called "products with digital elements" must fulfil, what actually falls under this term and which special cases exist. In addition, parts of the manufacturer's obligations are outlined. According to Art 1, the subject matter of the directive is (a) rules for placing products with digital elements on the market in order to ensure the cybersecurity of such products, (b) basic requirements for the design, development and manufacture of products with digital elements and the obligations of economic operators in relation to these products with regard to cybersecurity, (c) basic requirements for vulnerability remediation procedures to be followed by manufacturers to ensure cybersecurity of products with digital elements during life cycle and obligations of economic operators with respect to such procedures, (d) rules for market surveillance and enforcement of the above rules and requirements.

6 Opinions on legal issues of Activity 2 and Activity 3

6.1 Introduction and general considerations on Smart Shipping (SuAc 2.1)

The term smart shipping encompasses many different technologies. Each new technology raises countless detailed technical questions. Because of the many questions in individual cases, the very basic need for regulation should be illuminated and individual structural problems discussed. For this purpose, the following technologies can be distinguished as concepts in a very basic way:

- Assistance systems
- Remote operation
- Platooning
- Autonomous sailing

However, these technologies are only considered as a basic concept in order to be able to legally consider various possible conceptions. The following terms are used.

Assistance systems are systems that in some way facilitate or partially take over the work of the skipper. This includes, for example, the tracking pilot. Assistance systems are already in use today. They rarely cause legal problems as long as they are not intended to establish privileges. Therefore, they are only mentioned if they are expected to cause legal implications.

Remote operation allows the skipper to navigate the vessel by remote control. Accordingly, basically "only" the skipper's workplace is decoupled from the vessel.

Platooning involves a convoy. However, the convoy is not physically connected. Rather, one ship sails ahead and the ships behind automatically steer to the positions of the first ship. In contrast to a physically connected convoy, all ships are motorized.

In **autonomous sailing**, the ship can sail and move without human intervention. Human intervention is only required in case of malfunctions or similar.

Legally, this can be relevant for the following areas of law:

- Public law
- Civil law concerning liability of road users
- Criminal law



6.1.1 Public Law

Public law regulates rules of state organization, fundamental rights and the relationship between private individuals and the administration. Apart from regulations under European law, the area of public law is largely left to the Member States.

Remote control, platooning and autonomous sailing are not yet regulated at EU level. Even within the member states, there is still no comprehensive practice in dealing with the aforementioned technologies. The situation is different for assistance systems. If the technologies are to be used in practice, a legal basis for permission must be created. In addition, all other areas of public law must be checked for compatibility with the technologies.

In public law, the following areas may be affected:

- Operation of waterways (technical requirements)
- Qualification tests
- Traffic regulations²³
- Avoiding of danger
- Administrative execution
- Admission of vessels

In these areas, many questions, especially technical ones, arise. Within the framework of SuAc 4.2, legal problems will be discussed and suggestions for possible regulations will be developed.

6.1.1.1 Uniform European rules

In general, it is questionable whether uniform European rules to enable smart shipping make sense. The usefulness of introducing uniform European rules can of course be viewed from the perspective of many different interests. However, this is not the task at hand. Therefore, the meaningfulness will be considered exclusively on the basis of the goals and values of the EU. The goals of the EU are regulated in Art. 3 TEU. The following goals of the EU are relevant for the introduction of the rules in question:

- Establish an internal market,
- Promote scientific and technological advance.
- The strengthening of economic, social and territorial cohesion.²⁴

The creation of a single market is inevitably linked to the introduction of freedom to provide services and freedom of establishment within the member states. Uniform rules within the EU promote entrepreneurial activity abroad in the EU and reduce trade barriers. Furthermore, economic and territorial cohesion is also promoted if transports can easily take place across borders through smart shipping due to uniform rules. Whether uniform rules promote technological progress, on the other hand, is questionable. The alternative to uniform legal regulations of the EU are national laws of the member states. State competition can be beneficial to determine the best system. However, state competition only makes sense if competition between technologies and the associated systems cannot be made possible in any other way. This would be the case, for example, if fundamentally different systems could not be used or developed in parallel. Indications for the necessity of state competition are not sufficiently discernible.

It should also be considered where similar regulations have been in place to date and where a new regulation would fit. At the European level, the technical requirements for inland waterway vessels and also certificates of competency have already been regulated within the framework of a directive. Therefore, it would only be logical to strive for a European regulation in those areas as already mentioned above.

6.1.1.2 Use of the technologies

Even if we have a full or partial uniform regulation of the EU in smart shipping, the question naturally arises as to whether the member states themselves should decide on the approval of the technology on a waterway or whether the technology as a whole should be permitted in EU.

²³ Including crew requirements, necessary documents.

²⁴ https://european-union.europa.eu/principles-countries-history/principles-and-values/aims-and-values_de?gclid=EAlaIqobChMI-fenu7aj-wIVyPV3Ch3ipwTfEAAySAAEgLw9fD_BwE



So far, there is a European regulation on the approval of inland vessels as well as on qualification of the crew. Platooning, remote operation and autonomous sailing are not covered by the regulations. The existing regulations regulate sub-areas in isolation and do not provide rules for the operation of waterways or manning requirements. Therefore, the authorization of the aforementioned forms of operation cannot be regulated within the existing legal framework. A new legal basis would have to be created. On a technical level, it is questionable in advance what requirements a waterway must have in order to be able to use it by means of platooning, remote control or autonomous vessels. For example, in the case of platooning or remote control, there must always be an (internet) connection to the ships behind or to the control station. Without this (internet) connection, safe vessel traffic is not possible. Whether the infrastructure required for the respective technology exists or can be procured at a proportionate cost cannot be answered conclusively. Inland waterways are used to varying degrees. Regional peculiarities must also be taken into account. Similarly, political considerations such as social acceptance are also decisive in answering these questions. Ultimately, this question can only be answered on the basis of economic, nautical and political considerations. Taking into account regional concerns and sensitivities, it seems reasonable to leave this question to the member states.

6.1.2 Civil law

Civil law regulates the legal relationships between private parties, as opposed to the sovereign.²⁵ A distinction is made between legal and contractual obligations: In the field of smart shipping, relevant issues of civil law which are discussed in this report are:

- questions of liability²⁶,
- labour law issues (e.g. permanent video surveillance of employees)²⁷ and
- data processing²⁸

6.1.3 Criminal law

For the sake of completeness, criminal law is also mentioned. Criminal law regulates the public right to punishment by the sovereign. It is extensively regulated by the member states, although in some cases the member states have undertaken to make certain conduct punishable.

In the area of smart shipping, the legislator will also be able to consider which behaviours in IWT can be made punishable. For example, in the area of remote operation, it could be made punishable (ship owner), if the skipper cannot be identified in the event of damage or other misuse of the new technologies.

6.2 Smart shipping: liability in case of collision

The natural question in civil law is how liability should work in smart shipping and whether the existing regulations will work. The question of liability in the area of smart shipping is very complex. This is due to the fact that several legal systems may be involved and, in addition, a large number of cases must be considered. Therefore, for the purposes of this project, we will look at the structures of liability, but not at each individual law. Nor can we anticipate the full legislative process. However, looking at the structures will be sufficient to identify necessary changes in liability.

In the case of liability, two components are fundamentally relevant, namely:

- Substantive law²⁹ and, in the event of court proceedings, procedural law and the enforcement.
- Factual execution of the law.

When we talk about civil liability in the area of smart-shipping, both aspects must be considered. With regard to the factual execution of the law, it is useful to consider the stages of a case.

²⁵ Examples are family law, contract law (e.g. purchase or tenancy law), injunctive relief, corporate law, tort claims for damages

²⁶ See chapter 7.2

²⁷ See chapter 7.8, 7.9, 7.10

²⁸ See chapter 7.12

²⁹ In contrast to procedural law, substantive law regulates the direct legal relationship between persons, such as the creation or expiry of a claim or right.

- Events before the accident
- Damage event
- Investigations by the water police or private investigations, claim settlement, if not then:
- Legal action
- Enforcement

Substantive or procedural law is only relevant at the last three levels. Whereby the different levels are of course interconnected. For example, substantive law is worthless if it is not possible to make any determinations about the damage. Also, no out-of-court claim settlement will take place if the organs of justice are not effective. In those cases, there would be no consequences for non-payment.

The above explanations are, of course, generally valid. However, digitalisation goes hand in hand with the internationalisation of business relationships. Therefore, these considerations should always be taken into account when technologies require or enable international business relationships. States are also subject to political change and can create or lose a secure legal culture.

Regarding the law: Up to now, there is no European legislation that directly regulates questions of liability in IWT. As far as smart shipping takes place, the regular national liability rules apply. However, there is general European legislation. This general legislation at least partially harmonizes national laws or otherwise exerts an influence.

6.2.1 General information on national liability rules

In the event of an accident, the liability of the parties involved is primarily governed by the national law of the member states of EU. In the absence of harmonization, national laws on liability can vary widely in structure and also in content. Before looking at the possible legal structures, it is useful to look at the possible case constellations. The different case constellations illustrate which aspects can be regulated differently.

Liability debtor³⁰:

- Owner of the ship.
- Skipper
- Crew (labour law)
- Manufacturer or installer of ship parts

Potential creditors

- Public authority
- Crew and persons working on ships
- Third parties

Potential damages

- Bodily injury/ death
- Damage to property (infrastructure and other road users)
- Damage to cargo (transport law)

The above list illustrates that a large number of different cases can be legally relevant to liability. Most of the claims between the parties involved can be assigned to civil law. However, each of the Member States can determine the structure of its laws. Thus, depending on the structure, it may be that, for example, damage to the waterway is to be located in public law or compensation for injury to a person is to be located in criminal law. In the following, two quite fundamental principles in civil law will be presented.

- In civil law liability, a primary distinction is made between **contractual liability and tortious liability**. Contractual liability presupposes a contract or a relationship similar to a contract. Liability can be regulated in advance by agreement of the parties, provided that there is no mandatory law to the contrary. Depending on the legal form, contractual liability does not exclusively cover claims for fulfilment of the primary obligations of a contract, but also of so-called secondary obligations. The scope of right to subsidiary performance is governed by the respective national law. An example of a right to subsidiary performance is that the employer

³⁰ Of course, lock operators for example can also cause a damage. However, this chapter deals with specific problems in the area of smart shipping. Section 6.11 also addresses the liability of states or fairway authorities. This also applies to the operators of locks, insofar as these are not privately operated.

must take appropriate safety measures for the benefit of its employees and thereby prevent risks. If the employer disregards these duties, the breach of duty may also give rise to a claim for damages. Tortious liability is different. It applies by force of law and can therefore not be modified in advance.

The legal as well as the contractual claim mostly presuppose a so-called fault. Accordingly, the tortfeasor must have intentionally violated some duty of care or negligently disregarded it. Furthermore, there is also strict liability. No fault is required for strict liability. Strict liability is prescribed, for example, in road traffic law for vehicle owners in Germany.

- In court proceedings, the claimant must generally prove that the prerequisites for a claim exist. However, there may be different rules of **burden of proof**. One possibility is the reversal of the burden of proof. Also, fault may be presumed by law. In these cases, fault is assumed under certain conditions. In some cases, this legal presumption can be rebutted. The tortfeasor can disprove that he or she was not at fault, contrary to the statutory presumption. The legal presumption and the reversal of the burden of proof are ways of resolving problems of proof.

6.2.2 Existing EU rules

Although liability in the case of accidents in IWT is not regulated specifically, there are nevertheless laws that have an influence in the case of an accident.

6.2.2.1 Rome I and II

The Rome I and II Regulations are the central rules of conflict of laws rules in European law. In the case of cross-border (intra-European) legal disputes, the question regularly arises as to which law of the member states involved is to be applied.

Example: A shipmaster from Hungary sails with a Dutch ship on a German river against a French ship. Now the question arises whether Hungarian, Dutch, German or French law is to be applied.

The Rome I and II Regulations contain rules on which law is applicable. However, the regulations apply exclusively within the EU. If parties from third countries are involved, the international agreements or national regulations must be used to determine which law is applicable.

If non-EU states are involved, the law applicable must be checked on the basis of the international agreements or national regulations.

6.2.2.2 Regulation (EU) No 1215/2012

Regardless of the applicable law, the question arises as to the court before which any claims are to be asserted. Regulations in this regard can be found in the EU Regulation on Jurisdiction and the Enforcement of Judgments. Like the aforementioned regulations, it applies only to the EU.

6.2.2.3 Defective products: liability

For the sake of completeness, the guideline also 85/374/EEC is still summarized. It establishes the principle of liability without fault applicable to European producers. Where a defective product* causes damage to a consumer, the producer may be liable even without negligence or fault on their part.

A producer can mean:

- the producer of a raw material, the manufacturer of a finished product or of a component part,
- the importer of the product,
- any person putting their name, trade mark or other distinguishing feature on the product,
- any person supplying a product whose producer or importer cannot be identified.

Where two or more persons are liable for the same damage, they shall be liable jointly.

A product is defective where it does not provide the safety which a person is entitled to expect, taking all circumstances into account, including:

- the presentation of the product,



- the reasonable use of the product,
- the time when the product was put on the market.

The injured person carries the burden of proof. They must prove:

- actual damage,
- a defect in the product,³¹

6.2.3 Need for regulation in the area of smart shipping

The need for regulation is discussed below. Contractual liability does not play a significant role, as vessels or their owner mostly do not have a contractual relationship in case of collisions. Therefore the subject matter is exclusively tortious liability towards third parties.

6.2.3.1 General consideration

In Smart Shipping, individual activities of the skipper and crew are initially replaced or supported by new technologies. The more the activities are supported, the less damage can be the fault of a skipper. Of course, there is a possibility that the skipper misapplies the technologies or misunderstands information from the assistance systems. In those cases, the damage may be caused by an intentional or negligent breach of duty. At the end of the development is the unmanned ship. Due to its lack of existence, the skipper cannot be held liable at all. This circumstance makes it all the more clear that with advancing technologization, fault will be less and also less provable.

If a person is injured by the operation of a ship, the existence of the claim depends on how the member state of EU has structured the liability rules. If strict liability already exists, the injured party is in the same position as without smart shipping. If there is only fault liability, the injured party must try to prove fault at some level. This is likely to be difficult to do. The bottom line is that the injured party would no longer be protected by claims for damages. He or she can only insure this risk in advance. If the ship originates from a third country, the identical question of fault-based liability arises.

6.2.3.2 Remote control

The operation of a ship by remote control is not yet regulated. With remote control, only the workstation of the skipper is relocated and decoupled from the ship.³² Naturally, it is questionable under which conditions remote control should be possible. In addition to the technical question of how the workplace and the ship must be equipped for remote control, there are also practical questions regarding ship operation and liability.

On the substantive law level, a key aspect is whether remote operation has an influence on which law is applicable in the event of a ship accident or whether a legal vacuum is created. In the case of general tort liability, Art.4 Rome II generally regulates the decision on the applicable law:

General rule

1. Unless otherwise provided for in this Regulation, the law applicable to a non-contractual obligation arising out of a tort/delict shall be the law of the country in which the damage occurs irrespective of the country in which the event giving rise to the damage occurred and irrespective of the country or countries in which the indirect consequences of that event occur.

2. however, where the person claimed to be liable and the person sustaining damage both have their habitual residence in the same country at the time when the damage occurs, the law of that country shall apply.

3. where it is clear from all the circumstances of the case that the tort/delict is manifestly more closely connected with a country other than that indicated in paragraphs 1 or 2, the law of that other country shall apply. A manifestly closer connection with another country might be based in particular on a preexisting relationship between the parties, such as a contract, that is closely connected with the tort/delict in question.

³¹ <https://eur-lex.europa.eu/legal-content/DE/TXT/HTML/?uri=LEGISSUM:l32012>

³² See section 6.1



The above regulations provide clear rules as to which law is to be applied. The current rule is also unlikely to provide an opportunity for an abusive choice of law. This is because the rules do not link to the place of the tortfeasor. In this respect, there is no need for action.

If the skipper steers the ship from a third country, there is uncertainty as to which law is applicable.

