



REPORT ABOUT THE WORKSHOP ON R-MODE

Monday 9 – Thursday 12 September 2019

IALA Workshop on Ranging Mode

Main tasks

- Give overview about recent status world-wide R-Mode activities
- Define R-Mode requirements for implementation with VDES
- Develop R-Mode roadmap for the standardisation and implementation



9 – 12 September 2019

WORKSHOP ON RANGING MODE (R-Mode)

IALA Headquarters, Saint-Germain-en-Laye, France



EUROPEAN UNION

The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) is hosting a workshop on Ranging Mode (R-Mode) at IALA Headquarters, Saint-Germain-en-Laye from 9-12 September 2019. The working language will be English. The workshop is supported by the project R-Mode Baltic which is co-financed by the European Union through the European Regional Development Fund within the Interreg Baltic Sea Region Programme.

BACKGROUND

Ranging Mode (R-Mode) is a terrestrial positioning and timing system under development which supports vessel operations in coastal areas. It is foreseen as a backup system for GNSS. The R-Mode system itself consists of maritime radio transmitters, which were modified in a way that they broadcast synchronised ranging signals. Here, the transmissions of maritime radio beacons and base stations of Automatic Identification System (AIS) or, in the future, VHF Data Exchange System (VDES) are considered as signals of opportunity. The R-Mode system should be standardized to be used as a transnational navigation system.

OBJECTIVE

This IALA workshop aims to achieve the following:

- Give participants an overview about the recent status of world-wide R-Mode activities and latest results;
- Define R-Mode requirements for implementation with VDES;
- Develop a roadmap for the standardisation and implementation of R-Mode on MF and VHF transmissions.

TOPICS

The workshop deals with general R-Mode aspects which have to be agreed upon in the early phase of system development. In particular the maritime user requirements on a backup system and the implementation approach of R-Mode as part of VDES. Furthermore, world-wide experts are invited to discuss and share their results of R-Mode research, and agree a way forward, including R-Mode standardisation. To support ongoing and upcoming R-Mode research, development, validation and implementation activities a concept for an information exchange platform will be further developed which should comprise world-wide available R-Mode testbeds and test facilities.

ATTENDEES

The workshop will provide a forum for discussions between stakeholder groups. It is envisaged that the workshop will be attended by representatives of:

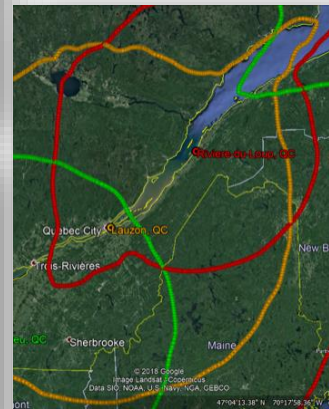
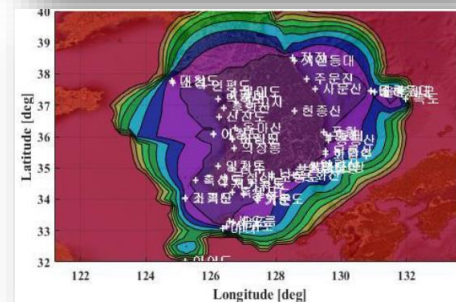
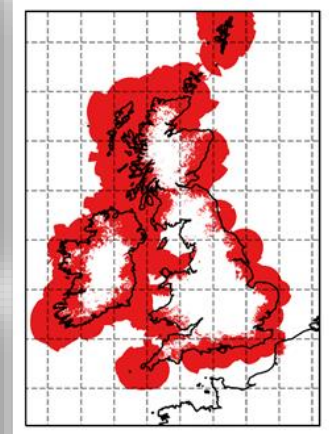
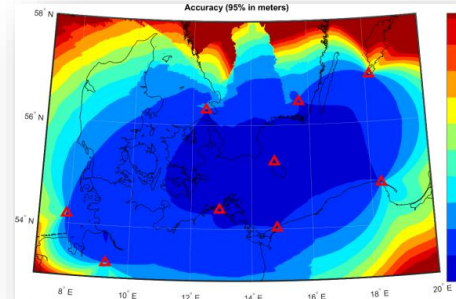
- IALA members
- IALA Sister Organisations
- Research institutions, which work on resilient PNT
- Key industry stakeholders such as manufacturers and users (shipowners, navigators, pilots, etc.)

