

RESULTS OF THE QUESTIONNAIRE to identify the use of Aids to Navigation in Inland AIS (AtoN)

Edition: October 2024



Context

As part of the task to “Monitor the development of the use of messages from Aids to Navigation in Inland AIS (AtoN)” (IV-24-18) which is included in the work programme 2024-2025, the CCNR decided to distribute an online questionnaire in order to identify how AIS AtoN are used.

This questionnaire was available online from 28 November 2023 to 31 January 2024 and received 164 responses. This report contains a synthesis of the results.

The CCNR would like to thank all the participants whose replies will help to optimise the possible uses of AIS AtoN on the Rhine.

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The questionnaire as published (Questionnaire to determine the use of Aids to Navigation (AtoN) in Inland AIS) is attached to this document. It was originally published in three languages: French, German and Dutch.

1. Sample

The questionnaire received 164 replies, broken down as shown below.

In terms of the type of organisation, the sample is diverse with all the organisations targeted represented. For example, the category “Other” includes AtoN manufacturers, a research institute and instructors of inland navigations.

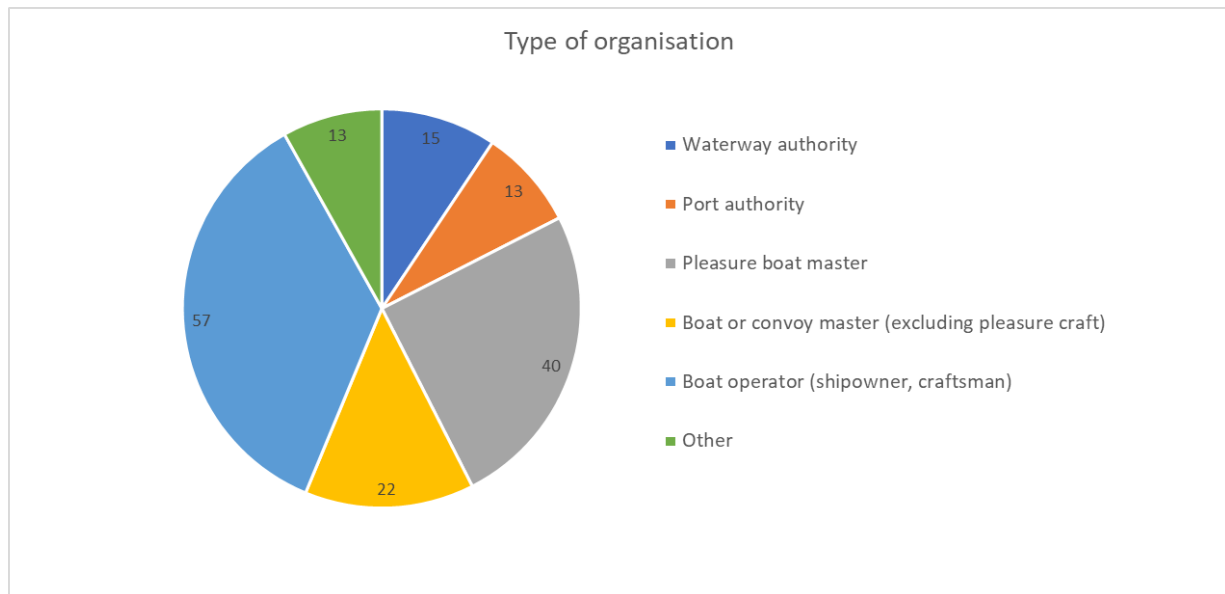


Figure 1 - Breakdown of replies to the question “Type of organisation”

2. Responses to questions to the authorities (total: 29)

2.1 Current use of AtoN

The German waterway authority “Wasserstraßen und Schifffahrtsverwaltung des Bundes” is the only waterway authority to report transmitting AtoN messages on the Rhine. These are physical AtoN transmitted as part of trials with signals from warning crafts in the Koblenz sector.

The most common reason given for not transmitting AtoN is the lack of knowledge regarding the technology. The responses given in the category “Other” include primarily those authorities not concerned with the Rhine, but also the inadequate capacity of the AIS network.

The Seville port authority reports using more than 10 different AtoN messages indicating the position of buoys by means of a physical AtoN at the mouth of the Guadalquivir canal.

The Waterways Directorate in Czechia reports transmitting between 5 and 10 different virtual AtoN messages on the Elbe in order to provide both information which does not appear on navigational charts (temporary installations, changes that have occurred since the charts were produced) and dynamic information (water level, bridge clearance, etc.).