At the level of factual enforcement, the question arises as to how a breach of duty by a skipper is noticed at all and can be utilized in the settlement of claims. If a collision takes place, the water police come and the parties involved in the accident take notice of each other. If the skipper is under the influence of alcohol or drugs, the water police will notice conspicuous behaviour and begin their investigations. Other conspicuous behaviour in the cab would also be noted. In case of a remote-control, the first question is the whereabouts. If the location is known, police can question the skipper and get an overview of the overall situation. If the location is not known, no findings or investigations can be made, for example, into the influence of alcohol or drugs.

Another problem arises if the skipper is sailing the ship from another country in the EU. If the whereabouts are known, the police can technically visit the skipper. However, the sovereign powers of the police end at the border of the state. Legally, only the police of the whereabouts may take action. If this problem is not solved, the resident police can only be asked for help via a request for assistance. The request for administrative assistance from an official is not regulated uniformly within the EU. In practice, the state will receive a request for assistance written in a foreign language. Only then can it be checked whether the resident police may take action. The entire procedure will take a lot of time. And even then, if the resident police act quickly, problems may arise due to the different legal systems. Suppose the police want to check whether the skipper was under the influence of alcohol. The requirements for an investigation can vary widely. In the worst case, the result of the investigation would not be usable for formal reasons.

If the ship were being guided from a non- EU state, the problems listed above would become even more apparent. Within the EU, a standard of law and protection of legal interests can be assumed. In the case of non-EU states, the administrative practice is to be assessed differently.

6.2.4 Possible solutions

6.2.4.1 remote-control

Concerning liability it is recommended to install regulations:

- The location of the skipper must be identifiable and localizable.
- Should remote operation also be possible from other EU countries, the administrative assistance of the water police must be regulated.
- Should remote control also be permitted from third countries, at least administrative assistance and the right to inspect files must be ensured.

6.2.4.2 No protection by fault-based liability

The problem of fault can be solved by introducing strict liability. Strict liability has already been successfully introduced within the EU.³³ With strict liability, every ship owner is liable regardless of fault. Accordingly, the ship owner is liable even if he has done nothing wrong and the ship nevertheless collides with another ship due to a technical fault. The ship owner can counter the liability risk with insurance. In addition, strict liability ensures that the ship owner uses his ship in a particularly responsible manner. For example, he will ensure himself that technically necessary updates are carried out. The same effect occurs with remote control. If the ship owner is liable, he will use the remote control with particular care.

Alternatively, a reversal of the burden of proof or presumption of fault could at least defuse the problem somewhat. If the ship owner can prove that he or she has fulfilled all legal duties of care (e.g. by presenting inspection records), the injured party will not be able to claim damages. The injured party will also not be able to claim damages if the ship is sailing on the wrong side of the water due to a technical error, for example. In those cases, the ship owner would have created a risk that he cannot properly control. Now it is questionable whether the injured party should bear this risk or the ship owner who operates the hazard.

³³ Directive EU 85/374



In the opinion of the working group, strict liability is to be favored. Whoever creates a source of risk must also be liable for it. It is less fair to impose this risk on the injured party.

If strict liability is introduced, the question of introducing compulsory insurance automatically arises. In the maritime sector, compulsory insurance has already been introduced (see 2009/20/ EC). Compulsory insurance has the great advantage that the injured party is not exposed to the risk of the tortfeasor's ability to pay. On the other hand, the ship owner has to pay the insurance premium. However, the introduction of compulsory insurance is not a legal issue, but a political one. Therefore, no recommendation is made in this respect.

6.3 Smart shipping: crew requirements

Autonomous sailing, platooning and remote operation are not currently envisaged at EU level. Therefore, no regulations enable to drive with less crew yet. Whether and to what extent crew facilitation should be permitted is, of course, a political question. Various goals can be pursued with the political decision. Likewise, it is a political decision to choose the means to the political aim. For example, restrictive crew relief could help preserve existing jobs. Likewise, crew relief could make shipping more economical, thus creating more shipping and, as a result, creating more shipping jobs. In the area of smart shipping, safety aspects or social acceptance are also considerations in the formation of political will. The described consideration is the task of politics and cannot be anticipated within the framework of the DIWA project. Nevertheless, the political decision-making process is to be supported by a technical analysis. In the following, problems, effects and also proposed solutions will be discussed in particular.

However, these explanations are not exhaustive. The technologies under consideration have not yet been properly tested and developed in practice. It is not possible to assess how reliably the systems will function in practice. At this point, the legislator is once again called upon. Therefore, when smart shipping technologies are introduced, it may make sense to require personnel redundancy. To signal to companies that this is an initial redundancy, regulations can be introduced for a limited time. After an evaluation, manning relief could then be reconsidered. However, as a working hypothesis for the considerations below, it is assumed that the systems basically work.

In the following, the first step is to present existing manning provisions as a baseline. In a second step, it is determined which needs arise with the new technologies.

6.3.1 Existing crew requirements

At the European Union level, no uniform manning regulations exist yet. Therefore, so far, all member states can decide for themselves which crew is required. Considering the freedom of services, it would certainly make sense to introduce uniform European manning regulations. In this framework, new technologies could also be considered. Uniform crew requirements have been established by CCNR for the Rhine.³⁴

6.3.2 Needs assessment for the new technologies

The second step is to analyze the need for manning. As is well known, there are no specifications on manning on the part of the European Union. The CCNR has provided for uniform regulations for the Rhine. Nevertheless, the European Union has regulated a catalog of requirements for skippers and crew within the framework of the Qualification Directive. This competence catalog shows which role is assigned to the skipper and the crew. Based on the assigned tasks, it can at least be determined whether the work of the crew is omitted or added elsewhere.

The object of consideration is always the basic constellation of a technology. Therefore, it is not considered if ships have additional new technologies. In this way, the main possible regulations on manning are to be analyzed. Of course it is clear that in the result the technologies are combined and therefore the explanations are not conclusive. It is unclear which mixed forms will prevail. Therefore, only the basic idea of a technology and the consequences for the necessary manning will be

³⁴ RPN_01042023_en.pdf (ccr-zkr.org)



considered. As mentioned at the beginning, the basis of the analysis is the competence catalog of the directive. The catalog is used to examine the extent to which the technology can perform the tasks. The following basic principles underlie the consideration. The aforementioned directive as well as the CCNR manning regulations assume that the skipper and the rest of the crew are always present on the ship. This means they are present during sailing even when there are no tasks to be performed. This, in turn, means that the technology must be able to perform all the tasks of the particular crew member to justify sailing with less crew. If the technology cannot perform all tasks, then the appropriate crew member must be physically present. Failure to adhere to this principle would put the traditional manned ship at a disadvantage compared to the smart ship. The disadvantage would be due to the fact that different requirements must be met.

Of course, it is possible to deviate from this principle. Unequal treatment may be permissible. Also, the previous ones can be changed structurally. Thus, certain tasks of the crew could be organized differently. These possibilities exist. Nevertheless, the following considerations are based on the principles listed above. On this basis, open questions are identified and potential solutions are discussed.

6.3.3 Platooning

Platooning is a special form of convoying. Accordingly, one ship with a crew sails ahead. The following ships will automatically head for the positions of the first ship. The ships are not physically connected, only digitally. According to the current legal situation, each ship in the convoy would have to be fully crewed, even if the ships behind independently follow the first ship. Of course, the goal of platooning is to enable less crew. The starting point for the following analysis of the requirements catalog is therefore that the rear ships are unmanned while the leading ship has a standard crew. The individual requirements will then be used to determine whether additional personnel is needed.

First, the tasks of the skipper will be considered:

"2.0 Supervision

The boatmaster shall be able to:

- *instruct other deck crew members and supervise the tasks they exercise, as referred to Section 1 of this Annex, implying adequate abilities to perform these tasks."*

Since the first vessel will be fully manned, the boatmaster can act on his crew as usual, i.e., give tasks and supervise their performance. As far as the rear ships are concerned, a distinction must be made. Due to the higher level of technology, various tasks are performed automatically. These include navigational tasks in particular. Control and maintenance tasks remain for the crew. The skipper must also be able to give tasks and check that they are carried out. Even if the control could be done partly by sensors, she or he must also be able to visit the ships and decide on measures. Therefore, the skipper must have the possibility to visit the vessels by boat. If the skipper goes to the rear vessels, the first vessel would be without a skipper. This is not permissible. Therefore, it must be considered

- Whether it is possible to deviate from the principle of the permanent presence of a skipper, or
- An additional skipper must always be on duty to carry out the checks or
- It is sufficient to control and instruct by sensor (this presupposes a risk analysis).

"2.1 Navigation

The boatmaster shall be able to:

- *Plan a journey and conduct navigation on inland waterways, including being able to choose the most logical, economic and ecological sailing route to reach the loading and unloading destinations, taking into account the applicable traffic regulations and agreed set of rules applicable in inland navigation;*
- *Apply knowledge of the applicable rules on the manning of craft, including knowledge on resting time and on deck crew members composition;*
- *Sail and maneuver, ensuring the safe operation of the craft in all conditions on inland waterways, including in situations that involve high traffic density or where other craft carry dangerous goods and require basic knowledge on the European agreement concerning the international carriage of dangerous goods by inland waterways (adn);*
- *Respond to navigational emergencies on inland waterways."*



Since the skipper is present, he can plan voyages and assemble and schedule the crew as usual. However, the skipper must plan for the voyage for the entire association. However, there are special features with regard to navigation. The following ships automatically head for the position of the first ship. The skipper would have to check whether the convoy is functioning properly and whether traffic obstructions could hinder the continuation of the voyage. Problematic are atypical events, such as failure of the rudder, the engine or breaking of the connection between the first and the following ships. In those cases, there is a risk of a major accident with closure of the waterway. In the case of manned vessels, the skipper initiates the necessary measures. If the propulsion fails, the skipper would warn the traffic by means of radio and sound signals and ground the ship with the help of the emergency rudder. This maneuver would attempt to avert further damage to the ship and other road users. In our initial case, the ships behind are unmanned. A rescue maneuver would basically fail. Therefore, it is questionable how to deal with this problem. In principle, three solutions are conceivable.

- The first solution would be a technical mechanism. The technical mechanism would have to reliably initiate a rescue maneuver in case of failure of the electronics, the rudder, the propulsion or the control signal (loss of internet connection). Whether sufficient reliable and safe technologies already exist would need to be researched. As a first step, the criteria for sufficient rescue maneuvers would have to be established. The next step would be to investigate the functionality of corresponding products.
- The second possible solution is for a person to visit the stricken vessel by boat and initiate the necessary measures. However, this assumes that the person can reach the vessel without significant danger. Whether the person endangers himself during the maneuver depends on many factors e.g. speed, distance to the shore/ground or the current. Also relevant is whether the vessels behind threaten to collide with the damaged vessel. The intended rescue action may fail not only because of the unreasonable risk to oneself, but also because of the time delay before the rescue action can be taken. The rescue action requires that the incident be noticed, personnel get underway, board the vessel, and then take initial action. Based on these considerations, going to the ship is almost certainly not a sufficient solution.
- A third possible solution is to provide the rear vessels with at least one person on call. If trouble were to occur, the appropriate person could initiate action. The skipper could instruct the maneuver by radio. The major disadvantage of this solution is that the crew relief sought with platooning would be at least partially invalidated. If an additional person were required on each rear vessel, the question of the person's qualifications would subsequently arise. If a skipper were required on each vessel, there would be no relevant savings in personnel in many cases. For smaller vessel units, the technology would fail for economic reasons, and even though the smaller vessel units could use shallower waters that are not currently used for economic reasons. Instead of requiring a skipper, there would be the possibility that a deck crew member would suffice. Additionally, emergency management credentials, for example, could be introduced for personnel. Since the personnel are deck crew members, the qualification "Navigation Platooning" could be introduced.

Furthermore, there is also the question of the procedure at locks and berthing. Is it technically possible for the vessels to enter the lock or berth in an automated way? If there is no technical solution, appropriate personnel must be available on the ships, as explained in the case above of emergency maneuvers. However, if any maneuvers that somehow require the vessels to be moved individually are impossible, it is questionable whether crew facilitation should even be considered. Atypical situations may require the entire convoy to dock. If this is only possible by calling in outsiders, the convoy cannot be managed sufficiently safely by the skipper in the leading ship.

"2.2 Operation of craft

The boatmaster shall be able to:

- *Apply knowledge of inland waterway shipbuilding and construction methods to the operation of various types of craft and have basic knowledge of the technical requirements for inland waterway vessels, as referred to in Directive (EU) 2016/1629 of the European Parliament and of the Council (1);*



- *Control and monitor the mandatory equipment as mentioned in the applicable craft certificate."*

The skipper can also perform the aforementioned tasks in the case of platooning. However, a convoy may consist of many individual vessels, each with its own propulsion system and associated equipment. If the skipper is to perform the aforementioned tasks, the control of the convoy will require more time. It is not possible to estimate how much additional time will be required. For this, a professional basis would have to be determined by barge operators.

„2.3 Cargo handling, stowage and passenger transport

The boatmaster shall be able to:

- *Plan and ensure the safe loading, stowage, securing, unloading and care of cargoes during the voyage; L 345/82 Official Journal of the European Union 27.12.2017 EN (1) Directive (EU) 2016/1629 of the European Parliament and of the Council of 14 September 2016 laying down technical requirements for inland waterway vessels, amending Directive 2009/100/EC and repealing Directive 2006/87/EC (OJ L 252, 16.9.2016, p. 118).*
- *Plan and ensure the stability of the craft;*
- *Plan and ensure the safe transport of and care for passengers during the voyage, including providing direct assistance to disabled persons and persons with reduced mobility in accordance with the training requirements and instructions of Annex IV of Regulation (EU) No 1177/2010."*

In platooning, the shipmaster can basically check the operations. Certainly, it is questionable how the loading as well as the unloading should take place. For example, the ships could be loaded simultaneously or successively. The control would also be possible by ship masters, whereby the control density can decrease with larger convoys.

The procedures are problematic if dangerous goods are to be transported. In those cases, it is questionable anyway whether platooning should be permitted. This is because individual measures to secure the cargo are more difficult to implement with the lower crew density. In order to determine the actual crew requirements, the transport of dangerous goods would have to be considered in detail. In particular, it would be necessary to determine which safety measures are required to maintain the current level of protection.

„2.4 Marine engineering and electrical, electronic and control engineering

The boatmaster shall be able to:

- *Plan the workflow of marine engineering and electrical, electronic and control engineering;*
- *Monitor the main engines and auxiliary machinery and equipment;*
- *Plan and give instructions in relation to the pump and the pump control system of the craft;*
- *Organise the safe use and application, maintenance and repair of the electro-technical devices of the craft;*
- *Control the safe maintenance and repair of technical devices."*

The tasks described above can be performed by the ship's master. However, it must be taken into account that all ships have complex technology and require appropriate planning and controls. In the overall view, it must be checked how much additional time the skipper actually has to spend.

„2.5 Maintenance and repair

The boatmaster shall be able to:

- *Organise the safe maintenance and repair of the craft and its equipment"*

Basically, it is up to the skipper to organize maintenance and repair as in regular operation. Depending on whether the skipper is to be responsible for this, this part will take correspondingly more time.

„2.6 Communication



The boatmaster shall be able to:

- *perform human resources management, be socially responsible, and take care of the organisation of workflow and training on board the craft;*
- *ensure good communication at all times, which includes the use of standardised communication phrases in situations with communication problems;*
- *foster a well-balanced and sociable working environment on board."*

The skipper can perform the tasks. The larger the association, the more people work at the operational level. Therefore, the shipmaster will basically have to manage more personnel and bear more responsibility.

„2.7 Health and safety, passenger rights and environmental protection

The boatmaster shall be able to:

- *Monitor the applicable legal requirements and take measures to ensure the safety of life;*
- *Maintain safety and security for persons on board, including providing direct assistance to disabled persons and persons with reduced mobility in accordance with the training requirements and instructions of annex iv of regulation (eu) no 1177/2010;*
- *Set-up emergency and damage control plans, and handle emergency situations;*
- *Ensure compliance with requirements for environmental protection."*

In principle, the skipper can perform the tasks unchanged. However, the support of physically impaired persons and the management of emergencies is not guaranteed as usual. The physical presence allows to perceive the atmosphere and to react individually to the needs of the persons and the situational challenges. Therefore, the question arises whether platooning should be used in passenger shipping at all and under what conditions. Of course, organizational solutions can be found for these problems and, for example, the responsibility of the skipper can be delegated to the rest of the crew. Regardless of passenger shipping, the area to be controlled becomes larger depending on the size of the convoy.

