

# AUTONOMOUS SAILING – The Legal Impacts



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# AUTONOMOUS SAILING – The Legal Impacts

- Technology and Innovation – What is to be expected?
- Do we need a discussion on the law issues? What the existing law says about it
- Existing rules and future potential
- Humans against machines – who wins?
- Collision scenario – who is in control?

# Technology and Innovation – What is to be expected?

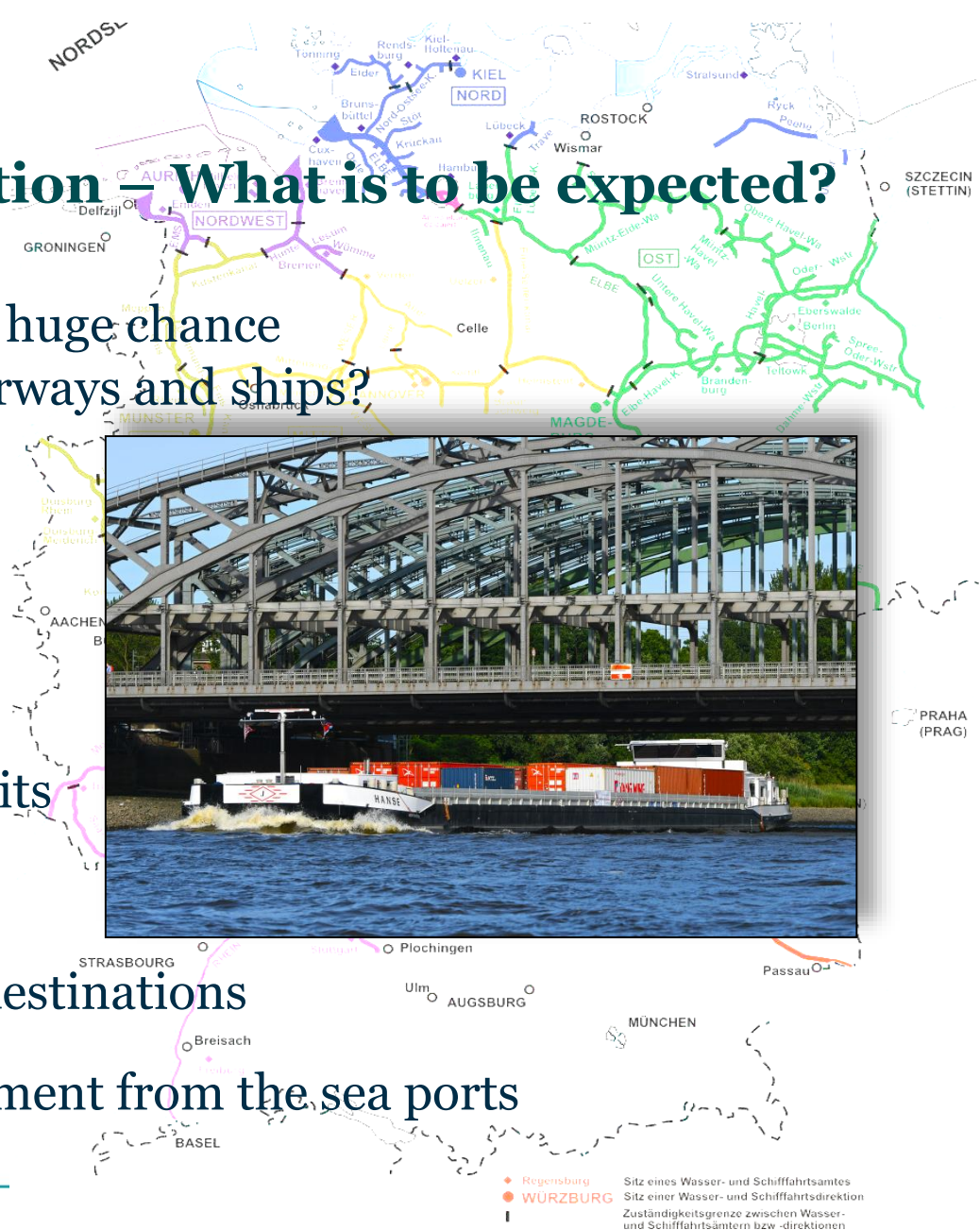
- Distinctions from other traffic, road, air, high seas...

	Advantages	Disadvantages
Air traffic	Limited kind of interactions, unified standards	Speed of aircraft
Road traffic	Land based data transfer	Complex interactions
Ocean Shipping	Limited kind of interactions	Data transfer and communication
Inland Shipping	Land based data transfer, low speed	Medium complex interactions

# Technology and Innovation – What is to be expected?

Why is autonomous shipping a huge chance for smaller inland waterways and ships?