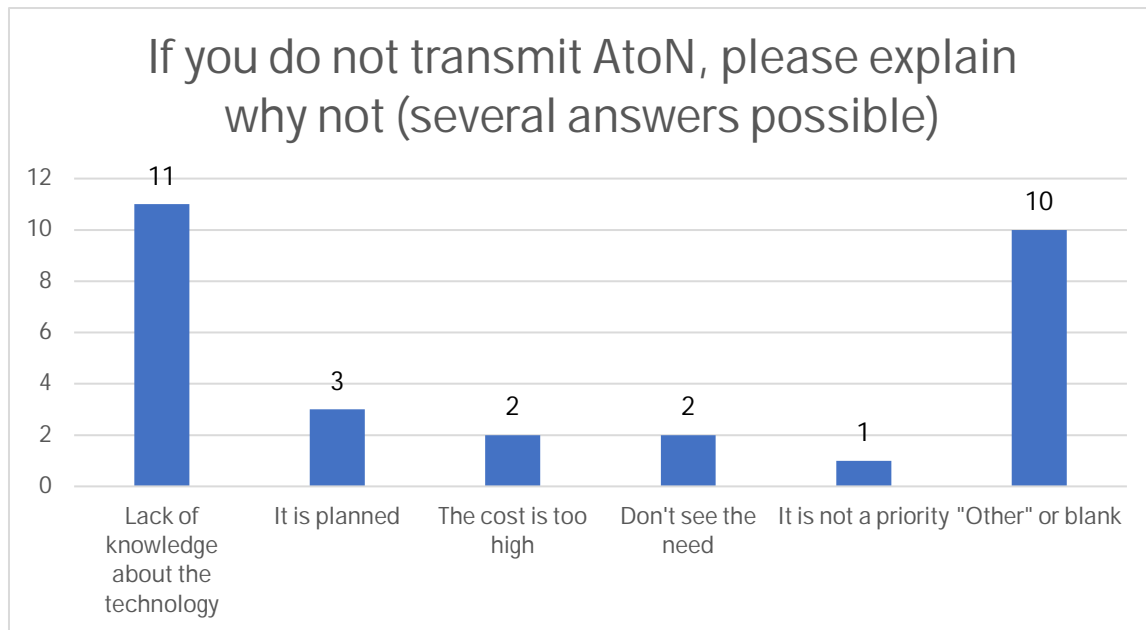


Figure 2 - Breakdown of replies to the question "If you do not transmit AtoN, why not?" (Several answers possible)

2.2 Value of the use of AtoN

The port and waterway authorities assessed the perceived value of various uses of AtoN (on a scale of 1 to 5, where 1 = no value and 5 = indispensable). The table below gives the mean (to the nearest tenth) and median of the scores awarded.

	Mean	Median
a) Installation of AIS AtoN devices on physical AtoN on certain particularly risky stretches or in harbour areas;	4,0	4
b) Indication of works or temporary danger zones by means of virtual AIS AtoN	4,2	4
c) Communication of certain notices to shipping, also by means of virtual AIS AtoN	3,7	4
d) Information on the state of traffic lights regulating locks, bridges or other structures	3,1	4

The respondents tended to give similar scores to cases (a) and (b). This may be explained by the fact that both involve dangerous zones.

Those authorities who plan to use AIS AtoN on the Rhine see a greater value for the uses proposed, particular for (b).

The question "Are you aware of other AIS AtoN reporting which you think could be usefully introduced on the Rhine?" received replies relating to meteorological conditions (fog, ice jams, flooding, low water); marking of the fairway; works or other temporary or unexpected situations; traffic management where a waterway is closed to navigation; and locks.

Some remarks highlight the value of AIS AtoN in conditions of reduced visibility, for example at night. Another remark felt, however, that it would be preferable to invest in better lighting.

One remark noted that it would be useful to use the AIS messages defined in the ES-RIS 2023 (i.e. ETA/RTA at the lock/bridge/terminal, Present bridge clearance, Water level, Signal station, Geographic notice, ISRS text message).

2.3 Plans to use AIS AtoN reporting (on the Rhine)

In answer to the question “Do you have any plans to use AIS AtoN reporting on the Rhine?”, 9 authorities (26%¹) replied that they did and described their plans:

- The Waterways Directorate in Czechia intends to develop the use of AIS-AtoN on the Elbe and the Vltava.
- The Swiss Rhine Ports (Schweizerische Rheinhäfen) intend to use AIS AtoN messages on the Upper Rhine (km 149.100) down to the Swiss-French-German border (Dreiländereck) (ca km 170.000). The type of data displayed will include bridge clearances, levels, traffic lights, existing buoys and warning crafts, construction sites and entrances to lock forebays.
- The Upper Rhine water and navigation authority (Wasser- und Schifffahrtsamt Oberrhein) intends to use AIS AtoN messages on the Upper Rhine, particularly in the passages of the sector referred to as “Gebirge”.
- The German Federal Waterways and Shipping Administration (Wasserstraßen und Schifffahrtsverwaltung des Bundes, Deutschland) is planning to mark work zones and dangerous areas, and also to carry out a study on marking the fairway during low-water periods.
- Voies Navigables de France plans to use AIS AtoN messages to provide information on the clearance under the rail bridge between Strasbourg and Kehl (km 293.680), as well as on the canalised Rhine.

3. Responses to questions to boatmasters and vessel owners/operators (total: 122 responses)

3.1 Waterways usually used

Most of the respondents sail primarily on the Rhine, as well as in the Rhine states and Belgium. The “Other” replies also included coastal waters.

¹ Percentages are rounded to the nearest whole number.