Summary:

Platooning will reduce the scope of navigational tasks. Therefore, a skipper will not be required on every ship in regular operation. Because platooning involves more independent ships, controls and organizational measures will require more time in the future. In addition, it is questionable whether sufficiently reliable technology is available for emergency manoeuvres. In the ADN area, as well as in passenger shipping, special rules apply to cargo or passenger safety. It is questionable to what extent individual measures can be taken over by technologies in individual cases.

Based on the previous assumptions, the following is recommended regarding possible European manning regulations:

- In platooning, in principle, the crew of the front vessel should be sufficient if a reliable technology exists.
- If the principle that a skipper must be present on a traditionally operated ship is to be adhered to, then another skipper must be present for each ship required by current law. Otherwise, the convoy would be unfairly privileged compared to a set of traditionally operated vessels, although the tasks are more complex due to the size of the convoy. This person must be able to visit the rear vessels with a boat. Therefore, it is imperative that a suitable boat be kept on hand, as well as the ability to access the aft vessels. If there are always two skippers on duty, skippers must be subject to a hierarchy. One of the skippers must be centrally responsible.
- There must be one person on each vessel of the platoon to perform emergency manoeuvres. This requirement can be waived if the emergency manoeuvre can be reliably taken over by technology.

6.3.4 Remote control

Considering the crew regulations, remote control consists of the spatial separation of the control station and the ship. The extent to which individual functions are automated and therefore the crew will be partially dispensable is the subject of further assistance systems and the associated crew relief.



Nevertheless, the question arises as to whether the skipper will be able to perform his or her duties fully from a distance or will have to be compensated for by additional crew. Another question is whether the skipper should be able to control several ships at the same time.

"2.0 Supervision

The boatmaster shall be able to:

- *Instruct other deck crew members and supervise the tasks they exercise, as referred to Section 1 of this Annex, implying adequate abilities to perform these tasks."*

The skipper can assign tasks to the crew via remote control. However, he cannot explain or control tasks on site. Control would be entirely via video surveillance or when a skipper is temporarily on board.

"2.1 Navigation

The boatmaster shall be able to:

- *Plan a journey and conduct navigation on inland waterways, including being able to choose the most logical, economic and ecological sailing route to reach the loading and unloading destinations, taking into account the applicable traffic regulations and agreed set of rules applicable in inland navigation;*
- *Apply knowledge of the applicable rules on the manning of craft, including knowledge on resting time and on deck crew members composition;*
- *Sail and manoeuvre, ensuring the safe operation of the craft in all conditions on inland waterways, including in situations that involve high traffic density or where other craft carry dangerous goods and require basic knowledge on the European agreement concerning the international carriage of dangerous goods by inland waterways (adn);*
- *Respond to navigational emergencies on inland waterways."*

In principle, the skipper can also navigate the ship from remote operation. It is problematic when navigational emergencies such as

- Failure of the connection to the ship
- Failure of the propulsion
- Failure of the rudder

occur. If the skipper is still able to act on the ship, he or she can (if the technical conditions are given) initiate the emergency manoeuvres like a skipper on the ship. If the connection to the ship is completely disrupted, e.g. due to loss of the Internet connection or an error in the software, considerable dangers can arise. How to deal with this potential danger is questionable.

The first solution would be a technical mechanism. The technical mechanism would have to reliably initiate a rescue manoeuvre in case of failure of the electronics, the rudder, the drive or the control signal (loss of internet connection). Whether sufficient reliable and safe technologies already exist would need to be researched. As a first step, the criteria for sufficient rescue manoeuvres would have to be established. The next step would be to investigate the functionality of corresponding products.

The second possible solution is to address this danger in terms of personnel. For example, a skipper on call could be required on the ship. However, on-call duty is only effective if the skipper is informed in good time that the connection has been broken and can also initiate the necessary manoeuvre in good time. Consideration may also be given to whether it is sufficient for a crew member to monitor the operation of the remote control and initiate a rescue manoeuvre if necessary. However, the initiation of a rescue manoeuvre by a crew member is problematic. First, it would have to be ensured that the crew member in question is capable of performing a rescue manoeuvre. Crew members are not skippers and therefore not trained to steer the ship independently in challenging situations. The lack of competence could be countered with an additional qualification. For example, the qualification of expert for remote operations could be introduced. Nevertheless, the problem remains that, according to law of the EU, the skipper is centrally responsible for the ship's command and is trained precisely for these cases. In fact, a crew member can navigate a ship under the supervision of the skipper. However, this mechanism would be reduced to absurdity. This is because regular operations would be left to the ship's master, even though the crew could cover them to a large extent. On the other hand, the difficult dangerous situations would be left to the crew. However, if the skipper were required to be on call and at the same time a skipper in remote control, the technology would become

less economical and therefore less attractive.³⁵ The problem would be alleviated if the shipmaster in remote control could, for example, operate several ships simultaneously with the help of persons at operating level.

"2.2 Operation of craft

The boatmaster shall be able to:

- *Apply knowledge of inland waterway shipbuilding and construction methods to the operation of various types of craft and have basic knowledge of the technical requirements for inland waterway vessels, as referred to in Directive (EU) 2016/1629 of the European Parliament and of the Council (1);*
- *Control and monitor the mandatory equipment as mentioned in the applicable craft certificate."*

The problem is that the skipper cannot carry out the checks on the required equipment. He cannot physically check the equipment, but would have to rely on video surveillance. However, this cannot suffice because no functional check can take place. Delegating these tasks to a crew member would be factually possible, but legally a change. Until now, the skipper has been centrally responsible for the ship. He is trained precisely for the task. If the crew is to take over the management tasks because the ship's master cannot perform them due to the distance to the ship, many people are responsible. In order to ensure safe ship operation nevertheless, the persons in charge would have to be trained. The area for which the persons are responsible would also have to be defined in a verifiable manner. The definition could then be made within the framework of the ship's log. However, this would require a change in the logbook. Thought must also be given to who should be able to carry out checks. Alternatively, inspections can be carried out by skippers who visit the ship for the purpose of inspections etc.

„2.3 Cargo handling, stowage and passenger transport

The boatmaster shall be able to:

- *Plan and ensure the safe loading, stowage, securing, unloading and care of cargoes during the voyage; L 345/82 Official Journal of the European Union 27.12.2017 EN (1) Directive (EU) 2016/1629 of the European Parliament and of the Council of 14 September 2016 laying down technical requirements for inland waterway vessels, amending Directive 2009/100/EC and repealing Directive 2006/87/EC (OJ L 252, 16.9.2016, p. 118).*
- *Plan and ensure the stability of the craft;*
- *Plan and ensure the safe transport of and care for passengers during the voyage, including providing direct assistance to disabled persons and persons with reduced mobility in accordance with the training requirements and instructions of Annex IV of Regulation (EU) No 1177/2010."*

The skipper can basically check and give instructions on the loading process via the video cameras and microphone, even in remote operation. However, he cannot physically intervene and check in detail, for example, whether a hose has been correctly tied down for filling. With a correctly instructed crew, there should be no significant risks in this respect.

"2.4 Marine engineering and electrical, electronic and control engineering

The boatmaster shall be able to:

- *Plan the workflow of marine engineering and electrical, electronic and control engineering; – monitor the main engines and auxiliary machinery and equipment;*
 - *Plan and give instructions in relation to the pump and the pump control system of the craft;*
 - *Organise the safe use and application, maintenance and repair of the electro-technical devices of the craft;*
 - *Control the safe maintenance and repair of technical devices."*

³⁵ Although the regulation may favor 24-hour sailing.

The skipper can also perform organizational tasks from remote operation. In contrast, controlling activities are only possible by means of sensor technology. Therefore, the skipper can only perform tasks to a limited extent. As far as the tasks are to be transferred to members of the crew, the consideration to 2.2 applies accordingly.

“2.5 Maintenance and repair

The boatmaster shall be able to:

- *Organise the safe maintenance and repair of the craft and its equipment”*

The skipper can perform the tasks. Restrictively, the skipper is held only by video or audio transmission.

„2.7 Health and safety, passenger rights and environmental protection

The boatmaster shall be able to:

- *Monitor the applicable legal requirements and take measures to ensure the safety of life;*
- *Maintain safety and security for persons on board, including providing direct assistance to disabled persons and persons with reduced mobility in accordance with the training requirements and instructions of annex iv of regulation (eu) no 1177/2010;*
- *Set-up emergency and damage control plans, and handle emergency situations;*
- *Ensure compliance with requirements for environmental protection.”*

In principle, the skipper can perform the tasks unchanged. However, the support of physically impaired persons and the management of emergencies is not guaranteed.

Another question concerning the crew is how many vessels a skipper from the remote operation should be able to lead at the same time. Until now, the question did not arise because it was mandatory for the skipper to be present on the vessel. It is an open secret that the experienced shipmaster is often not fully utilized in regular operations. However, it is impossible to estimate whether a skipper can control two ships at the same time. A technical basis does not exist. Therefore, a scientific study would be feasible as well as reasonable considering the economic potentials. Thus, the survey would not necessarily have to be carried out in a ship, but would also be possible in the simulators. In this context, it would have to be taken into account that the skipper would not necessarily have to stand at the helm himself. It would be sufficient if a person at the operating level operated at the control station and the skipper supervised and intervened in a coordinating manner. The person at the operating level could not only be on the ship, but also in the remote control centre. If the person is to be in the remote control centre, the person is not part of the crew. Therefore, the qualification would have to be required by law. To ensure that the person has sufficient experience, he or she should be at least a boatman. If the person is to work on the ship, an additional person would be required for each skipper if the current manning requirements are to be maintained. This is because there used to be one skipper per vessel. If the skipper now only has a coordinating role and is expected to intervene in an emergency, he will only be available to the ship on a pro rata basis. To compensate for his working time, another person would have to be made available at operating level for each required shipmaster. Otherwise, the remote operation would be privileged in terms of manning density

Recommendations:

- Remote operations must dispense with the requirement for a skipper permanently on the vessel and on duty. Because remote operation naturally assumes that regular navigation is working. It is questionable whether controls and instructions to the perhaps less experienced remaining crew are sufficient. To find out, a functional analysis as well as an analysis of risk may be useful.
- It may be possible for the skipper in remote operation to manage several vessels at the same time. However, he or she will need another person at the operating level per helm for this task. How many ships can be coordinated simultaneously is uncertain. Scientific studies could be conducted on this. The existing simulators could be used for this purpose.
- Whether a skipper can lead several ships at the same time without further assistance cannot be judged. There is no factual basis. Studies on this topic could also take place on the existing simulators. The existing simulators could be used for this purpose.
- In case of failure of steering commands during remote operation, a person must be able to perform a rescue manoeuvre. One possibility is to consider a ship's master on call as



necessary. An alternative would be to have the existing crew perform the manoeuvre. However, the crew would need to be properly trained. It would be appropriate to introduce a new qualification as "remote operations expert". If emergency manoeuvres were reliably driven by the software, no crew would be needed for this task.

6.3.5 Autonomous sailing

Inherent in autonomous sailing is that the ship moves without human action. Therefore, of course, the question is not to what extent crew functions are replaced by technologies. In the case of autonomous sailing, it is more questionable whether the legislature will not require a minimum crew when the technologies are introduced, in order to test the systems in practice and enable intervention in the event of technical malfunctions. The approach could possibly also help to promote social acceptance of autonomous systems.

Another question is whether unmanned vessels should be used in the passenger shipping sector or for the transport of dangerous goods. In the area of passenger shipping, the crew not only has the function of ensuring the operation of the ship, but also of taking care of the passengers. This care is particularly necessary in exceptional situations, such as when passengers are physically impaired or in the event of an accident. Non-standard rescue measures may also be required when transporting dangerous goods in order to prevent damage. There is also a risk of unauthorized persons boarding the ship. In those cases, the unauthorized persons may not know that dangerous goods are being transported and may negligently cause damage or the damage may be intentionally caused. For example, a number of teenagers might go on a tanker to barbecue in the summer, even though the liquid being transported is highly flammable. Those scenarios are, of course, worst-case scenarios, but they can still occur.

In light of the above considerations, no specific recommendation is made. Nevertheless, it is suggested that the legislature consider the following before enabling autonomous shipping:

- Should a minimum crew be required as long as autonomous sailing has not been sufficiently tested in practice?
- Should autonomous sailing also be used for the transport of dangerous goods or in the area of passenger shipping?

6.3.6 Assistance systems

Ships are gradually being equipped with new technologies. Therefore, ships may operate autonomously in many areas, but still require human intervention in some areas. For example, the ship may be fully autonomous, but docking currently still requires human action (automated assistance systems e.g. magnetic docking are being developed). Or a ship may be certified as autonomous, but a single technology does not work. In those cases, consideration must be given to whether full manning should be retained or manning should be mandatory only to the extent that it is technologically necessary.

If crew facilitation is to be required even to that extent, a uniform regulation recognized by all member states is appropriate. Within the framework of this regulation it makes sense to regulate a functional consideration. Accordingly, the necessary tasks of the full crew should first be described. The crew could then be dispensed with, insofar as the tasks (this includes emergency manoeuvres) are performed automatically. In those cases, the crew would be measured only on the basis of technical requirements.

At this point, it is questionable whether manning relief can be structured based on degrees of automation. From the automation levels, it is undoubtedly clear that at automation level 0, no crew facilitation is to be considered and at automation level 5, no crew will be required to operate the ship. The automation levels are designed to be very abstract. It is not clear from the automation procedures which tasks that are absolutely necessary for ship operation must be performed by a person. Only on the basis of the task can it be judged which nautical qualification the person needs and how many people are required. For automation level 4, an example is that a ship cannot enter a lock autonomously. At this point it is questionable which activity has to be taken over concretely. It makes a difference if the problem is the fastening with a rope or if the vessel has to be steered into the lock. If both tasks have to be done by the crew, there is no room for permission to sail with less crew. Without a full crew, the vessel could not be safely navigated into the lock. It would be different if the

vessel could be automated into the lock, but not automatically moored with a rope. In those cases, the task of navigation would be completely eliminated. Therefore, less manning can be considered. Based on the above considerations, the levels of automation cannot be used for crew facilitation.

Assuming political will for crew facilitation, it is questionable whether crew facilitation should be governed by a discretionary provision or by a tabulation. Under a discretionary provision, the decision on the occupation provision is delegated to the appropriate authority. It can then consider how much manning can be waived. The advantage is that a discretionary provision allows for a very individual decision and unforeseen developments can be taken into account. The disadvantage is that the responsible authorities will not always make uniform decisions. This circumstance may lead to a decrease in the acceptance of official decisions within the member states. Applicants will increasingly turn to the authorities that make less stringent decisions. If there were a uniform tabular regulation, which tasks are to be fulfilled by the crew and in which cases, ships with less crew would be allowed to sail, the disadvantages mentioned above would be eliminated. Entrepreneurs would also be able to make economic decisions. Because they would have a planning security, with which investment they could save stuff. Even if the table requires legislative effort, the solution would be preferable. In order to compensate for cases of hardship, an additional discretionary provision could be introduced for exceptional cases.

In light of these considerations, the following is recommended:

- A uniform solution for occupation facilitation is needed.
- Automation levels are initial indications of crew facilitation. However, crew facilitation cannot be determined based on automation levels without departing from existing safety standards.
- The rule should make crew facilitation mandatory for partial automation.

6.4 Smart shipping: technical requirements

The European Standard laying down technical requirements for inland waterway vessels (ES-TRIN) of the European Committee for Drafting Standards for Inland Navigation (CESNI) is the official standard for the construction of inland waterway vessels as it is for automatic vessels with remote control³⁶. Problems arising from the ES-TRIN and/or possible solutions are discussed below. Furthermore, we have linked this standard to a risk analysis done in Belgium (this is a first draft, the document has to evolve in the future and is therefore not published in public) on the safety issues in automatic navigation with the challenges that need to be addressed first. The risk analysis³⁷ is numbered per risk category and each category has received a specific identification number. This number is added and linked in red below each article.