- Smaller and cost efficient units
- Boost for inland shipping
- Boost for smaller links and destinations
- Boost for the inland on-shipment from the sea ports



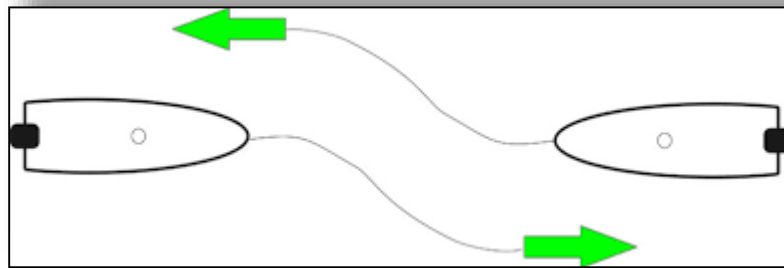
# Do we need a discussion on the law issues?

## What the existing law says about it

- International Conventions
  - Mannheim Treaty
  - 1960 Collision Convention
  - CLNI
  - CMNI
- Traffic Regulations
  - Rhine Police Regulation
  - Rhine Shipping Manning Regulation
- German Inland Shipping Law
  - Definition of Crew
  - Definition of barge master “Schiffer”

# Existing Rules and Future Potential

- Existing navigation rules are simple

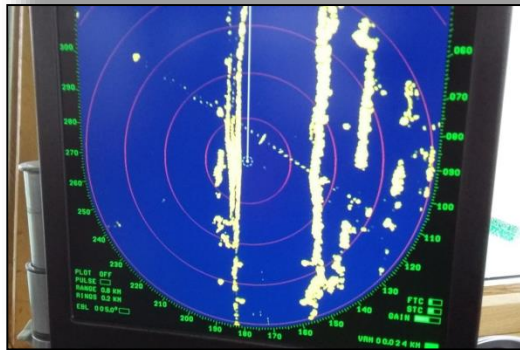


- Future autonomous navigation rules could be more complex



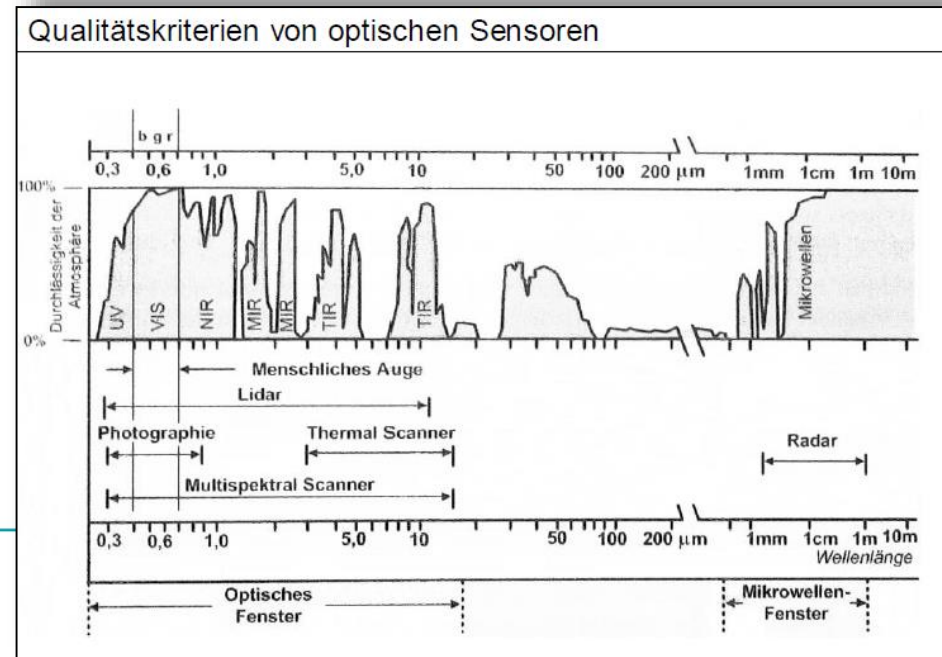
# Watchkeeping and Sensors

- The human eyes and ears
  - abt. 24 frames per second



- vs. Radar technology

- It's all about further and new sensor technology



# Watchkeeping and Sensors

- What the radar does **not** show:



Engine power acceleration



Status of small object

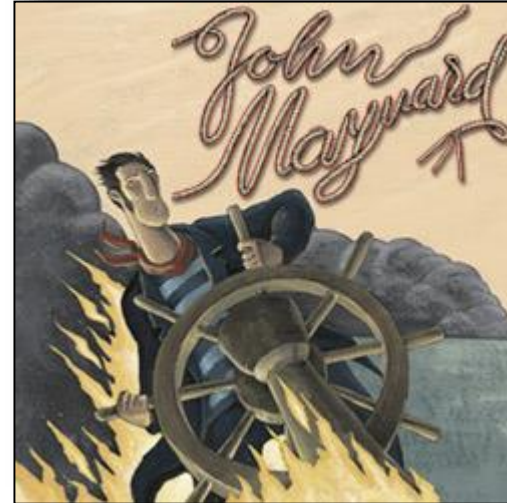


Bow wave



# The human factor - Failures and Intuition

- **The human factor as the prevailing source for accidents**
- **But also a source for creativity, intuition and heroic action in unpredictable situations!**