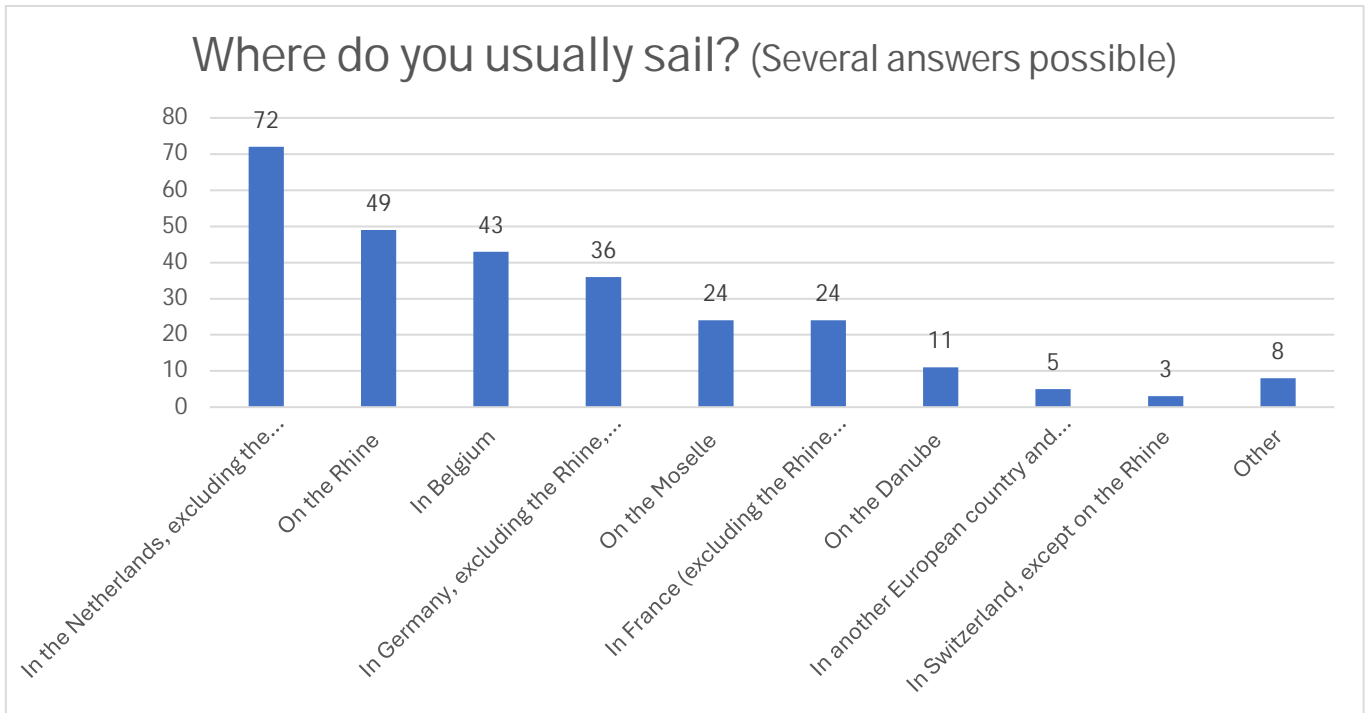


Figure 3 - Breakdown of answers to the question “Where do you usually sail?” (Several answers possible)?

3.2 Technical possibilities of the AIS AtoN messages

In answer to the question “Were you aware of the technical possibilities of these AIS AtoN messages?”, almost a third of the respondents answered that they were. Of those who were not aware, the vast majority (85%) were in favour of the CCNR developing a communication tool intended for boatmasters or owners/operators. Of those who had no opinion on the matter, the majority (5 of 9) were pleasure craft boatmasters (a third of those who replied to this question).