Chapter 3: Shipbuilding requirements

Article 3.03 "Hull"

"Doors in the aft-peak bulkhead and penetrations, in particular for shafts and pipework, shall be permitted where they are so designed that the effectiveness of those bulkheads and of the separation of areas is not impaired. Doors in the aft-peak bulkhead shall be permitted only if it can be determined by remote monitoring in the wheelhouse whether they are open or closed and shall bear the following readily legible instruction on both sides: 'Door to be closed immediately after use'."

Except for remote monitoring, the regulations do not prescribe remote operation of the doors and imply that the doors must be operated by human intervention. Remote monitoring in the wheelhouse if the doors are installed in the aft peak bulkhead. The provision prescribes human intervention and prevents remote operation. This poses a bottleneck for automatically operated remote vessels as for autonomous vessels. A possible operational solution is to check doors of the vessel before departure by a person that is not necessary on board during the trip. Another more technical solution is to install an analogue alarm which is an electrical coupling of alarm panel in wheelhouse and to install a digital alarm which is coupled with PLC.

³⁶ Technische voorschriften (PT) - CESNI - Comité Européen pour l'Élaboration de Standards dans le domaine de la Navigation Intérieure (edition 2023/1)

³⁷ Risk analysis is drafted by DVW and is not published in public. For more information, contact DVW via binnenvaartinnovatie@vlaamsewaterweg.be



Reference: Risk analysis: 60

Article 3.04 “Engine and boiler rooms, bunkers”

“Walls, ceilings and doors of engine rooms, boiler rooms and bunkers shall be made of steel or another equivalent non-combustible material. Insulation material used in engine rooms shall be protected against the intrusion of fuel and fuel vapours. All openings in walls, ceilings, and doors of engine rooms, boiler rooms, and bunker rooms shall be such that they can be closed from outside the room. The locking devices shall be made from steel or another equivalent non-combustible material.”

This is a bottleneck for automated or remotely operated (level 4 and below)

To prevent the spread of fire from engine rooms, boiler rooms and bunkers, the provision requires all openings in the walls to be closed from the outside. The provision requires human intervention and prevents remote operation.

Possible operational solution is that openings except ventilation should be closed before departure. Ventilation should be stopped and closed remotely and a checklist can be used before departure.

Possible technical solution:

- Ventilation on/off from Shore Control Center (SCC), electrical coupling
- Automatic closing of hatches?

Procedure: if someone on board is available, the procedure can be adapted for this purpose.

If no one on board: technical solution by automatically closing the hatch? Problem of electrical power supply (in case of fire) + vent pipes

Risk analysis: 73

Chapter 4: Safety clearance, freeboard and draught scales

Article 4.04: “Draught scales”

“1. Vessels whose draught may exceed 1 m shall bear a draught scale on each of their sides towards the stern; they may bear additional draught scales.

2. The zero points on each draught scale shall be taken vertically to this within the plane running parallel to the plane of maximum draught passing through the lowest point of the hull or of the keel where such exists. The vertical distance above the zero point shall be graduated in decimetres. That graduation shall be located on each scale, from the unladen water line up to 100 mm above the maximum draught by means of punched or chiselled marks, and shall be painted in the form of a highly-visible band in two alternating colours. That graduation shall be identified by figures at a distance of every five decimetres marked next to the scale as well as at the top of the scale. ES-TRIN Chapter 4 Safety clearance, freeboard and draught scales Edition 2021/1 Page 22

3. The two stern measurement scales affixed pursuant to the 1966 Convention on the Measurement of inland navigation vessels may replace the draught scales, provided that they include a graduation that meets the requirements plus, where appropriate, figures indicating the draught.”

Based on the draught scales, the actual draught of the vessel can be determined for the purpose of voyage preparation and navigation routes to be taken, which in itself requires human intervention. It is possible to do this remotely if enough information of the vessel is available. Implementing depth sensors on board is an option, but not enough to guarantee the correct actual draught of the vessel.

Risk analysis: 32 – 36 – 47 – 42

Article 4.05: “Specific requirements applicable to vessels navigating on zone 4 waterways”

“1. By way of derogation from Article 4.01 the safety clearance of doors and openings other than hold hatches for vessels navigating on Zone 4 waterways is reduced as follows: a) for openings which can be closed spray-proof and weathertight, to 150 mm; b) for openings which cannot be closed spray-proof and weathertight, to 200 mm.

2. By way of derogation from Article 4.02, the freeboard of vessels navigating on Zone 4 waterways may not be less than 0 mm, if the safety clearance according to (1) is respected.”



Closing doors and cargo holds may require human intervention. If this is the case, it can be done by only one person and this person is not necessarily a crew member. It can also be done before departure. A possible solution is to prepare a checklist to be done before departure by shore personnel (not necessarily on board during the voyage) under the supervision of the master in SCC.

Chapter 5: Manoeuvrability

Article 5.02: "Navigation tests"

- "1. Navigability and manoeuvrability shall be checked by means of navigation tests. Compliance with the requirements of Articles 5.06 to 5.10 shall, in particular, be examined.*
- 2. The inspection body may dispense with all or part of the tests where compliance with the navigability and manoeuvrability requirements is proven in another manner."*

It forms a bottleneck for automated and autonomous vessels because the vessel is steerable from an SCC. The entire trial shall also be conducted from the SCC in addition to the prescribed navigation test. A possible solution is that the procedure Committees of Experts will conduct trials also from the SCC.

Risk analysis: 32 – 46 – 43 – 21

Article 5.05: "Use of on-board facilities for navigation test"

- "1. During the navigation test, all of the equipment referred to in items 34 and 52 of the inland navigation vessel certificate which may be actuated from the wheelhouse may be used, apart from anchors.*
- 2. However, during the test involving turning into the current referred to in Article 5.10, bow anchors may be used."*

This provision requires human intervention and prevents remote operation. Devices that are operated from the steering position should be operable from the SCC.

Risk analysis: 32 – 46 – 43 – 21

Chapter 6: Steering system

Article 6.04: "Power source":

- "1. Steering systems fitted with two powered drive units shall have at least two power sources.*
- 2. If the second power source for the powered steering apparatus is not constantly available while the vessel is under way, a buffer device carrying adequate capacity shall provide back-up during the period needed for start-up.*
- 3. In the case of electrical power sources, no other power consumers may be supplied by the main power source for the steering system."*

This requirement prevents remote control of the vessel security functions from another vessel or other remote location, but does not preclude partially unmanned operations.

Controlling the steering system should also be done from two power sources. A technical solution would be to make use of two independent energy sources in parallel.

Risk analysis: 15 – 53 – 37 – 52

Article 6.06: "Rudder-propeller, water-jet, cycloidal-propeller and bow-thruster systems"

- "1. Where the thrust vectoring of rudder-propeller, water-jet, cycloidal-propeller or bow thruster installations is remotely actuated by electric, hydraulic or pneumatic means, there shall be two steering controls, each independent of the other, between the wheelhouse and the propeller- or thruster-installation which, mutatis mutandis, meet the requirements of Articles 6.01 to 6.05. Such systems are not subject to this paragraph if they are not needed in order to achieve the manoeuvrability required by Chapter 5 or if they are only needed for the stopping test.*
- 2. Where there are two or more rudder-propeller, water-jet or cycloidal-propeller installations that are independent of each other the second actuation system is not necessary if the vessel retains the manoeuvrability required by Chapter 5 if one of the systems fails."*



The same bottleneck as in Article 6.04 “Power source” occurs. The two independent control systems must be met if no independent propulsion is present. This also means that there must also be a dual or independent communication line between SCC and vessel.

This requirement is vessel-specific and is separate from the system to remotely control the vessel. If this already applies to the existing vessel, then in principle it should already be in place.

Risk analysis: 15 – 53 – 37 – 52

Article 6.07: “Indicators and monitoring devices”

“1. The rudder position shall be clearly displayed at the steering position. If the rudder-position indicator is electric it shall have its own power supply.

2. An optical and acoustic alarm shall be present at the steering position to signal the following:

- a) oil level of the hydraulic tanks falling under the lowest content level in accordance with Article 6.03(2) and decrease of service pressure of the hydraulic system;*
- b) failure of the electrical supply for the steering control;*
- c) failure of the electrical supply for the drive units;*
- d) failure of the rate-of-turn regulator;*
- e) failure of the required buffer devices.”*

Signalling and alarms should be available in SCC instead of on board of the vessel to signal problems with automation system or communication. The signals has to be displayed in the SCC.

Chapter 7: Wheelhouse

Article 7.01: “General”

“1. Wheelhouses shall be arranged in such a way that the helmsman may at all times perform his task while the vessel is under way.

2. Under normal operating conditions, sound pressure generated by the vessel and measured at the level of the helmsman’s head at the steering position shall not exceed 70 dB(A).

3. Where a wheelhouse has been designed for radar navigation by one person, the helmsman shall be able to accomplish his task while seated and all of the display or monitoring instruments and all of the controls needed for operation of the vessel shall be arranged in such a way that the helmsman may use them comfortably while the vessel is under way without leaving his position or losing sight of the radar screen.”

In this article, the wheelhouse and helmsman reflect the human-interactive design of vessels and is thus superseded in the case of unmanned operations. It prevents remote control of the vessel safety functions from another vessel or other remote location, but does not preclude partially unmanned operations.

The wheelhouse has to be replaced by the SCC. “The SCC shall be arranged in such a way that the helmsman may at all times perform his task while the vessel is under way.”

Risk analysis: 46 – 43 – 45 – 44 – 19

Article 7.06: “Navigation and information equipment”

“1. Navigational radar installation and rate-of-turn indicators shall fulfil the requirements laid down in Annex 5. Compliance with these requirements shall be determined by a type-approval issued by the competent authority.

2. Inland ECDIS equipment which can be operated in navigation mode shall be regarded as navigational radar installation. It shall meet the requirements of the Inland ECDIS standard. The requirements of Annex 5 must be complied with.

3. Inland AIS equipment shall meet the requirements of the current Test Standard for Inland AIS. The requirements of Annex 5 must be complied with.

4. The rate-of-turn indicator shall be located ahead of the helmsman and within his field of vision.

5. In wheelhouses designed for radar navigation by one person:

- a) the radar screen shall not be shifted significantly out of the helmsman’s axis of view in its normal position;*



- b) *the radar image shall continue to be perfectly visible, without a mask or screen, whatever the lighting conditions outside the wheelhouse;*
- c) *the rate-of-turn indicator shall be installed directly above or below the radar image or be incorporated into this."*

The vision for the future is for navigation and information equipment in SCC to be compliant as well, including type approvals. Furthermore, SCC should also be seen as a one-man steering position for radar navigation.

Risk analysis: 84 – 29

Article 7.07: "Radio telephony systems for vessels with wheelhouses designed for radar navigation by one person"

- "1. Where vessel wheelhouses have been designed for radar navigation by one person, reception from the vessel to vessel networks and that of nautical information shall be via a loudspeaker, and outgoing communications via a fixed microphone. Send/receive shall be selected by means of a push-button. It shall not be possible to use the microphones of those networks for the public correspondence network.*
- 2. Where vessel wheelhouses designed for radar navigation by one person are equipped with a radio telephone system for the public correspondence network, reception shall be possible from the helmsman's seat."*

The regulations for the VHF radio system should also apply to the SCC.

Future vision on the requirement is that the SCC should be seen as a one-man steering position for radar navigation.

VHF systems should also be operable from the SCC. In any case, it should be possible to listen out on the various channels and the helmsman in the SCC should also be able to speak on the necessary channels.

Risk analysis: 46 – 43 – 21 – 44

Article 7.11: "Stern-anchor operating equipment"

- "On board vessels and convoys whose wheelhouse has been designed for radar navigation by one person and exceeding 86 m in length or 22,90 m in breadth it shall be possible for the helmsman to drop the stern anchors from his position."*

This requires the immediate involvement of a human operation. The stern anchors should be operable from the SCC instead of by the helmsman on board.

Chapter 8: Engine Design

Article 8.05: "Fuel tanks, pipes and accessories"

- "13. Fuel tanks directly supplying the propulsion engines and engines needed for navigation shall be fitted with a device emitting both visual and audible signals in the wheelhouse if their level of filling is not sufficient to ensure further safe operation."*

A number of activities linked to safety in normal and emergency situations are monitored or controlled from the wheelhouse. This prevents remote control of the vessel safety functions from another vessel or other remote location, but does not preclude partially unmanned operations. In the future vision, a too low fuel level requires optical and acoustic signal in SCC.

Risk analysis: 77 – (13) 6

Chapter 9: Emission of gaseous and particulate pollutants from internal combustion engines **(1)**

Chapter 10: Electrical equipment and installations

Article 10.17: "Navigation lights"



- "1. Switchboards for navigation lights shall be installed in the wheelhouse. They shall be supplied by a separate cable from the main switchboard or by two independent secondary networks.*
- 2. Navigation lights shall be supplied, protected and controlled separately from the navigation lights switchboard.*
- 3. A failure of the device according to Article 7.05(2) shall not impair the operation of the navigation lights which it monitors.*
- 4. Several signal lamps forming a functional unit and installed together at the same point may be jointly supplied, controlled and monitored. The monitoring device shall be capable of identifying the failure of any one of these lights. It shall not be possible to use both light sources in a double light (two lights mounted one above the other in the same housing) simultaneously."*

If usually the vessels' PLC is used, there is in principle no problem to control and also monitor the navigation lanterns. A possible solution in the future is for the alarms, if a navigation lantern falls out, it should be possible to detect this in the SCC. That means that if an alarm does not go through the PLC, then it will have to be captured separately. It is important to guard that the control and safety functions remain separate.

Risk analysis: 46 - 43

Chapter 11: Special provisions applicable to electric vessel propulsion

Article 11.01: "General provisions for electric vessel propulsion"

"4. If the electric propulsion motors are fed by batteries or accumulators, their capacity must be monitored and displayed.

It must be ensured that the capacity of batteries or accumulators shall enable the safe reaching of a berth under the craft's own power at all times and under all conditions.

In the event of a drop of the capacity of batteries or accumulators to the minimum residual capacity required pursuant second sentence, an optical and acoustic alarm is to be triggered and displayed in the wheelhouse."

Reaching the residual capacity of the batteries and accumulators referred to in the second sentence shall be signalled by an optical and audible alarm and shall be readable in the wheelhouse. A possible technical solution is that the residual capacity of batteries and accumulators requires optical and acoustic signal in SCC keeping in mind that monitoring and safety functions must remain separate.

Risk analysis: 13 - 79 - 78

Article 11.04: "Power electronics for electric vessel propulsion"

"1. The power electronics requirements according to Articles 10.18 and 10.20 shall apply with the following provisions.

2. Power electronics must be designed for the anticipated loads, including overload and short circuit, during all operating and manoeuvring conditions.

3. If power electronics are force-cooled, they must, if their cooling system fails, be able to continue operating with reduced power while ensuring, at a minimum, in the case of electric main propulsion, that the craft is capable of making steerageway under its own power. In the event of a failure of the cooling system, an alarm is to be triggered and displayed in the wheelhouse.

4. Excitation circuits, the failure of which can endanger safe operation, may only be protected against short circuits."

The rule requires immediate involvement of a human operator and thus precludes unmanned operations. A possible solution in the future will be that there is an optical and acoustic signal in SCC required in the cooling system instead of in the wheelhouse.

Risk analysis: 79 - 78

Chapter 12: Electronic equipment and systems (/)



Chapter 13: Equipment

Article 13.03: “Portable fire extinguishers”

“1. There shall be at least one portable fire extinguisher in accordance with the European Standards EN 3-7 : 2007 and EN 3-8 : 2007 at each of the following places:

- a) in the wheelhouse;*
- b) close to each entrance from the deck to accommodation spaces;*
- c) close to each entrance to service spaces which are not accessible from the accommodation spaces and which contain heating, cooking or refrigeration equipment using solid or liquid fuels or liquefied gas;*
- d) at each entrance to engine rooms and boiler rooms;*
- e) at suitable points below deck in engine rooms and boiler rooms such that no position in the space is more than 10 metres walking distance away from an extinguisher.”*

In the case of unmanned vessels, fire protection will have to be considered separately and portable fire extinguishers will have to be replaced with automatic extinguishers, for example.