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International Association of Marine Aids to Navigation and Lighthouse Authorities
Association Internationale de Signalisation Maritime

World-wide R-Mode R&D activities



- International
 - Baltic Sea: R-Mode testbed for MF and VHF transmissions
- National
 - UK: Theoretical studies about MF and VHF performance and implementation
 - China: VDES R-Mode testbed
 - Korea: MF/VHF & eLoran testbed
 - Canada: MF R-Mode tests



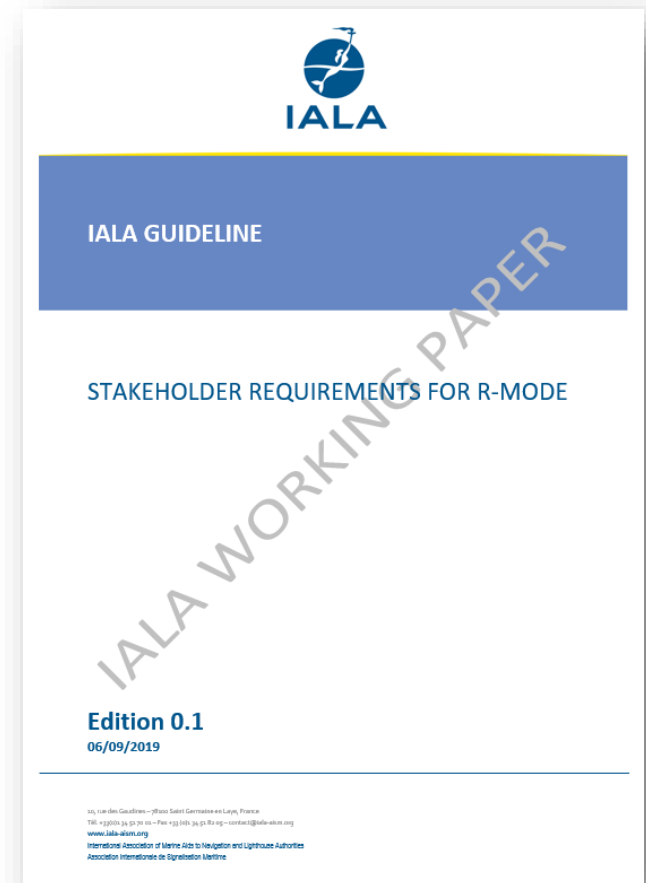
Topic 1: Requirements of stakeholders on the R-Mode system



- Draft comprises stakeholder requirements based on IMO, ITU, IALA and international project documents and publications.
- Work done at the workshop
 - Review document structure
 - Review predefined sections
 - Feedback to
 - Purpose of R-Mode system
 - Stakeholder identification
 - Life cycle diagram
 - External system diagrams

Results

- Draft is a strong basis for the further development of the IALA Guideline
- Send to ENG Committee
- Of importance for ENAV and ARM Committees