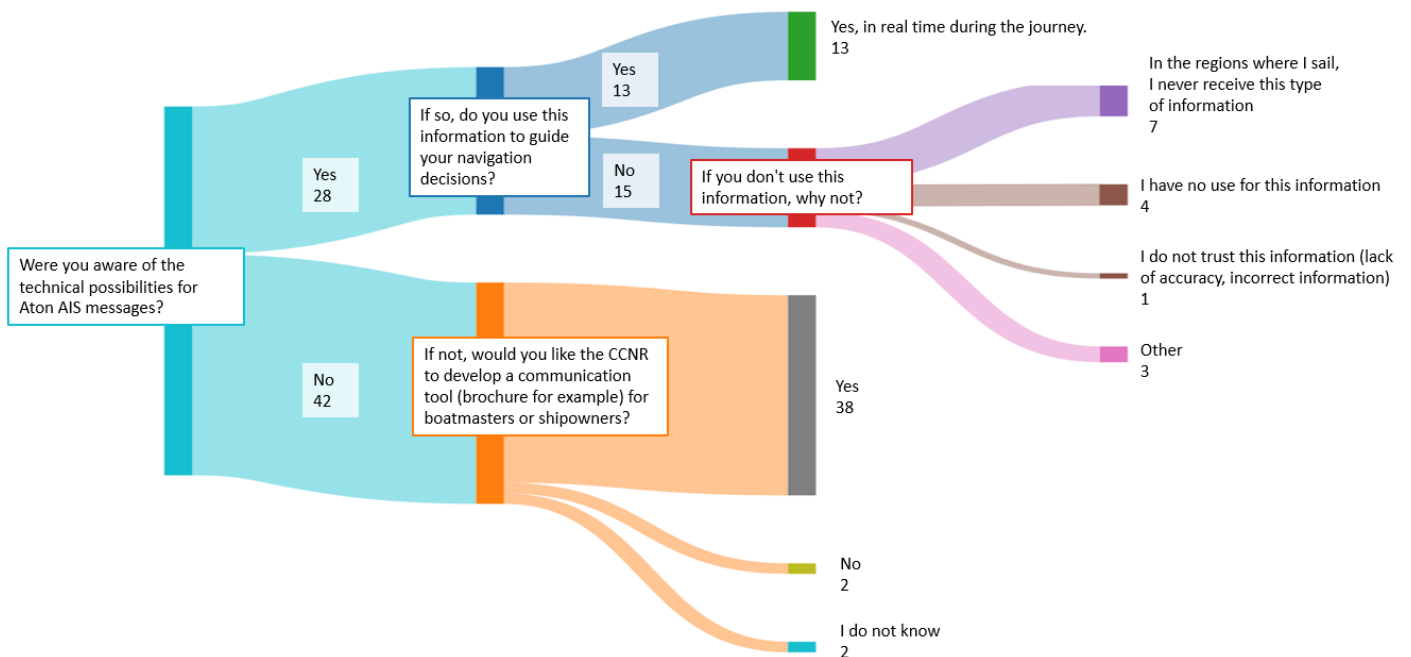


Figure 4 - Sankey diagram of the replies to questions about the technical possibilities offered by AtoN.

3.3 Chart display systems

3.3.1 Information on signage

The answers to the question “Do you have a chart display system that shows information on signage (construction areas, buoys, traffic lights)?” included 84 “Yes” (69%), 19 “No” (16%) and 19 “Don’t know” (16%). Over half of those who answered “No” (10 of 19) were pleasure craft boatmasters (who make up a third of the respondents to this question).

Of the boatmasters and owners/operators who answered “Yes”, the information that most would like to see displayed is the location of the navigable channel, in particular where this is subject to local restrictions, as well as where work is being carried out. In the “Other” category, the bridge clearance in tidal areas is mentioned several times. The replies to this question vary according to the profession. 60% of the pleasure craft boatmasters and the owners/operators would like to display where work is taking place whereas only 36% of boatmen (excluding pleasure boaters) would like this.

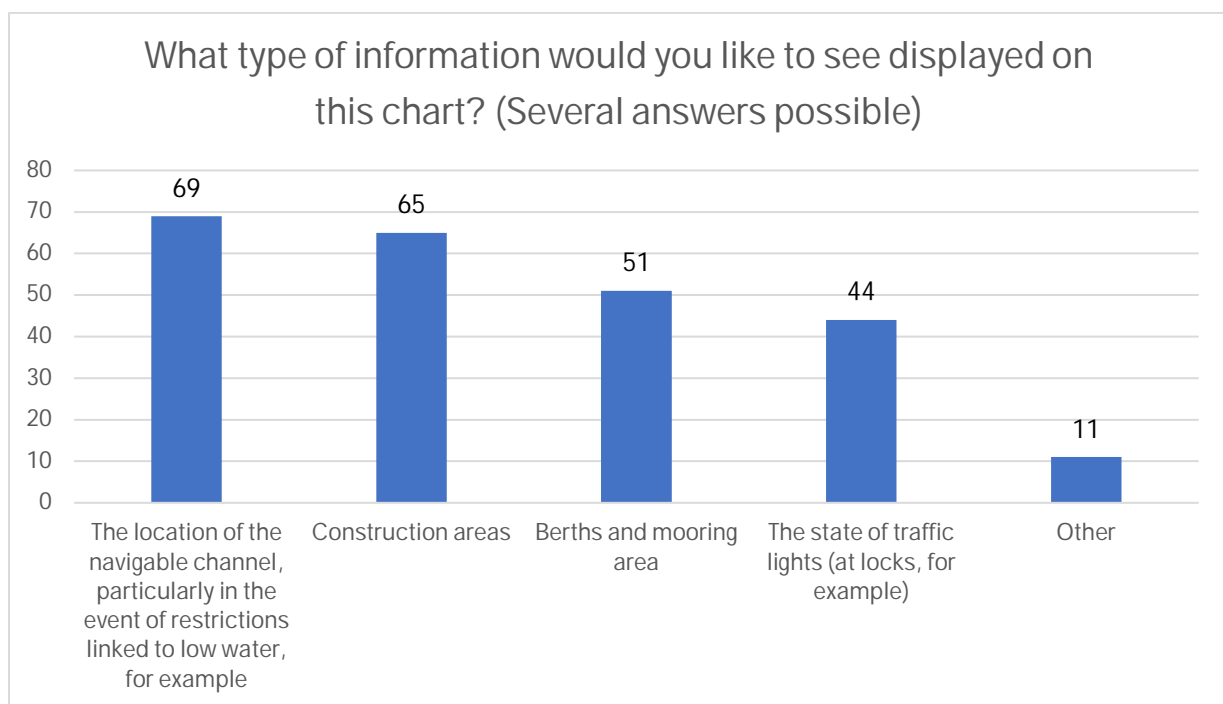


Figure 5 - Breakdown of replies to the question, “What type of information would you like to see displayed on this chart?” (Several answers possible)

Among the boatmasters and owners/operators who gave a negative reply, the most common reason for the absence of a system was “I would like to have access to this information, but the price of compatible display equipment is too high”.