Chapter 14: Safety at work stations

Article 14.01: “General”

“1. Vessels shall be built, arranged and equipped in such a way as to enable persons to work and move about in safety in passageways.

2. Permanently installed facilities that are necessary for working on board shall be arranged, laid out and secured in such a way as to permit safe and easy operation, use and maintenance. If necessary, mobile or high-temperature components shall be fitted with protective devices.”

In the future vision, if instruments are installed to automatically dock in the lock or at a quay, these should not prevent the normal passage of workers.

Since remotely operated or even autonomous vessels will usually not have a wheelhouse on board, it is not necessary to discuss the following chapters, as they focus on people living on board and discuss the equipment and establishment of the wheelhouse and the accommodation on the vessel.

- Chapter 15: Accommodation
- Chapter 16: Fuel-fired heating, cooking refrigerating equipment
- Chapter 17: Liquefied gas installations for domestic purposes
- Chapter 18: On-board sewage treatment plants

Furthermore, the special provisions are also not applicable for inland vessels:

- Chapter 19 special provisions applicable to passenger vessels
- Chapter 20 special provisions applicable to passenger sailing vessels not navigating on the rhine (zone r)
- Chapter 21 special provisions applicable to craft intended to form part of a pushed or towed convoy or of a side-by-side formation
- Chapter 22 special provisions applicable to floating equipment
- Chapter 23 special provisions applicable to worksite craft
- Chapter 24 special provisions applicable to traditional craft
- Chapter 25 special provisions applicable to sea-going vessels
- Chapter 26 special provisions applicable to recreational craft

Chapter 27 special provisions applicable to vessels carrying containers

Article 27.04: “Procedure for assessing stability on board”



"The procedure for assessing stability may be determined by the documents referred to in Article 27.01(2):

"Stability documents shall provide the boatmaster with comprehensible information on vessel stability for each loading condition. Stability documents shall include at least the following:

- a) information on the permissible stability coefficients, the permissible \overline{KG} - values or the permissible heights for the centre of gravity of the cargo;*
- b) data concerning spaces that can be filled with ballast water;*
- c) forms for checking stability;*
- d) instructions for use or an example of a calculation for use by the boatmaster."*

The requirement prevents remote control of vessel safety functions from another vessel or remote location, but does not preclude partially unmanned operations.

Risk analysis: 48 – 47 – 59 – 57 – 24 – 5

From what has been said, it is clear that the ES-TRIN standard is focused on human action. If the vessel is to operate in a fully or partially automated manner, the standards must be modified. Autonomous navigation as well as crew facilitation in the area of technologies remote control are hardly compatible with the current standards.

In addition, the standards do not cover areas such as software for (partial) automation or for a remote control center (setup, technical setup, internet connection requirement) or a wheelhouse of a platooning convoy. If the technologies are to be enabled, the standards should be expanded.

6.5 Smart shipping: additional consideration

6.5.1 Remote control: general consideration

6.5.1.1 Use of remote operation

First of all, the basic question to the legislator is how remote operation should be used in perspective. Basically, there are three models:

- The shipmaster in remote operation completely replaces the shipmaster previously on the ship.
- Remote operation is used as redundancy. For example, remote operation can be used as a fallback level for autonomous sailing or for persons with limited fitness.
- Remote operation extends an existing crew and allows for a longer form of operation in those cases.

When using remote control, it is of course questionable whether it should be used in all branches of shipping. Consideration should be given to passenger shipping or the transport of hazardous goods. Because remote operation is not yet widely used, there is not yet sufficient evidence to determine whether remote operation is as safe as regular shipping. It is therefore conceivable that the particularly sensitive areas of inland navigation could initially be excluded from remote operation. As soon as empirical values are available, approval could then be granted for the sensitive areas as well. However, there is no legal background for these considerations. The considerations are merely intended to show what legal possibilities might exist. In the end, the legislator must decide whether and how remote operation should be used.

6.5.1.2 Certification as boatmaster

The following discusses whether remote operation requires a specific certification. Differing conditions are experienced by the skipper with regard to

- The restricted perception of the ship and the environment as well as
- The limited possibility to act.

Depending on the design of the dislocated helm, the skipper has to guide a ship remotely with possibly deviating equipment. Whether this circumstance already requires an additional certificate of competence also depends on the subsequent design of the workplace.



The skipper in remote operation has only a more limited perception of the environment. In regular ship operation, the skipper can essentially fall back on four sensory perceptions, namely the

- Optical,
- Acoustic
- Tactile and
- Olfactory perception (smell)

In remote operation, visual perception is limited by the camera perspective. It is uncertain whether acoustic environmental effects should also be transmitted to the control station. Olfactory perception is omitted. In addition to perception, the scope for action in the event of an accident or malfunction is also limited to the technically possible access. The skipper has no possibility to intervene manually. The lack of access affects, for example, hazard investigation measures in the event of fire or the possibility of rectifying minor faults himself. The management of accidents etc. also has to take into account the fact that there may be no human being on board. Therefore, the skipper has to manage accidents in a different way. Various additional qualifications for skippers already exist within the framework of the Qualification Directive:

- Sailing on waterways that have been classified as inland waterways with a maritime character
- Sailing on waterways that have been identified as stretches of inland waterways with specific risks
- Sailing with the aid of radar;
- Sailing craft using liquefied natural gas as fuel;
- Sailing large convoys.

These special authorizations were created for cases in which special risks require additional knowledge and competencies. Consequently, a special authorization would also have to be introduced for remote operations. In the design examination, the candidate would then have to be able to demonstrate that he or she is capable of operating the ship remotely and reacting appropriately in hazardous situations.

Furthermore, the question arises as to whether the potentially required certificate of competency should be generally valid or should exclusively entitle the holder to use a specific control station of a remote control centre with the matching vessels. Which variant is appropriate depends on the design of the framework conditions. If there are standardized control stations with a defined number of screens, always the same control instruments, etc., similar competences of the skipper will be requested again and again. In those cases, a general special authorization would be well justifiable. The more individually the control station is designed, the more different is the control of the ship.

6.5.1.3 Control of the skipper and his tasks

Furthermore, it is questionable how the shipmaster as well as the workplace can be controlled. On German territory, ships are inspected as part of a regular traffic control. During these controls, the required documents, the condition of the ship and the skipper are checked. If the skipper is working at another workplace, controls must still be possible. Especially in the case of accidents, it should be possible to question the skipper about what happened and determine whether the skipper was under the influence of intoxicants and whether the workplace is being operated properly. Without basic rules, control would become impossible.

In advance, a mechanism must be in place to ensure that the skipper is identifiable, at least to the competent authorities. The mechanism must be designed in such a way that the skipper and the location of the workplace can be easily assigned to a vessel and on this basis a control can take place. At this point, it should be mentioned that the workplace must also be accessible within the framework of the control. For example, the living space as well as the private life is particularly protected according to Art. 8 European Convention on Human Rights (ECHR). If the legislator also intends to operate remote workstations in private premises, e.g. in the living room, it must be examined in detail to what extent regular controls are legally permissible.

Up to now, the shipmaster is also responsible for carrying the required documents on the ship, the cargo and the crew. If the skipper is not on the ship, it must be regulated where the documents are to be carried and/or filled in. An electronic solution would of course be an obvious choice, as this solution would also enable an unproblematic change from remote operation to regular operation.



6.5.1.4 Control of the skipper and his tasks in cross border situations

Another problem is the cross-border activity. If an accident occurs and the skipper is leading the ship from abroad, the water police cannot easily visit the skipper. In the case of a traditional ship, the skipper would be questioned about what happened.³⁸ In this context, unusual circumstances such as the smell of alcohol or a deficient wheelhouse would be noticed. However, the powers of the domestic water police end at the national border. Accordingly, the domestic police can only ask for investigations by means of a request for administrative assistance. However, this instrument is only partially promising. As a rule, the request for assistance is formulated in the language of the place of collision. The addressed authority would have to translate the document, comprehend its content and decide on the administrative assistance. As a rule, this process will not be completed within a short period of time. If investigations take place, they would be too late. This conflict can be resolved through two mechanisms:

- There is a European basis for simplifying administrative assistance, or
- Remote control is only permitted from within the country. In this case, there would be two possibilities. Either remote operations could only take place within a member state. This solution is hardly conceivable against the background of fundamental freedoms within the EU. The second possibility requires a transfer system to a domestic remote control center. This system would have to guarantee a smooth handover at the border as well as a documentation system.

6.5.1.5 Administrative coercion

It is important to note that even in the case of remote operation, it must be possible to enforce an order from the water police or the fairway authority by means of an administrative coercion. Administrative coercion is used to enforce an enforceable regulation of the administration. For example, a drunken skipper can also be removed from the helm by physical force. If a skipper is obliged to dock and does not comply with this obligation, the water police could go on board, remove the skipper from the wheelhouse and dock the vessel themselves or with the help of the existing crew. The measure of enforcement can be directed against a person, but also against a thing. In the area of remote controls, administrative coercion must also be possible. Otherwise, a grey area is created.

Regarding the skipper: Administrative compulsion against the skipper requires that the location of the remote workplace is known and that the skipper can be assigned to the vessel. If these conditions are met, administrative coercion can in principle be exercised against the skipper. As described above, problems arise when the remote operation takes place from abroad. In those cases, no administrative coercion would be possible without an agreement.

Regarding the ship: Administrative coercion against the ship is possible, but may be more difficult. The water police can, for example, drive the vessel to an anchorage if the skipper is no longer able to drive the ship, e.g. because of alcohol. All in all, it must be taken into account that the water police have so far rarely steered foreign ships. It is problematic that the ships are designed very differently (e.g. size, type of drive, design of the steering position) and accordingly have different sailing characteristics. If administrative coercion is nevertheless to be exercised, a distinction must be made as to where administrative coercion is to be exercised, at the remote workplace or directly on the ship.

Concerning the remote workplace, the water police can of course intervene without any problems. If the administrative coercion is to take place on a vessel, the water police must first get on the vessel, orient themselves, and then steer the vessel to the exclusion of remote control. This procedure can be risky if the skipper wants to prevent the police action. In order to simplify the administrative coercion, it is questionable whether the water police cannot and should not be given higher-ranking access by remote. With this higher-ranking access, the water police could, if the legal requirements are met, control the vessel in remote operation itself (its own remote workstation) to the exclusion of all others. However, this presupposes that the higher-level access functions smoothly from a technical point of view. The water police would have to maintain their own control station and be able to steer almost any ship. In the shipping industry, it is common practice for a skipper to have a new ship shown to him or her first, in order to become familiar with the steering position and special features of the ship. In

³⁸ This aspect is also relevant for liability or withdrawal of qualification.

the case of administrative coercion, this introduction would be omitted. In addition, the water police would have to maintain appropriate personnel for the exercise of administrative coercion. Considering that administrative coercion is currently practiced very little, at least in Germany, it is questionable whether this administrative coercion should be pursued in particular for economic reasons. The legislator is challenged to decide whether this digitalized administrative coercion is desired and whether it can be implemented.

6.5.1.6 Recommendations

- A decision must be made as to how remote control will be used. The choices are complete replacement of the skipper, supplementing an existing crew, or as redundancy, taken into account dealing with existing crew requirements and possible events.
- Based on existing EU rules, it is consequent to require an additional qualification for remote operation. It is open whether this should be effective in general or only for a specific ship-control station combination.
- In the case of remote operation, it must be ensured that a skipper is assigned to the ship and that a steering position is assigned to the skipper. The data must be fully documented and available to the authorities.
- Consideration must be given to whether remote control may also be operated from within the EU or from abroad. In the absence of sufficient cooperation between the administrative units, cooperation would first have to be intensified. Otherwise, there would be a risk that it would be almost impossible to monitor shipmasters in remote operation. An alternative could be a handover system.

6.5.2 Autonomous sailing: general consideration

6.5.2.1 Deployment of autonomous sailing

In advance, of course, it is not yet determined how autonomous sailing will be used. For example, autonomous sailing can of course enable unmanned shipping or as a crew facilitator. Unmanned shipping has the great advantage of being more economical, as there are no personnel costs. The use in the context of crew facilitation has the advantage that persons are on site as contact persons for other persons, in case of technical malfunctions as well as for the execution of controlling activities.

6.5.2.2 Water police measures/ administrative coercion

Furthermore, the police must be able to carry out controls, traffic safety measures and, if necessary, also exercise administrative coercion.

If a crew is on the ship, traffic safety measures or controls are possible without problems as before. For example, a ship can be required to anchor at a certain location. In those cases, the existing crew would be able to change the destination or manually steer the ship to the anchorage. If there is no crew, actions are correspondingly more difficult to design. If the ship is to anchor at a specific point, as in the previous case, it is questionable how to ensure that the ship executes the order. There are three possibilities:

- A responsible person can be reached and can, for example, influence the ship remotely or visit the ship in person in a timely manner.
- The water police can act on the ship on site, overriding automatic control.
- It is possible to act on the vessel electronically. Higher level remote access could be available to the water police.

In principle, all of the above variants can also be used side by side. The first variant, for example, has the great advantage that measures can initially be addressed to a natural person. The person can comment on the matter and cooperate. Also, the process is much easier for the water police. This is because the water police do not have to worry about controlling the vessel, but only about ordering the measure. The disadvantage is if the person is not reachable despite the obligation. Especially if the contact person is in another EU country, access tends to be difficult. Also, the person must not only be reachable, but also have electronic access to the vessel. Otherwise, any action can be explained, discussed and debated, but the water police would have to do it themselves. Assuming the responsible person is reachable and has the required access to the vessel, but is sitting abroad, the water police cannot effectively enforce an order.



Physical access to a vessel is difficult and therefore not realistically feasible in many cases. First, the water police would need to reach the vessel. If the cause of the police action is that the steering or transmission is not functioning, the vessel could drift uncontrolled in the current. Approaching the vessel would already be risky. Reaching the vessel, the water police can only act if the police officer has the necessary skills and the helm is standardized. This would be another challenge for the water police. The other disadvantage is that there is no contact person on site to whom any measures can be communicated.

The third option is, of course, particularly attractive because the water police can directly influence the steering without taking any risk of their own. There is a particular advantage when legal access to a foreign shipping company, for example, is more difficult. However, the police must be trained for such operations. As a matter of principle, it is professional practice for shipmasters to have a ship shown to them first and only then to start the journey. If the water police are to take over the steering, there is no need for familiarization. Rather, a ship would be taken over at short notice, although the technical details (e.g. construction of the drive) are unknown to the police officers. Therefore, in most cases, reliable vessel control would not be expected. Also, this system would involve additional costs for the water police. Because the ship-owner may save personnel with this technology, a levy for autonomous vessels would have to be considered.

The bottom line is that a person must always be responsive and physically accessible so that, if necessary, coercive police action can be enforced. If this cannot be ensured, there is a considerable security deficit. In this context, it must be taken into account that an accident at a narrow point or at a lock can severely disrupt or prevent shipping traffic.

6.5.2.3 Conclusion/recommendation

- Consider whether autonomous sailing should be pursued as unmanned navigation or as sailing with less crew.
- A contact person must be available to perform checks or address police actions.
- Enforcement of police measures must be ensured, otherwise there will be a safety deficit.

6.5.3 Platooning

6.5.3.1 Controls

Controls by the competent authorities are possible in platooning even if the trailing vessels are not regularly manned. In order to enable a regular control of the trailing vessels, the water police could be accompanied by crew members in those cases.

Regulations would still have to be made with regard to the logbook. In platooning, all vessels are complete vessels. This means they can change convoy or separate from the convoy and continue independently. It must be ensured that all journeys are correctly recorded and therefore traceable.

6.5.3.2 Traffic rules

It is questionable whether platooning does not require special traffic rules. With the autonomous ship as well as with the remote operation, it is possible that the ships sail quite regularly in normal operation. The platooning association is something completely new because the association is precisely not physically connected and thus recognizable to all other inland waterway users. Therefore, regulatory needs are conceivable in the following areas:

- Identification of the platooning convoy
- Procedures at locks
- Max. length of the convoy
- Distances between the ships
- Crossing of the convoy.

About those aspects a regulation must be found with nautical know-how.



