



REMOTE OPERATED IW NAVIGATION

PROPOSED TECHNICAL WORKING GROUP

TERMS OF REFERENCE

1. Background Definition of the Problem

Remote operated navigation in inland waterways represents a cutting-edge frontier, leveraging advancements in remote sensing, real-time data transmission, and automated systems. With remote-operated vessels, operators can navigate waterways remotely from a Remote Operation Center (ROC), optimizing efficiency and reducing certain operational risks. However, challenges persist, particularly in regulatory frameworks related to inland navigation to ensure safe and reliable deployment. Indeed, a remotely operated vessel should be as safe as a conventional vessel. Despite these hurdles, ongoing research and development efforts underscore a trajectory towards a future where remote operated and automated navigation becomes common place, reshaping the industry's landscape.

The WG will only target the remote IW navigation and not the semi-autonomous and autonomous navigation systems.

Recent innovations related to remote IW navigation

Recent innovations are poised to revolutionize remote vessel operations, enhancing control and reliability. Advanced machine learning technologies are being developed to provide enhanced situational awareness, offering real-time and accurate interpretation of complex inland navigation environments. This innovation promises to improve safety and operational efficiency by enabling more informed decision-making. Additionally, continuous innovation is driving the system's ongoing development, equipping the Operator with the best tools to optimize navigation. For example, haptic controllers have been installed in the ROC. These advanced controllers provide an intuitive interface, allowing operators to receive not only visual and audio signals but also physical feedback. On the other hand, remotely operated vessels face new risks like the need to have a reliable and safe connection shore/vessel. For example, cybersecurity risks must be mitigated as the vessel cannot be seen as an isolated entity anymore.

The continuous stream of innovations ensures that the technology becomes increasingly refined and robust, paving the way toward a more efficient and safer future for the sector.



2. Objectives

CHALLENGES

A challenge of IWT is the lack of personnel on board of vessels. Remote operated vessels offer new possibilities to work in the field of inland navigation but on shore. This might be more compatible and attractive considering the private expectations of the staff. The shortage of personnel also poses a risk to safety, as inadequate staffing can lead to higher risks of accidents and inefficient emergency management. However, technology offers a potential solution to bridge this gap by enabling remote operation (and automation), which can reduce the reliance on human labor and enhance efficiency.

NEEDS FOR TOMORROW

The technology to steer a vessel (ROC) remotely seems to be ready for broader implementation in the sector, with promising prospects for improved operational efficiency and safety. However, to effectively and responsibly integrate these technologies, a solid legal framework is crucial. This framework must provide clear guidelines and standards that regulate not only the technical aspects but also address the ethical and safety issues associated with remote systems as well as explore the legal implications.

Therefore, requirements are needed for:

- The functional/technical adaptations to be carried out at the vessel to make it possible that it can be operated from a ROC, including the behavior of the vessel if the connection with the ROC would be broken.
- The quality of the connectivity between the ROC and the remotely operated vessel.
- The technical equipment, the essential procedures and the minimal requirements for the personnel operating the vessel from the ROC.

The people carrying out the operation are responsible for the behavior of the vessel. In the legal system of many countries, the boatmaster is responsible for the behavior of the vessel in the traffic system. So far, the boatmaster must always be on duty on board the vessel and respect the same legal system. When the vessel is operated remotely this might no longer be the case anymore. So, the legal framework of the country should be updated to cope with this.

There is also an international aspect, since a vessel in country A could be navigated to country B. The legal framework of country A cannot be applied in country B (and vice versa), making law enforcement difficult.

3. Earlier Reports to be Reviewed

Some relevant technical publications to be reviewed include:

- WG210 "Smart Shipping"
- Existing functional requirements of ROC's and 'as build' information (for example the application information of experiments carried out on IW - www.seafar.eu)
- Documents describing functional requirements for remotely operated vessels (for example the CCNR recommendations adopted in December 2023¹, information for implementing a pilot project on the Rhine²)

¹ <https://www.ccr-zkr.org/13020500-en.html#07>

² <https://www.ccr-zkr.org/12050000-en.html#04>



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- The Flanders requirements (<https://www.vlaamsewaterweg.be/smart-shipping>) and the Dutch assessment framework.

4. Scope of Work

The work to be done can be divided in 3 tasks:

1. Updating the WG210 section related to remotely operated vessels.
2. Identifying gaps and possible functional requirements for remote operated vessels, their ROC's and their connections vessel/shore.
3. As generally vessels tend to cross borders and therefore only international regulations can safeguard significant investments in the fleet, a task will be to explore the legal possibilities to cope with the concept of a vessel that is sailing in a country A but is remotely operated by a ROC located in a country B.

5. Intended Product

In accordance with the scope of work the report will contain 3 parts

- New developments and pilot projects performed related to remotely operated vessels.
- List the gaps and functional requirements for remote operated vessels, their ROC's and their connections vessel/shore.
- Report about the legal issues, particularly for transborder traffic

6. Working Group Membership

Members of the working include experts and professionals with relevant experience and expertise in remote operated IW navigation, smart IW shipping and innovative IW navigation technologies from :

- governmental administrations,
- research institutions (technical, human factor specialists as well as legal)
- the private sector (technology developers and IW shippers & operators)

7. Target Audience

The primary target audience for the working group's output includes professionals, decision-makers, and stakeholders involved in the development of remote operated IW navigation. The output can help authorities in shaping requirements for allowing experiments with remotely operated vessels on inland waters.

8. Relevance

8.1. Relevance to Countries in Transition, etc.

The findings of the WG are relevant for any country (worldwide) that has interest in development of remote operated IW navigation

8.2. Climate Change and Adaptation

The WG will not discuss the environmental impact and climate change impact

8.3. Working with Nature

The WG topic is not directly linked with WWN concept, even closely related

8.4. UN Sustainable Development Goals

Similarly, the relation with the UN SDG will not be enhanced



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9. References