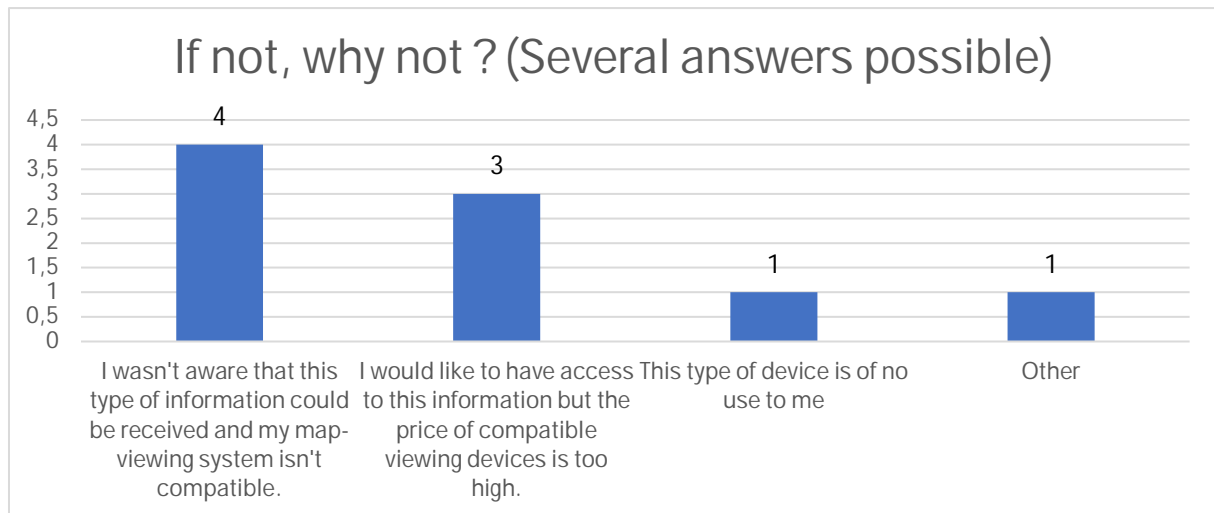


Figure 6 - Breakdown of replies to the question “If you do not have a chart display system that shows information on signage (construction areas, buoys, traffic lights), why not?” (Several answers possible)

3.3.2 Other types of dynamic information

The responses to the question “Do you have a chart display system that also shows other types of dynamic information specific to certain uses (water level, bridge clearance, ETA/RTA, etc.)?” included 67 “Yes” (55%), 42 “No” (34%) and 13 “Don’t know” (10%). 60% of those who answered “Yes” to the previous question on information related to signage also answered “Yes” to this second question.

The great majority (78%) of vessel owners/operators and boatmasters who answered “Yes” use this system when making navigational decisions. Of those who do not, almost half said that they do not trust this information. Other reasons given included using other sources of information (such as notices to shipping), the unreliability of the information and the lack of information about this system.

Among the vessel owners/operators and boatmasters who do not have this display system, the principal reason given was the cost of compatible equipment.

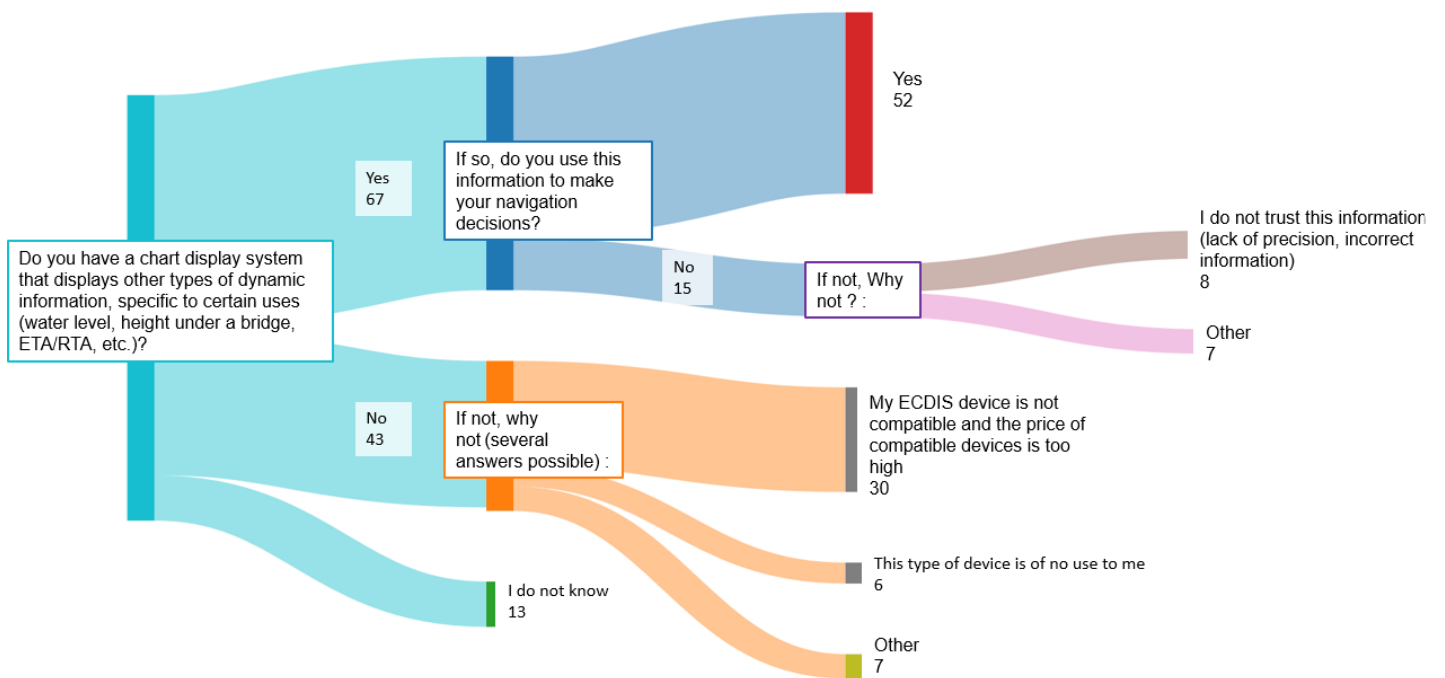


Figure 7 - Sankey diagram of the replies to questions about chart display systems showing other types of dynamic information that are specific to certain uses.