6.5.3.3 Qualification

It is questionable whether a new certificate of competency is useful for platooning. As described above, special certificates of competency already exist at the European level for the case that an activity causes special risks. A special authorization already exists for larger associations. Measured against the existing regulations, it would therefore be questionable whether platooning creates special requirements for the shipmaster or risks that require a separate certificate of competency. In platooning, the skipper is responsible for a convoy that is not physically connected. Among other things, he is responsible for navigation, formalities, control of the vessels and also for emergency management. Unlike a physically connected convoy, the skipper is responsible for several independently sailing vessels. All tasks require somewhat different coordination and planning than in regular. In particular, emergency management is somewhat different, depending, of course, on the technical solutions and the possible presence of crew on the vessels behind. Taking into account that the skipper directly sails only one vessel, it cannot be conclusively assessed whether the tasks of platooning require a special authorization. However, in order to treat all forms of vessels equally, special authorization must be required at least when the size of the convoy requires "special authorization" sailing large convoys under current law.

6.5.3.4 Recommendation

- It must be possible for at least one crew member to accompany the police during inspections.
- There must be a uniform regulation for keeping the logbook, so that the logbook shows without problems when the ship belonged to a platooning convoy.
- Nautical traffic experts should consider to what extent new traffic regulations are needed for platooning units.

6.6 Responsibility of skipper

Although it is not explicitly regulated at the European level, it is nevertheless assumed, e.g. in the Directive 2017/2397 that the shipmaster is responsible for all operations and conditions on the ship. For example, he is responsible for the following:

- cargo/passengers
- crew
- safety
- navigation
- condition of the ship
- documents

Because the skipper has always had to be present on the ship, he has been able to ensure the following:

- present as contact (in case of accident, controls of the water police, other road users, reception of police orders)
- administration and keeping of the necessary documents
- monitoring of the condition of the vessel (e.g. can be done in case of cargo leakage)
- The sailing mode can be changed at the request of the authorities or third parties (e.g. short-term blockage due to people overboard – beyond the range of the sensors etc.)

In smart shipping technologies, the shipmaster will be assigned a new role. He will no longer perform these functions as before. With remote control, the skipper can only exercise this all-encompassing responsibility remotely. With autonomous sailing, no one is present or reachable. If the ship collides, there is no one present with whom further action can be discussed. If the ship is to change direction due to a police order, influence on the ship must be ensured in some way. In the area of platooning or assistance systems, the ship's master as the responsible person is at least close by as a contact person.

If no technical solutions can be found for the aspects ensured so far, there are two possibilities:



- a person is on the ship
- a person can be reached and can visit the ship or exert influence if necessary.

6.7 Documents on a vessel

According to the current legal situation, the shipmaster must carry various documents in paper form, including documents on the cargo, crew documentation, the ship, technology on board, crew qualifications, etc. As soon as smart shipping technologies are available, the documents cannot be controlled as before. But even regardless of smart shipping, the question arises as to whether paper documents should be retained in the future. Developments can be seen in some areas. For example, a certificate of qualification can now be issued in electronic format. The certificates of qualification are also stored in a database and can be viewed by the water police.³⁹ EFTI also enables data exchange on shipping documents. Therefore, the question arises whether in the future all documents should be

- In an analogue or digital format available on board or
- in electronic format and
- stored in a database.

If all documents were deposited, the skipper could also be exempted from having to carry all papers with him. In the event of a police control, the documents could be accessed in a database. Within the database, the individual pieces of information could be merged.

This approach could greatly simplify police controls. Police officers could view in advance in the police station or on the police boat and then carry out a coordinated and targeted control. Furthermore, this approach is also a way to make documents in the area of smart shipping accessible to the police or fairway authority.

Depositing these documents in a uniform European database seems sensible and logical, or at least the documents should be accessible at all time by competent authority, therefore central or decentral data retrieval is both possible. Nevertheless, this is not mandatory from a purely legal point of view. Therefore, a unified database containing all relevant documents cannot be recommended. It is a purely political, but not a legal decision.

6.8 Data protection – pitfalls to avoid

A large number of the new developments extend to the exchange of data between ship, port, other mode of transport, ship-owner etc. The data exchange takes place B2B. A real need for action by the legislator is not apparent. Data exchange takes place as in other business areas. However, the sovereign authorities should observe the market in IWT in order to discover undesirable developments in good time. A very important regulation for the exchange of personal or personally identifiable data is the General Data Protection Regulation (GDPR). The sovereign authorities should not only prosecute violations, but also work to ensure that the GDPR is complied with. In the case of new regulations, the legislator must also always bear in mind that entities are bound by various data protection regulations. In order to achieve a broader understanding, the "pitfalls to avoid" are described below.

The General Data Protection Regulation (GDPR) is a regulation in the European Union (EU) that regulates the handling and processing of personal data. Looking at the business developments of Ac. 2 the exchange of data between fairway authorities and economic operators in the field of shipping as well as the companies passing by each other will become more and more important. With the GDPR, a legal framework for the processing of personal data already exists within the EU. When it comes to sharing personal information with processors and sub-processors, there are several common pitfalls to be aware of in order to ensure compliance with GDPR.

- Lack of a written contract: GDPR requires that companies have a written contract in place with any processors or sub-processors they share personal information with. This contract must

³⁹ Art. 25 Directive (EU) 2017/2397

outline the specific purpose for which the data will be used, as well as any security measures in place to protect the data.

- Lack of proper due diligence: Companies are responsible for conducting proper due diligence on any processors or sub-processors they share personal information with. This includes evaluating the security measures in place to protect the data, as well as the company's overall compliance with GDPR.
- Failure to obtain consent: GDPR requires companies to obtain explicit consent from individuals before sharing their personal information with processors or sub-processors. This includes clearly informing individuals of their rights under GDPR, such as the right to access, correct, or delete their personal data.
- Lack of transparency: GDPR requires companies to be transparent about their data processing activities. This includes providing individuals with clear and concise information about how their personal data is being collected, used, and shared, as well as the rights they have under GDPR.
- Not limiting the number of places where personal data is stored. This is necessary to minimize the risk of data breaches and protect individuals' privacy. By keeping personal data in a limited number of locations, organizations can better control access to the data, implement stronger security measures, and more easily detect and respond to any unauthorized access or misuse of the data. Additionally, limiting data storage can help ensure that personal data is not kept longer than necessary, reducing the risk of data being mishandled or misused. Overall, limiting data storage is an important aspect of GDPR compliance and helps organizations meet their obligations to protect individuals' personal data.
- Not limiting data retention: GDPR requires organizations to limit the amount of time they keep personal information, but many organizations fail to properly implement this requirement. This means they keep personal information for longer than necessary, which increases the risk of data breaches and other security issues.
- Not conducting regular data protection impact assessments: GDPR requires organizations to conduct regular data protection impact assessments to identify and mitigate risks associated with data processing. Many organizations fail to conduct these assessments, which increases the risk of data breaches and other security issues.

To avoid these common GDPR pitfalls, companies should ensure that they have written contracts in place with processors and sub-processors, conduct proper due diligence on these companies, obtain explicit consent from individuals before sharing their personal information with third parties, report data breaches as required, provide transparency about their data processing activities, conduct regular data protection impact assessments on processes in place and limit both the number of places where and the time personal data is stored to a minimum.

6.9 RIS enabled corridor management (Su.Ac. 2.4): legal opinion

In SuAc 2.4 it is concluded that certain legal requirements enabling the international exchange, processing, storage and provision of RIS related information (fairway-, infrastructure-, traffic- and transport related data) to authorized users are not covered by existing European legislation like the RIS-directive 2005/44. Therefore, specific legal basis had to be developed and was put into force by the partnership in order to enable the operation of the international common systems EuRIS and CEERIS within the project RIS COMEX (2016-2022). The so-called legal Core Arrangement 1 and Core Arrangement 2 provide a solid legal basis for the related data exchange, storage, processing and provision dedicated to the current functionality and user groups of EuRIS and CEERIS, but still, any further developments and/or extensions have the potential to require a related amendment and update of these legal arrangements. Therefore, legal guidance and ideally a solid European legal basis covering all kinds of RIS data exchange and services is required and would give certainly related to legal requirements within the further development and provision of harmonized information services for inland navigation.

Another important aspect is approaching and relates to the legal basis for multimodal data exchange. Additional questions concern (further) harmonized reporting requirements and automatic slot reservations at locks based on RTA communication between locks and skippers.



6.9.1 Use of EuRIS/CEERIS by 3rd parties.

Both EuRIS and CEERIS provide harmonized Corridor RIS services which fall under the scope of the RIS Directive⁴⁰.

RIS is meant to support both traffic and transport management in inland navigation, including, wherever technically feasible and legally allowed, interfaces with other transport modes sea, roads and railways.

In this perspective, according to the annex of the RIS regulation⁴¹, RIS includes services as fairway information, traffic information, traffic management, calamity abatement support, information for transport management, statistic and customs services and waterway charges and port dues. However, RIS are not dealing with internal commercial activities between one or more of the involved companies, although RIS are open for interfacing with commercial activities.

Therefore, the RIS application is efficient, expandable and interoperable so as to interact with other RIS applications and, if possible, with systems for other modes of transport. It shall also provide interfaces to transport management systems and commercial activities. On a European level RIS users must have access to the same services and information.

The parties concerned are the so-called RIS-users, namely groups of users such as boat masters, RIS operators, lock and/or bridge operators, waterway authorities, port and terminal operators, operators in calamity centers of emergency services, fleet managers, cargo shippers and freight brokers.

On the processing of personal data necessary for the operation of RIS the GDPR is applicable, as well as Directive 2019/1024 on the re-use of public sector information. Roughly speaking, the latter is hardly applicable to CEERIS, for which personal data needs to be processed. For EuRIS, as far as personal data are not processed, the GDPR might not be applicable for all data processing.

Open data, such as fairway information, can be shared freely, whilst for (non-anonymized) traffic information or information for transport logistics/management (vessel positions, ETD, ETA, RTA, ATA et cetera) the GDPR comes into play.

Now that the group of RIS users is fairly broadly defined, the question is which parties are considered to be a 3rd party within RIS. This means other parties than specified above and who are not covered by the Core Arrangements 1 and 2.

As far as such a 3rd party acts as controller it acts on behalf of the controller, e.g. a contractor for system operation. Nevertheless, when the processor acts outside the mandatory contractual instructions from the controller to the processor, the processor is also responsible for compliance with the GDPR and might be liable.

In case a 3rd party is nor a RIS user (controller) nor a processor for a RIS user, apparently it concerns further processing in a manner that is incompatible with the original purposes for processing personal data (i.e. RIS services by RIS users). If there is no legal basis for such processing, and such processing is deemed necessary, amendment of applicable law, respectively the establishment of specific legal basis (e.g. amendment of Core Arrangements 1 and/or 2 or an additional legal arrangement dedicated to a specific purpose) appropriate with the GDPR might be indicated.

⁴⁰ Directive 2005/44/EC of the European Parliament and of the Council of 7 September 2005 on harmonized river information services (RIS) on inland waterways in the Community (as amended).

⁴¹ Commission regulation (EC) No 414/2007 of 13 March 2007 concerning the technical guidelines for the planning, implementation and operational use of river information services (RIS) referred to in Article 5 of Directive 2005/44/EC of the European Parliament and of the Council on harmonised river information services (RIS) on inland waterways in the Community (also referred to as the RIS regulation).

6.9.2 Emergency services centres

Emergency services are mentioned as part of RIS. Calamity centres of emergency services are RIS users and have access to several RIS services, including those for CAS (Calamity abatement support)⁴². For this they do not need prior permission from, for example, the ship. The data collected for ship reporting may be used for this purpose⁴³.

If, in the event of a calamity, assistance is provided by another vessel (good seamanship, i.e. article 1.04 CEVNI) not in the capacity of a calamity centre, the skipper has only access to tactical traffic information⁴⁴. Any liability issues will be settled between the ship providing assistance or the calamity center and the ship in need of assistance.

6.9.3 Harmonisation of reporting requirements in all countries

In article 8.02 of CEVNI, reporting requirements of ships are prescribed. This concerns both categories of ships that must report as well as the data that must be communicated. According to article 8.02 paragraph 3 of CEVNI, the data must be reported to the competent authority either in writing, or by telephone or if possible electronically.

For example in the Police regulations for the navigation of the Rhine (RPR) of the CCNR, a similar text has been included in article 12.01 of that regulation. The RPR is now mainly based on electronic reporting and the CCNR intends to further expand the electronic reporting obligation. In Dutch police regulations, similar regulations apply and/or are in development.

Within the Danube region the reporting requirements among the countries are not harmonized, therefore similar but different. In recent years, an initiative within the Danube Region Strategy took care on setting the first steps in harmonizing the reporting forms for "Arrival/Departure Report", "Crew List" and "Passenger List" which were already adopted by the majority of the Danube countries within the years 2022/2023. Further harmonization is certainly required and especially electronic reporting needs to be further promoted and, once it is well accepted, made mandatory.

Within the scope of the already applicable codes and regulations, it presumably appears that no legal objections stand in the way of further automation of reporting requirements.

Legislators and fairway authorities have the opportunity to further harmonise, automate, and reduce the required reports to what is necessary. For the time being, there is no mandatory legal requirement to do so. It is a purely political decision. However, in the context of smart shipping, especially in the area of autonomous ships, an automated reporting system will be necessary.

6.9.4 Automatic slot reservation at locks

Decisions concerning trip planning, effective navigation, manoeuvring of the vessel et cetera form part of the skippers tasks and responsibilities. Vessel traffic services (VTS) let the responsibility of the skipper and decision making alone. At present, slot reservation, let alone automatic slot reservation, is not foreseen in vessel traffic services (VTS). Also, for a skipper no enforceable right for the use of a certain (slot) reservation exists, as a legal basis for such a right is non-existent⁴⁵. This works both ways, as the free passage of a ship also should not be restricted by any such kind of right. VTS is meant to inform and coordinate both skippers and lock personnel in order to optimize use of the fairway and locks, but not to grant any rights.

⁴² Table 4.6 of the annex of the RIS regulation.

⁴³ Table 5.2.3 of the annex of the RIS regulation.

⁴⁴ Table 4.6, under "TTI" of the annex of the RIS regulation.

⁴⁵ Apart from priority of passage through locks by ships carrying specified signs (i.e. article 6.29 CEVNI), or designated ships from emergency services granted the right of priority by the competent authorities (Article 6.29 RPR).



From a legal point of view, (automatic) slot reservation in such a way that enforceable and respectable rights come into play would be a new concept in the legal framework for inland shipping⁴⁶. Such a working method for the handling of shipping traffic, based on individual permission from skippers is not possible. This requires rather fundamental rethinking of shipping regulations and subsequent amendment of the law.

6.10 ITS, ERTMS, e-navigation (SuAc 2.5): legal opinion

In SuAc2.5 the legal framework for other modalities (maritime shipping, railway transport and road transport) is compared with the legal framework for inland shipping. One of the recommendations is to investigate the Commission Regulation (EU) No 1305/2014 which specially defines the technical specification for the interoperability of 'telematics applications for freight subsystems' (TAF TSI).

Pursuant to Article 2(e) of Directive 2008/57/EC⁴⁷, the European Rail System is subdivided into structural and functional subsystems with regard to the interoperability of the European Railway System. Each of the subsystems is covered by a technical specification for interoperability (TSI). TAF TSI is the technical specification for interoperability relating to the 'telematics applications for freight' subsystem of the European rail system.

The European Railway System is managed by infrastructure managers (IM's) and is used by railway undertakings (RU's). Every year the IM has to publish a network statement (NS), in which the services and facilities offered to RU's and applicable conditions and fees are described.

The IM has the RU to give access to the minimum access package. This concerns in particular the use of a train path over the tracks, and directly related services. Services and facilities of the minimum access package may only be supplied by the IM, for which a track access charge must be paid by the RU.

Access to the railway infrastructure and related services and facilities is granted on the basis of a Track Access Agreement between every IM and RU.

TSI TAF provides technical procedures and messages concerning the request and specific characteristics of train paths. It also prescribes procedures for traffic handling, for instance with regard to (departure) composition and the load weight of the train. However a Track Access Agreement between IM and RU must be conducted for the TSI to come into effect.

