



TECHNICAL LEAFLET



HUMAN FACTOR ROOT CAUSES OF ACCIDENTS IN INLAND NAVIGATION

PHASE 2A : HMI & WHEELHOUSE DESIGN

Incidents

Incidents in Inland Waterway Transport (IWT) change and seem to increase in severity & cost of claims. Human factors account for about 70-80% of all incidents, according to databases and literature. Also changes in IWT itself develop like increasing automation, other business models, etc.

Based on triangulation approach

- ▶ information from questionnaires (**85 respondents**);
- ▶ interviews;
- ▶ and on-board-observations helped to reveal context of human factors root causes (**10 selected vessel visits**).

Paul Goris, president of the IWT Platform: "The Inland Waterway Transport sector is on the eve of a major transition in terms of sustainability and digitalisation. This requires further development of standards and certain safety requirements."



Report

This report covers phase 2a: an in-depth study into three factors that relate to the root cause of inadequate Human-System-Integration:

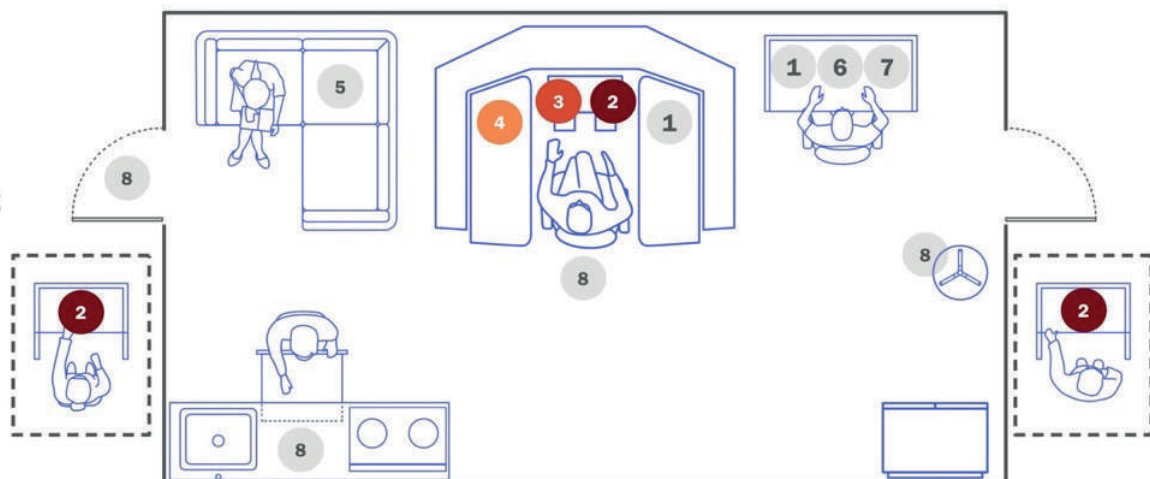
- ▶ Wheelhouse design;
- ▶ Human-Machine Interface (HMI);
- ▶ and current and future levels of automation.

Research conducted by:



INTERGO

- 1 Voyage/ cargo planning
- 2 Navigating
- 3 Monitoring operation craft
- 4 Monitoring safety state
- 5 Meeting & managing
- 6 Administrating
- 7 Coaching
- 8 Others

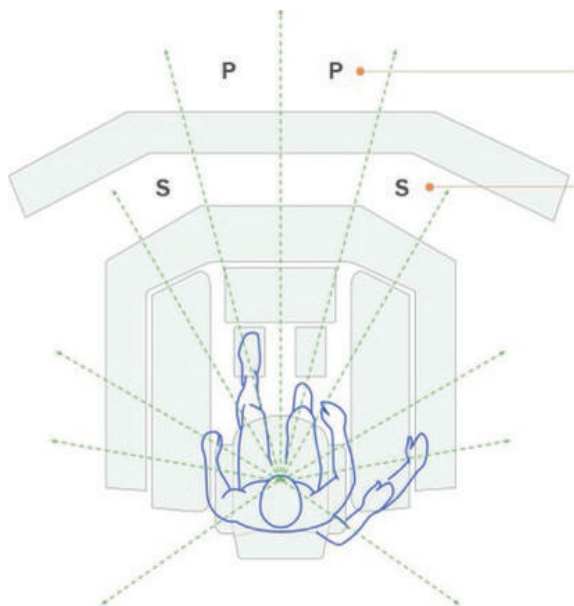




Results

The results of the questionnaire showed that about 60% of the respondents think uniformity in wheelhouse design is important. In tankers - where crew often changes from vessel- this is even 76%, and only 6% disagree (rest has no opinion). This research (phase 2a) shows that even 'classic' instruments like rudder control and propulsion control, navigation lights controls, etc. have varying positions across the inland navigation fleet.

Reachability, visibility, and legibility are often compromised, leading to (potential) errors and musculoskeletal disorders.



P: Visual field for primary displays

S: Visual field for secondary displays



Recommendations

The first recommendation is to update and improve the available wheelhouse and HMI design guidelines. A user- and task-based approach should be followed, and guidelines should anticipate on developments in automation. Industry commitment is an important first step in general use of these guidelines.

The other recommendation is to develop a vision on minimum required availability, reliability, usability, and integration of information and automation at the helmsman's position. This should lead to systems that are safe and truly support navigation, without introducing new risks like distraction, creating a false sense of safety, and too many or unclear alarms.

Next step? An integral approach

The next challenge is to translate the recommendations of phase 2a and 2b into concrete measures and implementation. This doesn't happen overnight. An integral step-by-step approach must be applied in following-up the recommendations, with attention for technology, organisation (including leadership and strategy) and people. Careful interaction with stakeholders and experts is required and solution packages should be defined. This increases the chance of achieving the objectives in a steady and supported manner. The approach should be described in a roadmap. We recommend developing this roadmap together with the relevant stakeholders within the European nautical field.



To read the full report, go to www.ivr-eu.com/ or www.inlandwaterwaytransport.eu

As a result of the research Phase 1- based on data and expert analysis - several factors were identified that contribute to the incidents. As a follow-up, two separate studies were requested:

- ▶ Phase 2a: Human-machine interface and wheelhouse design;
- ▶ Phase 2b: Further investigation into four most plausible accident causes.



DISCLAIMER

The content of this Technical Leaflet has been assembled with the greatest possible care. However, IVR cannot guarantee accuracy or completeness. IVR accepts no liability which may arise from the content of this leaflet. This leaflet is based on the published report of Intergo: Human Factor root causes of accidents in inland navigation, Phase 2a HMI & Wheelhouse design. © IVR Technical Leaflet November 2021