3.3.3 Breakdown of responses by sector

The replies differ according to the sector (pleasure craft boatmaster, boatmaster excluding pleasure craft and operator/owner). The differences are particularly in the case of the question “Do you have a chart display system that also shows other types of dynamic information specific to certain uses (water level, bridge clearance, ETA/RTA, etc.)?” Only 14 pleasure craft boatmasters (out of a total of 41) answered “Yes” (34%), while 17 (77%) of the boatmasters excluding pleasure craft gave an affirmative answer.

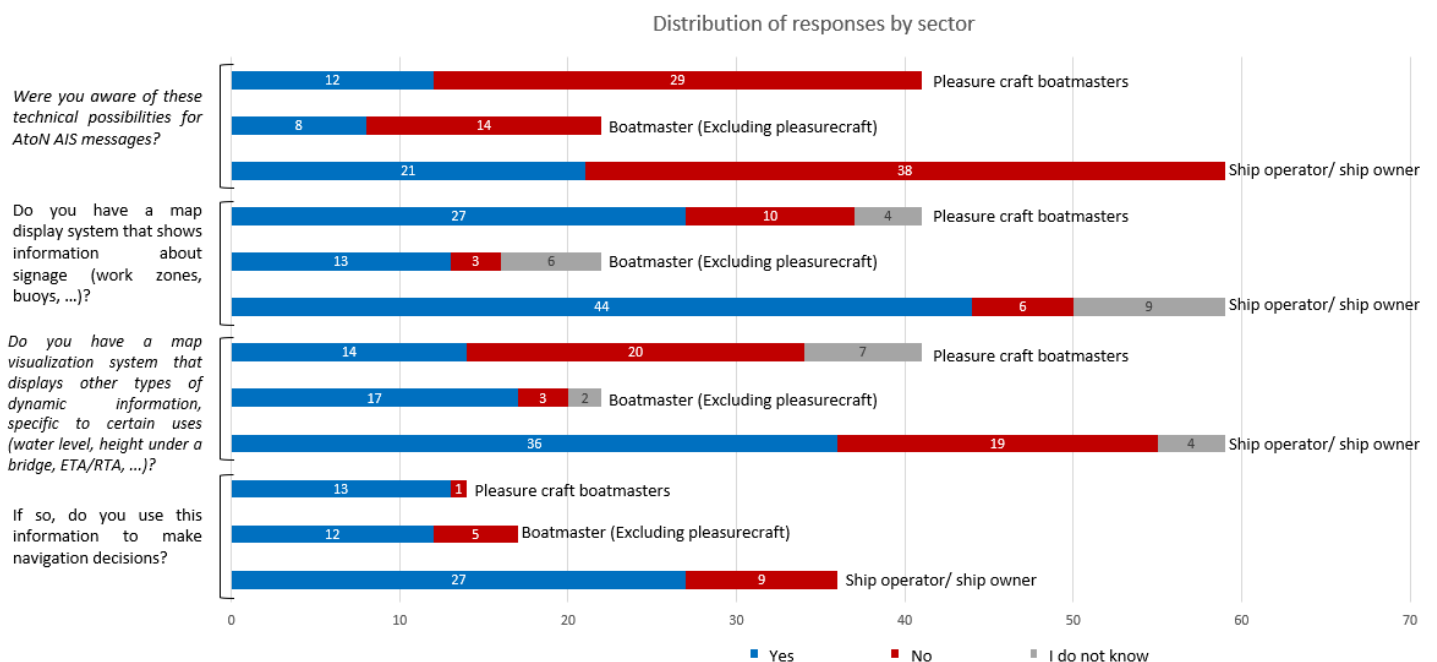


Figure 8 - Breakdown of responses by sector

3.3.4 In your opinion, which specific zones, structures or sections of the Rhine would most benefit from the use of AIS AtoN messages that could be displayed on the Inland ECDIS device, and why?

The non-compulsory question “In your opinion, which specific zones, structures or sections of the Rhine would most benefit from the use of AIS AtoN messages that could be displayed on the Inland ECDIS device, and why? (For example, a lock, a difficult passage, a section particularly affected by low water, etc.)” received over 100 replies, indicating the respondents’ interest in this technology.