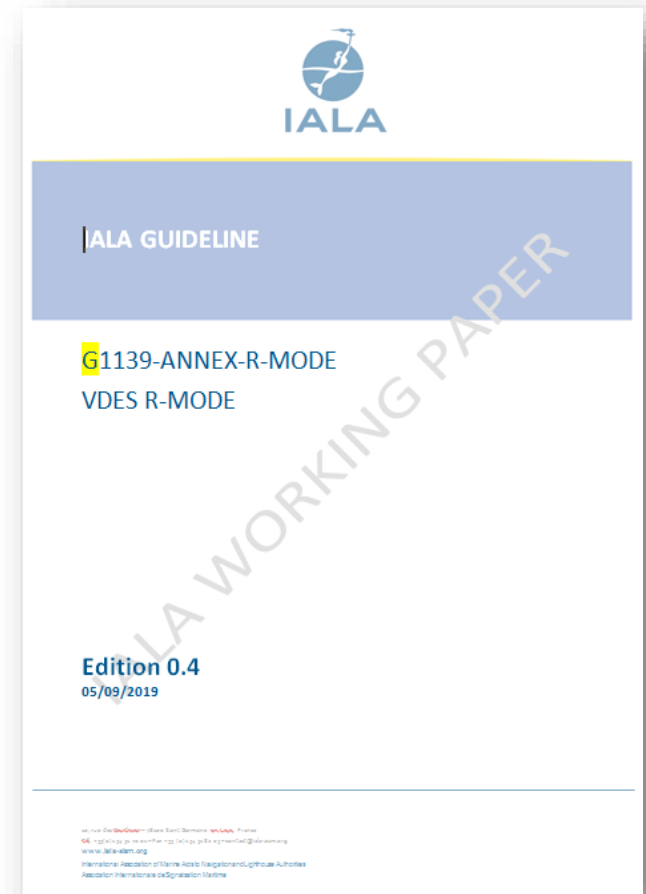
Topic 2: VDES R-Mode implementation



- IALA works on G1139 technical specification of VDES => ITU-R M.2092-1
- R-Mode a first application of VDES
=> Annex in G1139

Results

- Presentations about outcomes of the waveform measurement of VHF R-Mode on the Baltic Sea, Ammersee and the Bohai and Yellow Seas were welcomed.
- Structure of the IALA Guideline G1139 annex was endorsed.
- Suggestion how to continue G1139 annex were made.
- VDES data channel should be used for the distribution of additional information relevant to navigation.



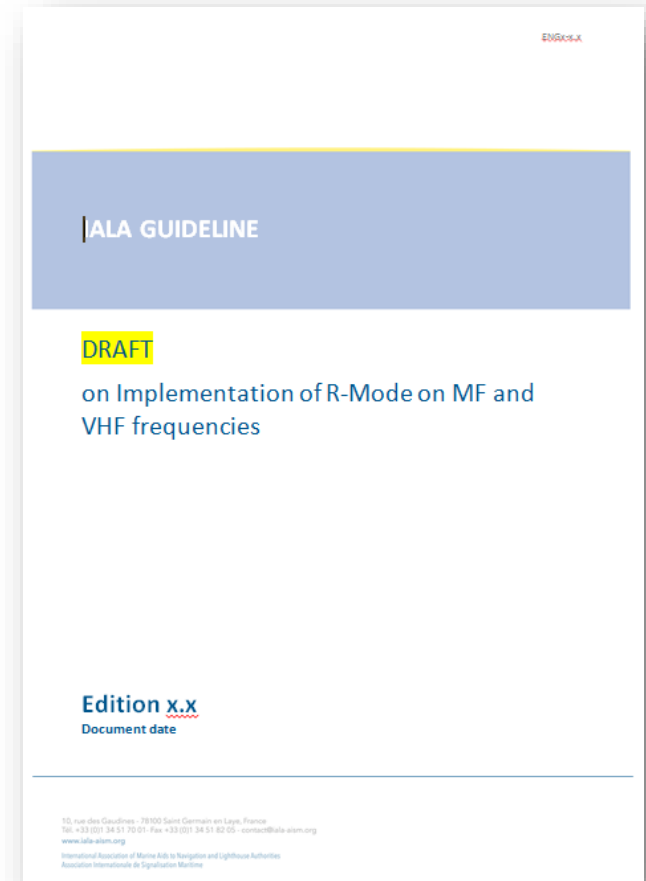
Topic 3: Guidelines on Implementation of R-Mode on MF and VHF



- R-Mode is a cross-border terrestrial navigation system.
- Interoperability requires standardisation and harmonisation.
- Task of the workshop:
 - Review draft
 - Which information is required in the Guideline

Results

- It is beneficial to provide a common Guideline for MF and VHF R-Mode implementation.
- The system design and requirements should be scalable to enable various R-Mode implementations.
- Draft will be further developed by ENG committee.



