

# Rules & Regulations - Testing Maritime Automation Systems

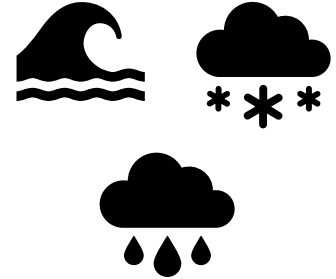
Mirjam Bogner, DLR





# The role of testbeds in realizing maritime automation

- simulations cannot reflect all aspects of environment & system behavior  
→ test Automation Systems/AI Systems in real operational environment
- Federal Ministry for Digital and Transport: funding programmes to build digital testbeds in ports & inland waterways  
→ create test possibilities for industry





# The role of testbeds in realizing maritime automation

Two kinds of testbeds:

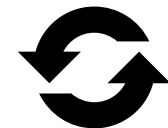
- temporary testbeds

- infrastructure set up for duration of tests in dedicated area
- designed for one particular campaign



- permanent, sustainable & re-usable testbeds

- permanent infrastructure
- designed for easy integration and testing of various systems
- e.g. eMIR (DLR)







# eMIR eMaritime Integrated Reference Platform


## Modelling / Analysis


## Verification & Validation (V&V)

## Demonstration

Near Collision DB  



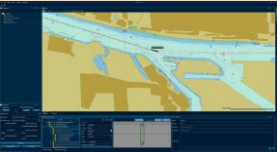

Hazard DB  


Scenario DB  


Charts  



### Virtual V&V

Maritime Traffic Simulation & Ship Bridge Simulator




VeLAS


SotA Sensors & Reference Waterway



ROC Certification Lab



Test platforms



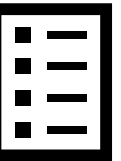
### Physical V&V





# Current situation & experiences

- permission for dedicated area
- easier if port operators are involved
  - e.g. AMISIA: Niedersachsen Ports; permission by Port Authority required (Nds. Ministerium für Wirtschaft, Bauen, Verkehr und Digitalisierung)
- IMO Guidelines for Maritime Autonomous Surface Ship (MASS) trials (2019): recommendations for risk reduction



## 2.6 Trial awareness

Reasonable steps should be taken to ensure that potentially impacted third parties are informed of the trial of MASS systems and infrastructure.

→ „Hafenbehördliche Bekanntmachung“





Deutschland – Nederland

Ferry Go!

# Current situation & experiences

Niedersächsisches Ministerium für Wirtschaft,  
Verkehr, Bauen und Digitalisierung  
- Hafenbehörde -  
Zum Lotsenhaus 25  
26723 Emden



Niedersächsisches Ministerium  
für Wirtschaft, Verkehr, Bauen  
und Digitalisierung  
- Hafenbehörde -

## Hafenbehördliche Bekanntmachung für den Hafen Emden

Nr. 23/21

### Kameraboot im Jarßumer Hafen

In der 35. und 36. Kalenderwoche 2023 und abschließend am 10.09.2023 erhebt das Forschungsboot Sally für das Deutsche Zentrum für Luft- und Raumfahrt anonymisierte Forschungsdaten in Form von Kameraaufnahmen aus dem Jarßumer Hafen.

Für Absprachen ist das Boot unter dem c/s DK8705 auf VHF-Kanal 72 zu erreichen.



# Current situation & experiences

IALA (International Association of Lighthouse Authorities)

- Guideline G1 107: “PLANNING AND REPORTING OF TESTBEDS IN THE MARITIME DOMAIN”

→ collect information about maritime testbeds



- 3 active testbeds: eMIR, Hermitage (Russia), Palaemon (Italy)

- 48 completed testbeds



→ high number of temporary testbeds 



# Sustainable, permanent and reusable testbeds

## Advantages


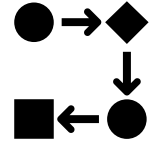
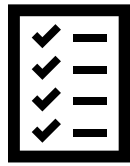

- cost efficient 
- fast 
- validated testing facility and testing processes 
- experience of testbed operators beneficial for system developers 

- reduce formal effort in trial preparation & conduction
- fast and agile system development: competitive advantage 
- reduce time-to-market of maritime automation systems  





# Recommendations from Researcher's POV

- clarify responsibilities 
- introduce a standardised process to request MASS trials and to set up permanent testbeds 
- introduce standardised testbed infrastructure and test processes 
- clarify certification procedures 



# „Regulatory sandboxes law“





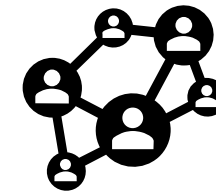
„Regulatory Sandboxes“  
Possibilities to test innovations under real conditions for a limited time with authorities involved

Draft legislation passed in German Cabinet Nov. 2024  
→ simplify permissions for regulatory sandboxes



# „Regulatory sandboxes law“ - Goals

- discover chances and risks of innovations at early stages 
- facilitate introduction of legal framework for regulary operations 
- Online Innovation Portal
  - launch announced for May 2025
  - create point of contact for people involved in regulatory sandboxes
  - bring stakeholders together
  - support knowledge transfer to legislation





# „Regulatory sandboxes law“ – How can it help us?

- knowledge transfer: adjusting regulations based on test results
  - testing systems e.g. in eMIR directly contributes to certification process & market launch
- simplified legal frameworks for testing innovative systems
  - easier to request trials, set up testbeds and potentially establish permanent test areas





# Conclusions

- testbeds important to assure safety of maritime automation systems and bring them to market
  - already recommendations (IMO, IALA) and possibilities to test, e.g. which port operators involved
  - „action items“ for the future:
    - define clear processes & responsibilities to establish permanent testbeds and request trials
    - standardise testbed infrastructure and processes
    - enhance knowledge transfer to legislation
    - clarify certification procedures
- regulatory sandboxes law is a promising initiative



# References

- <https://www.bmwk.de/Redaktion/DE/Dossier/reallabore-testraeume-fuer-innovation-und-regulierung.html>
- <https://www.register-iri.com/wp-content/uploads/MSC.1-Circ.1604.pdf>
- [BMDV - Digital Test Beds](#)
- [Maritime Autonomy Assurance Testbed – NPL](#)
- [IALA Guideline 1115](#)
- [Planning and Reporting of Testbeds in the Maritime Domain - IALA AISM](#)
- [Hafenbehörde | Nds. Ministerium für Wirtschaft, Verkehr, Bauen und Digitalisierung](#)



# Imprint

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