The answers (given as free text) can be divided into a number of categories:

1. **Answers suggesting types of location or situation to be prioritised** by the AIS AtoN. Some of these answers are in line with the authorities’ answers to the question on the value of AIS AtoN messages (see 2.2). In this category the respondents think that AIS AtoN should be installed at locks and construction sites, to indicate the width of the fairway and bridge clearance, in particular to indicate the presence of submerged objects during low water, in narrow sections, at intersections and where there are cross currents.
2. **Answers naming more or less exact locations**, either with or without an explanation: The municipal port in Wesel (particularly affected by low water); the four rivers the Ems, the Weser, the Meuse and the Upper Scheldt (where the use of weirs determines bridge clearances); narrow stretches such as the Upper Rhine between Mannheim and Iffezheim; locations where the boatmen don’t know the width of the navigable channel (Upper Rhine, Rheingau, Lorcher Werth, Neuwied, etc.); the Deutzerplatte (to indicate that work is taking place, such as dredging); Rhine km 356-358; Rhine km 520-600; Upper Rhine; Middle Rhine; the Port of Antwerp; Plittersdorf bridge; the Wadden Sea; the waterway known as “Staande Mast (Fixed Mast Route); the inside bends of the Waal; the Elbe; the Vltava, Zeeland; the IJsselmeer; the route from Mainz to Koblenz; Apothekereck; Danube Straubing- Vilshofen etc.
3. **Answers advocating against the use (or excessive use) of AIS AtoN messages**. The reason given are the information overload on the Inland ECDIS and the limited capability of the AIS network.

4. Remarks

In their answers to the last question “Other remarks” some respondents took the opportunity to clarify their answers, to comment on the question and to submit their ideas on AIS AtoN technology in general.

Rijkswaterstaat made a number of points. This authority believes that the device processing the information in the wheelhouse is not relevant (Inland ECDIS or other). Incorporating certain information directly into the inland electronic navigational charts (IENC) could also be an option, which would require less frequent updates in order to guarantee accuracy. Virtual AtoN could offer a more economical solution than hybrid AtoN. The Rhine might not be the ideal location for this type of technology without a clear definition of the requirements in terms of accuracy and responsibility.

To avoid an information overload on the screen, one comment suggested displaying just the symbol for the object, with the name or number only visible if the user specifically clicks on it.

One comment explained that the position of a floating signal buoy might have changed. Using AIS AtoN would therefore be the only way for boatmen to know reliably whether the signal from the buoy should be respected or not. Another stressed the importance of the physical presence of AtoN in ensuring consistency between the digital and real images. Other comments emphasised the importance of physical AtoN, in particular luminous buoys.

Some comments expressed concerns about the capacity of the network to manage the volume of these signals without compromising the safety of traffic. As the AIS network could become saturated in some places, other technologies, such as VDES, could be more suitable. One comment explained that in Hungary, the replacement of buoys with AtoN AIS has caused frequent overloading of AIS equipment, leading to malfunctions.

Annex: Questionnaire

**Annex
Questionnaire
to determine the use of Aids to Navigation
(AtoN) in Inland AIS**

Questionnaire to determine the use of Aids to Navigation (AtoN) in Inland AIS

1. Introduction to AtoN

Navigational aids are defined in the ES-RIS 2023/1, Part II, Article 5.01:

“A navigational aid (also known as Aids to Navigation, or AtoN) is a marker which provides support during navigation. Such aids include markings for lighthouses, buoys, fog signals, and day beacons.”

Some Aids to Navigation transmit information via the Inland AIS system and these are known as “AIS AtoN”. The information is displayed on the screen of the Inland ECDIS equipment (see figure 1).

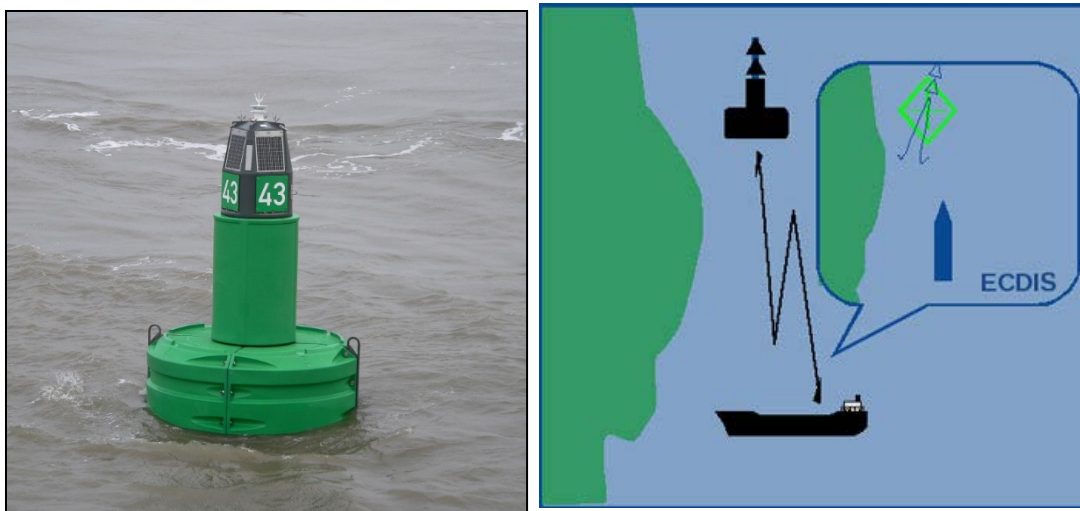


Figure 1. Left: a buoy transmitting an AIS report Right: a diagram of vessel receiving the information in an AIS report and displaying this information on the Inland ECDIS equipment

Where the buoy (or another physical object) is fitted with an Inland AIS that transmits an AtoN report, it is referred to as a physical AIS AtoN.

It is not necessary for a navigational aid (such as a buoy) to be physically present on the waterway for information to be sent to an Inland ECDIS via the Inland AIS. The information can also be transmitted by an Inland AIS located in a shore installation. This is referred to as a virtual AIS AtoN.