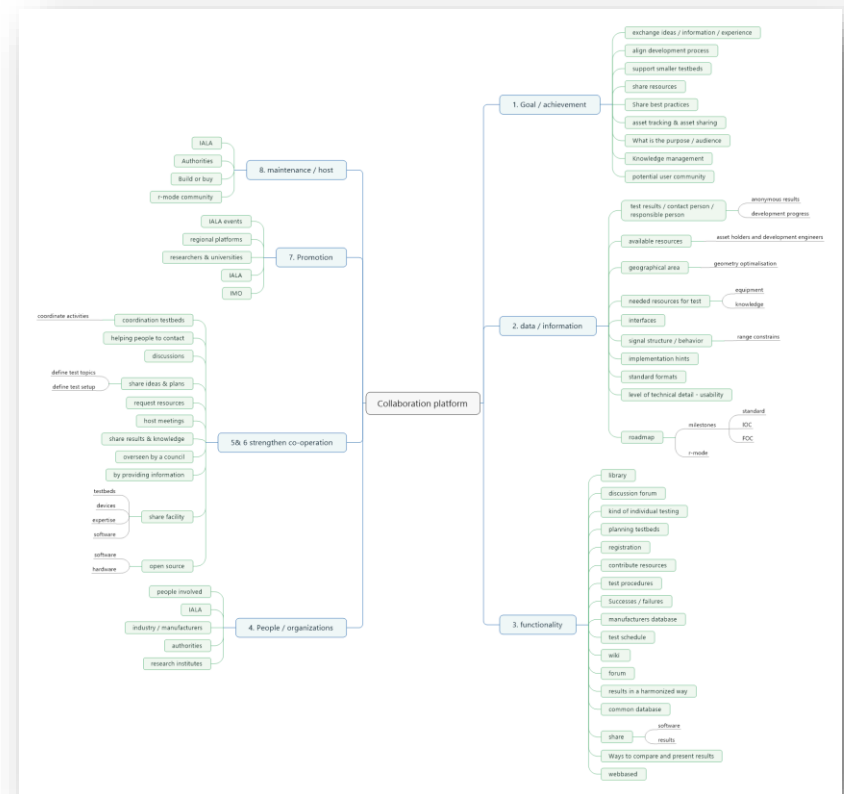
Topic 4: Platform for coordination of test facilities and testbeds



- R-Mode development in large projects requires a platform to preserve results and coordinate activities.

Results

- Generation of a mind map with ideas towards the platform.
- A collaboration platform for the use of testbeds could enhance and promote the development of R-Mode or other IALA activities.
- The governance of the collaboration platform needs to be solved.
- IALA could play a leading role.



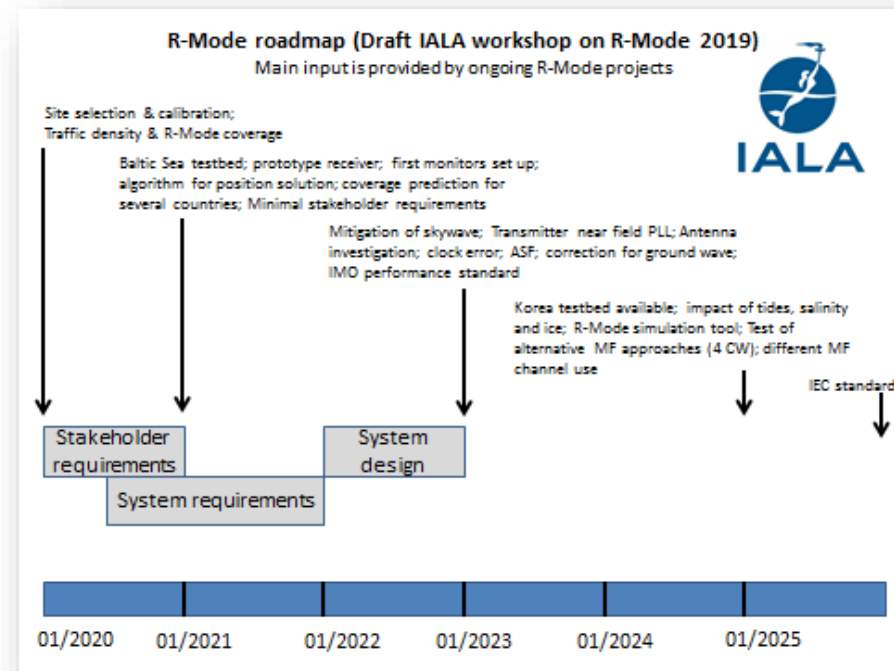
Topic 5: R-Mode development, standardisation and implementation roadmap