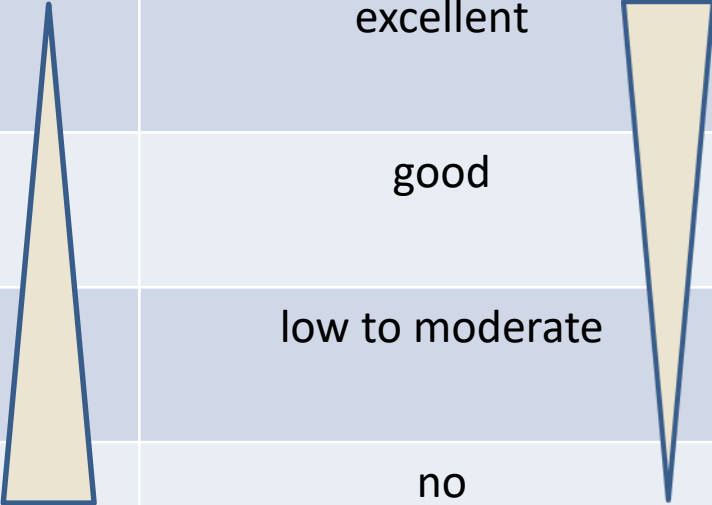
*"John Maynard war unser Steuermann,  
Aushielt er, bis er das Ufer gewann,  
Er hat uns gerettet, er trägt die Kron,  
Er starb für uns, unsre Liebe sein Lohn.*

*"John Maynard was our helmsman true.  
To solid land he carried us through.  
He saved our lives, our noble king.  
He died for us; his praise we sing.  
John Maynard."*

*Theodor Fontane*

# Humans against Machines – Who wins?

	Human	Machine
Rules Capability	low	excellent
Sensor Capability	good	good
Experience	very high	low to moderate
Intuition / Creativity	potential	no



# Collision Scenario – Who is in control?

- Standard situations
  - Ship on sensor control (local sensors and GPS)
  - Ship on track plan communication (land based control)
  - Ship to ship communication
- Irregularities
  - Unpredicted situations
  - “black-out” (switch to safe mode)
- Collision avoidance
  - Change to manual steering (time lost until manual control is effective)
  - Who can “stop” the autonomous vessel?

# Collision Scenario – Who is liable?

- Standard situations
  - Ship on sensor control (local sensors) – system manufacturers?
  - Ship on track plan communication – land based master?
  - Ship to ship communication – other vessel’s master?
- Irregularities
  - Unpredicted situations – program designers and classification?
  - “black- out” (switch to safe mode) – operator of barge?
- Collision avoidance
  - Change to manual steering (time lost until manual control is effective) – land based master?
  - Who can “stop” the autonomous vessel?
    - “super” controller on land?

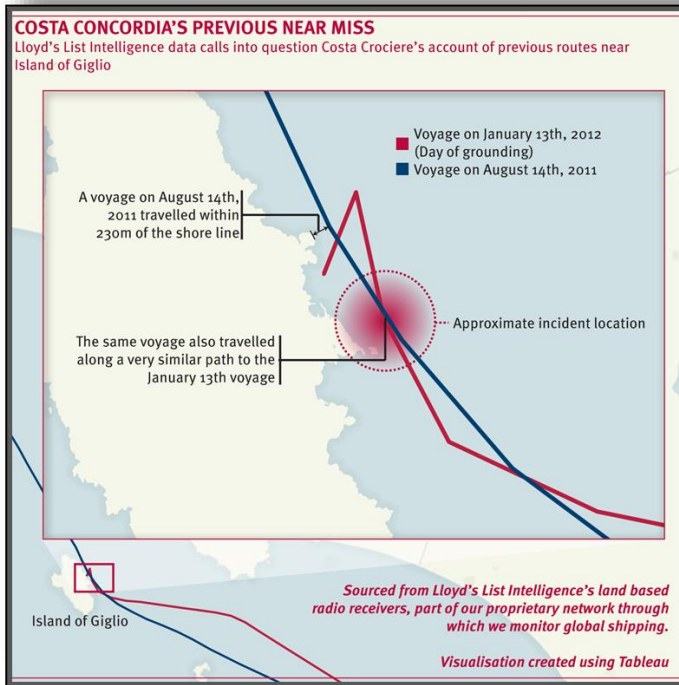


# Collision Scenario – Who is liable?

- The “super” master in his land based operation centre is already reality:



FOC - Carnival Group Fleet Operations Centre, Hamburg with 180 personnel, 37 cruise ships on watch



# Collision Scenario – Legal basis for liability?

Legal concepts for the future :

1. Duty to insure and direct actions against underwriters
2. Liability based only on causation (the bigger and the faster vessel bears more liability than the smaller one)?
3. Strict liability vs. fault-based liability
4. Product liability
5. Liability for breach of the traffic security duty (Verkehrssicherungspflicht)

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*Thank you for your attention!*



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