The information transmitted by the AIS AtoN consists of identifying information which can be in a variety of forms (see Figure 2).

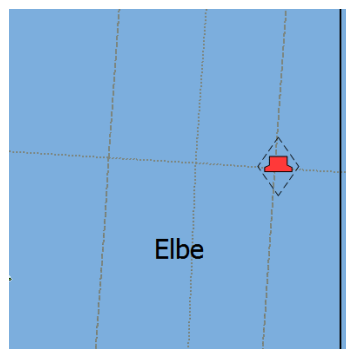


Figure 2. The Inland ECDIS displays the information received from the AIS AtoN

This technology makes it possible to mark any danger zones, some of which may be temporary, for example construction areas or areas likely to cause problems during periods of low water.

It also allows the transmission of dynamic information, such as real time information on the state of traffic lights.

Fields marked with an asterisk (*) must be completed.

2. Background information¹

Surname, Forename:

Name of your Organisation:

Location of your organisation (city):

Email address²:

*Type of organisation: [*choose only one option*]

Waterway authority

Port authority

Vessel operator/vessel owner

Boatmaster (excluding pleasure craft)

Pleasure craft boatmaster

3. *For authorities: Current use of AtoN

a) Do you currently transmit AIS AtoN reports on the Rhone?

If yes:

- What type of AIS AtoN report do you transmit? (physical AtoN or virtual AtoN)
- What need does this AtoN meet?
- On what stretch of the Rhine is this (in km)?
- How many different AIS AtoN reports do you transmit?
 - o 1 to 2
 - o 2 to 5
 - o 5 to 10
 - o More than 10

¹ Personal information will only be used to contact you at a later stage, e.g. for a more detailed interview. It will not be passed on to third parties.

² The email address can also be provided without any additional information. It will be used to communicate the conclusions.

If you do not transmit AtoN, why not? (*Several answers possible*)

- Lack of knowledge about the technology
- I don't see the need
- The cost is too high
- It's planned
- Not a priority
- Other (please specify):

b) In your opinion what is the value of AtoN in the following cases?

(On a scale of 1 to 5, where 1 = no value and 5 = indispensable)

- Installation of AIS AtoN devices on physical AtoN on certain particularly risky stretches or in harbour areas;
- Indication of work taking place or temporary danger zones by means of virtual AIS AtoN;
- Communication of certain notices to shipping, also by means of virtual AIS AtoN;
- Information on the state of traffic lights regulating locks, bridges or other structures.

4. For the authorities: Future use of AtoN

a) Do you have any plans to use AIS AtoN reporting on the Rhine?

(Please include all relevant information, such as the stretch of the Rhine concerned)

b) Are you aware of other AIS AtoN reporting which you think could be usefully introduced on the Rhine?

(Please include details of other systems and explain how they would be useful.)

5. *For boatmaster or operators/owners: Where do you usually sail? (Several answers possible)

- On the Rhine
- On the Danube
- On the Moselle
- In Germany, excluding the Rhine, Danube and Moselle
- In France, excluding the Rhine and Moselle
- In the Netherlands, excluding the Rhine (Lek, Waal, Nederrijn, etc.)
- In Switzerland, excluding the Rhine
- In Belgium
- In another European country, excluding the Danube
- Other

6. *For boatmaster or operators/owners: How do you use the information contained in the AIS AtoN reports (either physical or virtual)?

a) Were you aware of the technical possibilities of these AIS AtoN messages?

- Yes
- No

If no, would you like the CCNR to develop a communication tool (such as a brochure) aimed at boatmasters or owners/operators?

- Yes
- No

b) Do you have a chart display system that shows information on signage (works, buoys, traffic lights)?

- Yes
- No
- Don't know

c) If yes (a), do you use this information to make navigation decisions?

- Yes
- No

If no, why not:

- Where I sail, I never receive this type of information.
- I don't trust this information (lack of accuracy, incorrect information).
- This information is not useful to me.
- Other (please specify):

d) If yes (b), what type of information would you like to have displayed on this chart?

- areas where work is taking place
- the state of traffic lights (e.g. at locks)
- boundaries of the fairway/navigable channel, especially when restrictions are in place, for example during low water
- berths and mooring areas
- Other (please specify):

If no (b), why not?

- I didn't know one could receive this type of information on my system and my chart display system is not compatible
- I would like to have access to this information, but the cost of compatible display equipment is too high
- I would not find this type of device useful
- Other (please specify):

- e) **Do you have a chart display system that also shows other types of dynamic information specific to certain uses (water level, bridge clearance, ETA/RTA, etc.)**
- i. Yes
 - ii. No
 - iii. Don't know
- If yes (i), do you use this information for your navigation decisions?
- Yes
 - No
 - If no, why not?
 - I don't trust this information (lack of accuracy, incorrect information).
 - This information is not useful.
 - Other (please specify):
- If no (ii), why not?
- My ECDIS device is not compatible, and the cost of compatible equipment is too high.
 - This type of device is not useful to me.
 - Other (please specify):
7. **In your opinion, which specific zones, structures or sections of the Rhine would most benefit from the use of AIS AtoN messages that could be displayed on the Inland ECDIS device, and why? (For example, a lock, a difficult passage, a section particularly affected by low water, etc.)**
8. **Other remarks:**