In the NS additional and ancillary services and facilities offered by third parties are mentioned as well. Use of services and facilities is agreed upon by RU's and providers of these services and/or facilities.

The European Railway System is a regulated market, supervised by regulatory bodies.

In SuAc 2.5 it is recommended to investigate TAF TSI with respect to DIWA. From a legal point of view it is also recommended to take into account the specific legal aspects of the European Railway System, as described above. Currently, the framework conditions of IWT and the rail mode are not comparable and of course due to the fact that rail does not allow uncoordinated free movement of many different trains. In inland shipping, to embed TAF TSI-like regulations with an infrastructure manager no contractual relationship exists. If similar systems were to be introduced, a significant change in the usage structure would be required. This would be costly. Moreover, it would always be questionable whether less burdensome measures could not be equally effective. Therefore, no recommendation can be made at this point.

6.11 Liability of member states (Fairway authorities)

As more and more information has to be provided on the part of the fairway authorities, shipping operators are potentially relying on them increasingly. If the information is not provided or if the data provided is incorrect, damage can occur. Therefore, the question arises whether within the EU the

⁴⁶ And for IMO-based maritime shipping as well.

⁴⁷ Repealed by Directive 2016/797/EU of 11 May 2016 on the interoperability of the rail system within the European Union (recast).



liability of the operator should be regulated and whether, liability is desirable.⁴⁸ Because there is no absolute legal need for a uniform regulation, it is purely a political question. Nevertheless, this question is obvious and must at least be seen as a potential regulation by the legislator. Of central importance is the question of what incentives should be aimed at. The following ideas are relevant here:

- Financial feasibility of any claims
- Pressure on the administration that data should be provided continuously and correctly.
- Should the shipping industry rely on the data or be motivated to work redundantly (including technologies).

Therefore the recommendation is to further elaborate the liability and possible regulations.

6.12 Labour law

6.12.1 Introduction

With the introduction of remote control, autonomous sailing or platooning technologies, it is inevitable that ships will or can be controlled by sensor technology. Sensor technology is required for either navigation, monitoring of the ship or cargo, or supervision/instruction of workers. No matter what purpose the sensor technology serves, if work is performed by human action, it is or can be monitored by sensor technology. Therefore, the question naturally arises under which conditions the sensor technology may be used.

The question is still quite abstract, as very different case constellations are conceivable. In the field of remote control or platooning, for example, it would be conceivable for the deck crew to be monitored by the ship's captain during all activities using sensors such as cameras and/or microphones. In the field of autonomous sailing, the ship is operated without human intervention. Accordingly, people would only be on the ship for repairs, inspections or maintenance. However, the quality of the intervention depends not only on the duration of the stay, but also on the use of the sensors. Thus

- The storage of the acquired data,
- The design of the sensors
- The number of sensors
- The type of transmission (e.g. Number of screens)
- The positioning of the sensors

would still be questionable.

6.12.2 EU- regulations

Unfortunately, the questions raised above cannot be answered on the basis of a specific law on employee monitoring at the EU level. The limits of permissible surveillance can only be assessed on the basis of general laws such as the Charter of Fundamental Rights of the European Union (CFR), the General Data Protection Regulation (GDPR) and the European Convention on Human Rights (ECHR).

6.12.2.1 On the Charter of Fundamental Rights

The Charter of Fundamental Rights of the European Union (CFR) protects the fundamental rights people enjoy in the European Union (EU). It is a modern and comprehensive instrument of EU law, protecting and promoting people's rights and freedoms in view of changes in society, social progress, and scientific and technological developments.⁴⁹

The part relevant to the subject of the sensors is Art. 8 CFR:

⁴⁸ For clarification: The liability of the EU towards the Member States is regulated in Art 340 TFEU. However, there is no legal basis at the level of the EU that regulates the liability of the fairway authorities towards private parties in a uniform and conclusive manner.

⁴⁹ <https://eur-lex.europa.eu/EN/legal-content/summary/charter-of-fundamental-rights-of-the-european-union.html>

Art. 8 CFR: Protection of personal data

- (1) Everyone has the right to the protection of personal data concerning him or her.*
- (2) Such data must be processed fairly for specified purposes and on the basis of the consent of the person concerned or some other legitimate basis laid down by law. Everyone has the right of access to data which has been collected concerning him or her, and the right to have it rectified.*
- (3) Compliance with these rules shall be subject to control by an independent authority.*

6.12.2.2 On the GDPR

In addition, the General Data Protection Regulation (GDPR) has existed since 2018. The GDPR is a regulation. It applies directly and does not have to be implemented by the member states. The DSGVO regulates many details regarding the protection of personal data in many areas. The central provision are Art. 5 and 6 DSGVO:

Article 5(1) / GDPR: Principles relating to processing of personal data

(1) Personal data shall be:

- a) processed lawfully, fairly and in a transparent manner in relation to the data subject ('lawfulness, fairness and transparency');*
- b) collected for specified, explicit and legitimate purposes and not further processed in a manner that is incompatible with those purposes; further processing for archiving purposes in the public interest, scientific or historical research purposes or statistical purposes shall, in accordance with Article 89(1), not be considered to be incompatible with the initial purposes ('purpose limitation');*
- c) adequate, relevant and limited to what is necessary in relation to the purposes for which they are processed ('data minimisation'); accurate and, where necessary, kept up to date; every reasonable step must be taken to ensure that personal data that are inaccurate, having regard to the purposes for which they are processed, are erased or rectified without delay ('accuracy');*
- d) kept in a form which permits identification of data subjects for no longer than is necessary for the purposes for which the personal data are processed; personal data may be stored for longer periods insofar as the personal data will be processed solely for archiving purposes in the public interest, scientific or historical research purposes or statistical purposes in accordance with Article 89(1) subject to implementation of the appropriate technical and organisational measures required by this Regulation in order to safeguard the rights and freedoms of the data subject ('storage limitation');*
- e) processed in a manner that ensures appropriate security of the personal data, including protection against unauthorised or unlawful processing and against accidental loss, destruction or damage, using appropriate technical or organisational measures ('integrity and confidentiality');*
- f) The controller shall be responsible for, and be able to demonstrate compliance with, paragraph 1 ('accountability').*

Article 6 (1) / GDPR: Lawfulness of processing

(1) Processing shall be lawful only if and to the extent that at least one of the following applies:

- a) the data subject has given consent to the processing of his or her personal data for one or more specific purposes;*
- b) processing is necessary for the performance of a contract to which the data subject is party or in order to take steps at the request of the data subject prior to entering into a contract;*
- c) processing is necessary for compliance with a legal obligation to which the controller is subject;*
- d) processing is necessary in order to protect the vital interests of the data subject or of another natural person;*



- e) *processing is necessary for the performance of a task carried out in the public interest or in the exercise of official authority vested in the controller;*
- f) *processing is necessary for the purposes of the legitimate interests pursued by the controller or by a third party, except where such interests are overridden by the interests or fundamental rights and freedoms of the data subject which require protection of personal data, in particular where the data subject is a child.*

6.12.2.3 On the ECHR

Finally, the European Convention on Human Rights (ECHR) must also be taken into account. This is a treaty under international law that has been ratified by all EU member states and accordingly has the status of a national law. In the area of video surveillance, Art. 8 ECHR would be a provision of fundamental relevance:

Art 8 (1) ECHR: Right to respect for private and family life

(1) Everyone has the right to respect for his private and family life, his home and his correspondence.

Since video recordings of employees are personal data, the European General Data Protection Regulation (GDPR) must be observed in this respect (which replaced Directive 95/46/EC on the protection of individuals with regard to the processing of personal data and on the free movement of such data, which was in force until then). However, the GDPR does not contain any specific standards dealing with the visual monitoring of employees. Due to this, it is necessary to fall back on the general clause of Art. 6 GDPR, which regulates when data processing is lawful. The how of data collection and processing is regulated by Art. 5 (1) of the GDPR and establishes certain rules in this regard.

Art. 8 of the Charter of Fundamental Rights of the European Union is practically of little relevance anymore, as its content is fully covered by the GDPR.

Video surveillance also interferes with the privacy of employees, so that the scope of Art. 8 (1) ECHR is also affected.

6.12.3 European jurisdiction

No cases of employee monitoring in the area of shipping have yet been decided by case law at the European level. However, several decisions have already been issued on the general subject of employee monitoring.

In the course of a series of decisions, the ECHR had to deal with the issue of surveillance of employees by their employer. The linchpin of the decisions was Art 8 ECHR. The ECHR is not binding on private individuals, i.e. not on companies. However, it must be taken into account by national courts within the framework of their jurisdiction and therefore applies at least indirectly to private individuals.

6.12.3.1 Decision Köpke v. Germany (October 5, 2010 – 420/07)

In the decision Köpke v. Germany, the covert video surveillance of an employee at the workplace in order to clarify a reasonable suspicion of theft was deemed permissible, provided that it was limited in time and location and that no other equally effective means of protecting the employer's ownership rights was available which interfered to a lesser extent with the employee's right to respect for private life.

Of particular importance was the fact that the surveillance measure was based on reasonable suspicion and, on the other hand, was limited to specific suspected employees.

In its balancing of interests, the Court found in a negative respect that covert video surveillance at the workplace was a serious intrusion into the private life of the employee, since his behaviour was reproducibly recorded and he could not escape it. On a positive note, however, he noted that the surveillance was only initiated after a well-founded suspicion of theft had been established. In addition, the measure had been narrowly limited in time and space. Furthermore, the data had only been processed by a small group of persons entrusted with this task and had only been used for the purpose

of terminating the employment relationship and in labour court proceedings. Thus, the interference had been necessary to achieve the purpose required by the video surveillance. In addition, the Court found that the employer's property interests, which also had to be taken into account, could only be safeguarded if, on the one hand, the employer was allowed to store the recordings until the final conclusion of the proceedings brought by the complainant for evidentiary reasons and if it was not possible to identify the perpetrator by other means.

6.12.3.2 Decision *Bărbulescu v. Romania* (September 5, 2017 - 61496/08).

In *Bărbulescu v. Romania*, the ECtHR had to rule on the fact that a Romanian employee of a company used a messenger for private communication contrary to an official instruction. The employer found out about this because it monitored the communications of its employees.

In its decision, the ECHR set out a number of requirements that any monitoring of employee correspondence or communications must meet in order to be compatible with Art. 8 ECHR.

6.12.3.3 Decisions *López Ribalda and Others v. Spain* (January 9, 2018 & October 17, 2019 - 1874/13 & 8567/13).

In *López Ribalda and Others v. Spain*, the ECtHR had to deal with the issue of "surveillance of employees" again and twice.

After the operator of a supermarket had discovered missing amounts, he installed cameras in the market which monitored the entrance and exit areas as well as the checkout area. However, he only informed the employees about the cameras in the entrance and exit areas. Since the suspicion did not relate to a specific person, this meant that all employees who were in the areas were monitored. The applicable national data protection laws required comprehensive notification of the surveillance measures as well as marking of the monitored areas. The complainants were unsuccessful before the national courts, as the courts considered the interference with the employees' rights on the basis of suspicion to be justified.

In its first **decision of 09.01.2018**, the ECtHR ruled that the actions of the supermarket operator constituted a violation of Art. 8 ECHR.

He clarified in advance that this was not a contradiction to the above-mentioned decision *Köpke v. Germany*, as in this respect no national regulation existed on the prerequisites for the surveillance of employees in case of reasonable suspicion and a reasonable suspicion existed against specific persons.

According to Article 8 of the Human Rights Convention, the state was obliged to strike a fair balance between the employee's right to respect for his private life and the employer's interest in protecting his property rights. This is violated if the employee is not comprehensively informed in advance in the event of covert video surveillance, which constitutes a significant intrusion into the employee's private life, as required by domestic provisions. Thus, a balancing had to be done in accordance with the principle of proportionality, in which the legitimate aim of the measure was the protection of the employer's interest in protecting his property rights, weighed against the employee's right to respect for his private life. The Chamber weighed the two interests in favour of the employer. In doing so, it relied primarily on the fact that the surveillance was too comprehensive in terms of time and the persons monitored, and not sufficiently narrow and specific.

However, it was not until the **Grand Chamber of the ECtHR** issued its **decision of 17.09.2019** that the exact principles to be taken into account in the context of the balancing process were clarified, transferring the principles from the decision *Bărbulescu v. Romania* (see above) accordingly to video surveillance. The Court stated in this regard:

These criteria must be applied taking into account the specificities of the employment relationship and the development of new technologies [...]. [...] In order to ensure the proportionality of video surveillance measures in the workplace, national courts should take into account the following factors when balancing the conflicting interests:

- (i) Whether the employee was informed in advance of the possibility of video surveillance and of its introduction. [...]*
- (ii) The extent of the employer's surveillance and the degree of intrusion on the employee's privacy. [...]*



- (iii) Whether the employer has advanced legitimate reasons to justify the surveillance and its extent. [...]*
- (iv) Whether it would have been possible to establish a monitoring system based on less intrusive methods and measures. [...]*
- (v) The consequences of the surveillance for the employee who is subjected to it. Consideration should be given, in particular, to what the results of the monitoring have been used by the employer and whether [this is consistent with] the stated objectives.*
- (vi) Whether adequate safeguards have been provided to workers, particularly where the nature of the monitoring activities is [invasive of privacy]. Such safeguards may take the form of, among other things, informing employees of the installation and scope of the monitoring, disclosing such action to an independent adjudicative body, or allowing employees to file a complaint.*

In the end, however, the Grand Chamber came to a different conclusion than the Small Chamber and ruled against a violation of Article 8 ECHR. It found that the video surveillance was sufficiently limited in time and space, that no equally suitable milder means was available and that it only served to identify the perpetrators and to impose measures against them. Since only the manager, a legal representative of the company and union representatives had access to the material, the group of persons with knowledge was also sufficiently limited. Furthermore, with regard to the protection of privacy, it should be noted that the checkout area was a publicly accessible place. In this regard, the Chamber further states:

"This expectation is very high in places that are private by nature, such as restrooms or locker rooms, where increased protection or even an outright ban on video surveillance is warranted. It remains high in enclosed work areas such as offices. It is manifestly lower in places that can be viewed or accessed by colleagues or, as in this case, the general public."

Finally, the Grand Chamber again explained the importance of informing data subjects in principle "clearly and prior to implementation of the existence and conditions of such data collection." In doing so, however, it clarified:

"However, it [the Court] wishes to emphasize that the information provided to the person under surveillance and its scope are only one of the criteria to be taken into account when assessing the proportionality of such a measure in a specific case. However, in the absence of such information, the guarantees deriving from the other criteria will be all the more important."

Accordingly, it is not sufficient to inform employees comprehensively about the monitoring. Rather, proportionality in the sense of the above-mentioned principles must also be cumulatively observed.

6.12.4 Summary/Conclusion

As mentioned at the beginning, there are no specific rules for dealing with sensors in the area of labour law. It is therefore necessary to fall back on the general rules on data processing as set out in the General Data Protection Regulation (GDPR) since 2018. As a rule, however, there are also domestic regulations on data protection, which are often more specific than the European regulations. In Germany, for example, there is the Federal Data Protection Act (BDSG), which deals with video surveillance of public spaces in Section 4 BDSG and with data processing for employment purposes in Section 26 BDSG.

At the European level, only the European Court of Human Rights (ECHR) has made specific pronouncements on video surveillance, which in several decisions had to deal with the – in the specific cases, however, covert – surveillance of employees. In doing so, however, it also established general principles on video surveillance that are to be applied in the context of the proportionality test if the interests of the employer are to be reconciled with the protection of the employee's privacy.

Roughly summarized, this means that video surveillance of employees is possible in principle, but only within narrow limits.

However, since the rulings were issued under the old legal situation (i.e. before the GDPR came into force), it is questionable to what extent the principles established by the ECtHR can be applied to the current legal situation.



In all likelihood, we can also expect to see GDPR-related rulings on the topic of "video surveillance of employees" in the coming years. However, it often takes several years before such a case reaches the courts at the European level, which is due to the fact that all national instances have to be passed through beforehand.