- Input: R-Mode mind map that summarises tasks, risks and stakeholders.
- Task of the workshop
 - Review mind map
 - Add opportunities and applications
 - Generate roadmap

Results

- R-Mode mind map was endorsed and extended by adding risks, opportunities and applications.
- R-Mode development is done in several time-limited R&D projects. Roadmap development therefore difficult.
- Major progress will be done until 2026.



Conclusions



- There is international recognition that the GNSS alone is insufficient for critical applications.
- There is a strong interest in R-Mode with world-wide R&D activities.
- IMO Resolution MSC.401(95) on the performance standards for multi-system shipborne radionavigation receivers enables the use of radionavigation systems including R-Mode.
- The work programmes of international organisations such as the IMO and ITU has to be harmonized with the IALA work programme to achieve standardisation and world-wide implementation of R-Mode.
- Standardisation of R-Mode will be continued in ENG and ENAV committee.

Thank you!

IALA Workshop on R-Mode 2019

European Navigation Conference

11-14 May 2020

Dresden, Germany



International Congress Centre Dresden

CALL FOR PAPERS

Important Deadlines

Extended Abstract Submission:	1 November 2019
Notification Acceptance:	20 December 2019
Paper Submission*:	15 February 2020
Early Bird Registration:	10 January - 1 April 2020
Registration as Exhibitor:	15 December 2019 – 1 March 2020

*paper not mandatory for presentation





A: GNSS Updates & Policies

- ☐ Current and emerging challenges on positioning, navigation, and timing (PNT)
- ☐ Future developments of GNSS, augmentation services and backup systems
- ☐ Operation of GNSS ground and space segment
- ☐ Maintenance of system and data integrity

B: GNSS Algorithms & Services

- ☐ Multi-system radio-navigation and digital signal processing
- ☐ High-accurately positioning w./o. augmentation services
- ☐ Ranging/positioning in critical environments
- ☐ Integrity evaluation within PNT systems

C: Resilience and Autonomy

- ☐ Challenges of autonomous operated systems regarding reliability and resilience of technologies
- ☐ PNT solutions for autonomous operation
- ☐ Situation awareness and adaptive controlling for autonomous systems



D: Multi-Sensor & Data Fusion

- ☐ Integrity monitoring/management within complex information, navigation & communication systems
- ☐ Design, operation and target-driven optimization of multi-sensor-networks
- ☐ Navigation for SWARM robotics

☐ Cybersecurity in sensor networks

Special Sessions ?

Do you want to organize a special session on emerging topics in navigation? Make a proposal and contact us dgon@ENC2020.eu

E: Aviation & Marine Navigation

- ☐ Challenges in safety and security of information, communication, and navigation in relation to current and emerging threats
- ☐ Space- and ground-based augmentation services
- ☐ Threat detection and mitigation methodologies

☐ Navigation of unmanned systems in air, at sea, and on land/water/air

F: Space & Science Applications

- ☐ Space exploration
- ☐ Atmospheric science: exploration of ionosphere and troposphere
- ☐ GNSS-based earth observation
- ☐ GNSS-based controlling of space missions and experimentations

Technical Exhibition

Companies, agencies, and research institutions are invited for a technical exhibition, which will be directly placed in the conference area.



G: Mobility and

- ☐ Navigation for upcoming transportation and mobility concepts
- ☐ Situation awareness for road & rail traffic systems
- ☐ Mass-Market ICN Solutions and Applications (e.g. Location Based Services, Apps)
- ☐ Telematics Solutions and Infrastructure Components for automatic, remote controlled and autonomous transportation
- ☐ Seamless Urban and Indoor Navigation
- ☐ Protection of safety-critical data & information

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