6.12.5 General principles for the assessment of permissible video surveillance.

If we now consider the relevant case of video surveillance of the crew of a ship controlled by remote control, we must conclude that this is possible in principle from a legal point of view, but only within the limits set by the GDPR and the case law of the ECtHR. In the course of the following recommendation for action, the principles developed by the ECtHR will be primarily examined

6.12.5.1 Informing the employee

First, it is necessary to inform the employees concerned comprehensively and precisely about the visual surveillance. If this is not done, surveillance under the given circumstances can hardly be considered compatible with the principles established by the ECtHR, if only because of its extent. In this context, the conditions of surveillance, i.e. both the monitored area and the period of surveillance, must be precisely specified so that no doubts can arise as to who is being monitored or recorded, when and where.

This information must be communicated to the workers before the start of the monitoring activity. Ideally, there should also be signs on the ship indicating that video surveillance is taking place.

6.12.5.2 Scope of surveillance and degree of invasion of privacy.

In addition, the scope of the surveillance must be clearly defined and care must be taken to ensure that it is as comprehensive as necessary and at the same time as limited as possible.

In terms of time, this means that video surveillance may only take place during the periods in which this is necessary to achieve the legitimate reasons (see on this under c.). In this respect, recourse could be made to when a shipmaster would monitor his crew on site. Video surveillance would not be necessary, for example, when the ship is waiting in port in the meantime without any activity.

In spatial terms, all areas necessary for operation and safety should be monitored, such as cargo space and areas, the engine room and other areas where the crew is working in a professional capacity. In contrast, areas used by the crew in their free time and during breaks, as well as enclosed work areas, should not be monitored. These include, for example, sleeping quarters, locker rooms, toilet rooms, break rooms and also offices, if any.

In addition, the circle of people who have access to the recordings or view them must be limited to the most necessary. In this respect, of course, the ship's master would have to be granted access, but not other persons for the time being. This requirement is closely linked to the question of storing the recordings. In this respect, the ECtHR has ruled that at least storage until the conclusion of proceedings against an employee is fine. Transferred to the general case relevant here, this would mean that storage per se should at least be possible. However, the time period for this is difficult to determine. However, due to the large amount of data alone, regular deletion would be required.

6.12.5.3 Legitimate reasons for monitoring and its extent

Surveillance must also be justified by legitimate reasons or objectives put forward by the employer. These are very significant and must carry some weight so that they sufficiently counterbalance the protection of the crew's privacy. Several legitimate reasons can be considered at once:

On the one hand, the surveillance would serve to safeguard the operational process. The skipper must be aware at all times of what is happening on his ship in order to be able to guarantee smooth operations. Part of this is also the monitoring of the actions of his crew in the sense that the skipper is able to give the necessary instructions depending on the situation.

On the other hand, monitoring would also serve the safety of the ship's crew, the operational safety, so to speak. Their employer also has an interest in this, because on the one hand he has duties of care towards his employees, and on the other hand he also has an interest in a functioning crew.



Finally, surveillance inevitably also serves the purpose of recording potential misconduct on the part of the persons recorded. However, this is a side effect of the surveillance, which is legitimate but not in itself the purpose of the surveillance.

All these are circumstances that an "analogue skipper" could perceive himself on the spot. The video surveillance must therefore serve, so to speak, to replace the eyes of the skipper on board who is not present on site.

6.12.5.4 Necessity requirement

In addition, video surveillance must also be necessary according to the general principles, which means that no equally suitable means of achieving the legitimate objectives may be available that is less intrusive.

In this respect, it is not apparent which means this could be. In other words, it is not possible for the skipper acting by remote control to adequately replace his visual perception.

6.12.5.5 Consequences of monitoring for the employee

In the context of the consequences of monitoring for the employee, particular attention must be paid to the purpose for which the employer uses the recordings. Here, a link must be made to the previously mentioned legitimate reasons. These are definitely in the interest of the employees, for example when it comes to securing the operational process and the safety of the crew. It is true that video recordings could also be used to document potential misconduct by the crew, whereupon they might have to fear professional consequences. However, as already mentioned, this is not the purpose of the whole thing, but only an inevitable side effect.

6.12.5.6 Adequate guarantees for the employee

Finally, according to the case law of the ECtHR, employees must also be granted certain guarantees that strengthen their position in relation to the employer. In this respect, the prior information about the monitoring must be mentioned on the one hand. In addition, the establishment of an independent monitoring body or a possibility to lodge a complaint can also be considered. It is therefore advisable to provide a contact person who should examine any complaints made by the crew and monitor compliance with the general conditions for video surveillance.

6.12.6 Recommendation

The extent to which employee monitoring is permissible in the area of smart shipping cannot be assessed conclusively. There are no special or concrete rules on this topic at the EU level. So far, only general rules such as the GDPR or similar set limits to the monitoring of employees. However, these limits are not fixed, but must be defined as part of a balancing of conflicting interests. If the permissibility of monitoring employees is disputed, a court ultimately decides on the limit of what is permissible. For legislators, this balancing process means uncertainty because we can weigh things ourselves, but we may make a different assessment. Against this background, the following is recommended:

- Employees should be informed about video surveillance.
- Video surveillance should cover the employees' work area as much as necessary and as little as possible. This means that privately used premises should not be monitored. The number of cameras and monitors should be kept to a minimum.
- Storage of recordings is to be avoided.



7 Results and conclusions

7.1 Interactions towards other Sub-Activities

7.2 Conclusions

7.2.1 Legal structure

In the area of data exchange, there are a large number of rules that regulate individual areas.⁵⁰ For the legal user, these rules can only be understood with a great deal of effort. For the member states, a statutory regulation with general and specific rules would be much easier to implement. A uniform regulation also offers the chance to present a system as a coherent concept in the field of IWT.

7.2.2 Smart Shipping

In the area of smart shipping, the legislature will not be able to avoid the decision to either introduce new rules to enable it or to counter smart shipping. In the overview below, it can be seen which areas would need to be changed for which smart shipping technology.

Adaptation or supplementation of the existing legal situation necessary?				
Topic	autonomous shipping	platooning	remote control	assistance systems
Technical requirements	yes	?	yes	partial
Crew requirements	yes	yes	yes	partial
Liability	yes	yes	yes	no
Qualification	no	yes	yes	no
Traffic rules	?	yes	no	no
Police actions	yes	yes	yes	no
Responsibility	yes	yes	yes	no
Documents	yes	yes	yes	no

From the listed overview, the scope of the legislative challenge is presented in the report. If the legislature is committed to enabling smart shipping, which is exclusively a political decision, then the following aspects should be considered:

General framework conditions must be established in a timely manner that are binding for smart shipping entities. No false incentives should be created here. Criteria for testing new technologies must also be created. These must illuminate the critical points of a technology.

If a technology fulfils the legal requirements, entities in smart shipping should have a clear perspective, Therefore a clear procedure must be created, e.g. test phase, evaluation and final technical approval.

New technologies are developing rapidly. Legislators should find a way to address these as quickly as possible. The new technologies will always represent a potential on the one hand and a possible security risk on the other. Therefore, the legislator will predictably and regularly be confronted with

⁵⁰ See section 4.3.

a certain degree of uncertainty. General procedural structures should be developed to speed up the process. International cooperation should also be regulated to enable cross-border testing and implementation.

7.2.3 Data protection

In the area of data protection, a distinction must be made between who exchanges data. If data is exchanged between private parties, such as in the area of Synchro Modality the general data protection regulations such as the GDPR apply. There is no apparent or known need for action in the IWT area. However, it is not known whether data is being improperly collected, further processed or used. In principle, the way in which data is processed can lead to illegal price fixing or illegal competition. However, this problem arises in other areas of the economy. It is advisable to monitor the market and observe erroneous developments.

7.2.4 Ris enabled corridor management (SuAc. 2.4): legal opinion

The RIS Directive must be constantly reviewed and further developed. Again and again, individual problems will arise. The legislator will have to decide whether to act. Essentially, two problem areas have emerged:

- In case a 3rd party is not a RIS user (controller) nor a processor for a RIS user, apparently it concerns further processing in a manner that is incompatible with the original purposes for processing personal data (i.e. RIS services by RIS users). If there is no legal basis for such processing, and such processing is deemed necessary, amendment of applicable law appropriate with the GDPR might be indicated.
- If, in the event of a calamity, assistance is provided by another vessel (good seamanship, i.e. article 1.04 CEVNI) not in the capacity of a calamity centre, the skipper has only access to tactical traffic information⁵¹. Any liability issues will be settled between the ship providing assistance or the calamity center and the ship in need of assistance.

Because the RIS guideline is being revised and a new version is expected in the near future, it remains to be seen whether an innovation will be included for these topics.

7.3 Recommendations

Listed below are the recommendations from this sub-activity. These can be directed to stakeholders as well as follow-up projects after the DIWA project.

We ordered the recommendations in different categories. Between the category the recommendations are listed based on how easy the recommendation is to implement.

- Basic: B
- Intermediate: I
- Advanced: A

REC	Recommendation	B-I-A	Action for	Paragraph
Smart shipping in general				
REC 1	Find a standardized approach to deal with new developments and their risks and potentials. The approach should accelerate (formal) processes and create investment security as far as possible.	B	EU/ member states	General
Smart Shipping: Liability				
REC 2	Remote operation/platooning: Develop a system to identify and localize the skipper in charge and	B	EU and CCNR	Section 6.2 (SuAc 2.1)

⁵¹ Table 4.6, under "TTI" of the annex of the RIS regulation.



	a legal frame that applies to all member states.			
REC 3	Remote operation: Investigate if remote operations should be possible from other EU countries and if so, the administrative assistance of the water police must be regulated.	B	CESNI/TI	Section 6.2 (SuAc 2.1)
REC 4	Remote operation: Investigate whether remote control has to be permitted from third countries? If so, at least administrative assistance and the right to inspect files must be ensured.	B	CESNI/TI	Section 6.2 (SuAc 2.1)
REC 5	Consider strict liability for the owner of a vessel.	I	EU/ member states	Section 6.2 (SuAc 2.1)
REC 6	Consider compulsory liability insurance for the owner of a vessel	I	EU/ member states	Section 6.2 (SuAc 2.1)
Smart Shipping: European manning regulation				
REC 7	Consider manning rules at EU level in IWT.	B	EU/ member states	Section 6.3: Smart shipping: crew requirements
REC 8	Examine whether the general responsibility of the skipper should be retained or should a new structure of responsibilities be introduced?	B	EU/member states	Section 6.3: Smart shipping: crew requirements
REC 9	Remote operation: If a risk relevant to the vessel remains when the (internet) connection to the vessel is lost, it is appropriate for a member of the vessel's crew to perform a rescue maneuver. Define the necessary qualification for the person in charge. o.	B	EU/ member states	Section 6.3: Smart shipping: crew requirements
REC 10	Remote operation: Investigate scientific studies to examine how many ships can be coordinated simultaneously and if for each task a back-up person should be provided.	I	EU/ member states	Section 6.3: Smart shipping: crew requirements
REC 11	Remote operation: Investigate studies to examine whether a skipper can lead several ships at the same time without further assistance. The existing simulators could be used for this purpose.	I	EU/ member states	Section 6.3: Smart shipping: crew requirements
REC 12	Remote operation/Platooning: Develop a risk analysis if a failure of steering commands during remote operation should take place.	B	Fairway authorities	Section 6.3: Smart shipping: crew requirements
REC 13	Remote operation/Platooning: Consider introducing a new	B	EU	Section 6.3: Smart shipping:



	qualification for the skipper as "remote operations expert" or for platooning			crew requirements
REC 14	Autonomous sailing: Examine whether a minimum crew should be required as long as autonomous sailing has not been sufficiently tested in practice.	B	Fairway authorities	Section 6.3: Smart shipping: crew requirements
REC 15	Autonomous sailing: Examine whether autonomous sailing should be used for the transport of dangerous goods or in the area of passenger shipping.	A	CESNI/TI	Section 6.3: Smart shipping: crew requirements
REC 16	Assistance systems: Create a legal frame for crew facilitation based on (safety) requirements for specific functions.	A	CESNI/TI	Section 6.3: Smart shipping: crew requirements
Water police measures/ administrative coercion				
REC 17	Remote operation: Develop rules and regulations for how remote control will be used. Where should the documents be located? Who is in charge on the vessel? Should the authorities have a possibility to manipulate the ship?	A	CESNI/TI	Section 6.5.2: Autonomous sailing: general consideration
REC 18	Remote operation/Platooning: Investigate whether a remote controlled vessel may be operated from within another country within the EU or from outside the EU.	A	CESNI/TI	Section 6.5.2: Autonomous sailing: general consideration
REC 19	If Rec 18 is yes: Remote operations: Create a legal frame and system to enable cross border police control.	B	EU and CCNR	Section 6.5.2: Autonomous sailing: general consideration
REC 20	Autonomous sailing: Create a system so that for unmanned ships there is always a contact person available who can act on the ship from outside or make decisions e.g. in case of accidents.	B	EU and CCNR	Section 6.5.2: Autonomous sailing: general consideration
REC 21	Enforce that police measures must be ensured in smart shipping, otherwise there will be a safety deficit.	B	EU and CCNR	Section 6.5.2: Autonomous sailing: general consideration
REC 22	Platooning: Develop a uniform regulation for keeping the logbook, so that the logbook shows without problems when the ship belonged to a platooning convoy.	I	EU and CCNR	Section 6.5.2: Autonomous sailing: general consideration
REC 23	Investigate whether new traffic regulations are needed for platooning units by experts.	I	Fairway authorities or local government	Section 6.5.2: Autonomous



				sailing: general consideration
General principles for the assessment of permissible video surveillance				
REC 24	Check that monitoring the ship with sensors does not violate employees' rights.	A	CESNI/TI	Section 6.12
Documents on a vessel				
REC 25	Consider to introduce a system or electronic portal, where all documents of a vessel or crew can be found by the competent authorities.	I	EU/CCNR	Section 6.7
Legal opinion: SuAc 2.4				
REC 26	RIS: In case a 3rd party is nor a RIS user (controller) nor a processor for a RIS user, apparently it concerns further processing in a manner that is incompatible with the original purposes for processing personal data (i.e. RIS services by RIS users). Find out if there is a legal basis. If not, a decision must be made about the creation of a legal basis or the use must be stopped. Check whether anything is directly or indirectly regulated in the new version of the RIS Directive.	B	EU	Section 6.9: SuAc. 2.4: legal opinion
REC 27	Decide about harmonisation and automation of reporting requirements in all member states. Check whether anything is directly or indirectly regulated in the new version of the RIS guideline.	B	EU/CCNR/member states	Section 6.9: SuAc. 2.4: legal opinion



8 Appendix

8.1 Abbreviations

Abbreviation	Explanation
A2B	Authority to Business
AIS	Automatic Identification System
API	Application Programming Interface
B2B	Business to Business
B2E	Business to Employee
BDSG	Federal Data Protection Act (Bundesdatenschutzgesetz)
CAS	Calamity Abatement Support
CCNR	Central Commission for the Navigation of the Rhine
CEERIS	Central & Eastern European Reporting Information System
CESNI	European Committee for Drafting Standards for Inland Navigation
CEVNI	European Code for Inland Waterways
CFR	Charter of Fundamental Rights of the European Union
DTLF	Digital Transport and Logistics Forum
EC	European Community
ECHR	European Convention on Human Rights
ECHR	European Convention on Human Rights
ECtHR	European Court of Human Rights
EEC	European Economic Community
eFTI	Electronic Freight Transport Information
ES-RIS	European Standard – River Information Services
ES-TRIN	European Standard laying down Technical Requirements for Inland Navigation vessel
ETA	Estimated time of arrival
ETD	Estimated time of departure
EuRIS	European River Information Services
GDPR	General Data Protection Legislation
IM	Infrastructure Managers
Inland ECDIS	Inland Electronic Chart Display and Information System
IWT	Inland Waterways Transport
NS	Network statement
PLC	Programmable Logic Controllers
RIS	River Information Services
RPR	Police regulations for the navigation of the Rhine
RTA	Requested time of arrival
RU	Railway undertaking
SCC	Shore Control Center
TAF TSI	Telematics applications for freight subsystems
TEU	Treaty on European Union



TFEU	Treaty on the Functioning of the European Union
TTI	Tactical traffic information
UN/EDIFACT	United Nations rules for Electronic Data Interchange for Administration, Commerce and Transport
VTS	Vessel traffic services



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