Potential for the inland navigation fleet to adapt to changes in the water discharge

Bonn, June 25th 2009

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VAYA CON DIOS
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Content

- Short general introduction
  - Marin: short survey of Marin in relation to IWT
  - Influence of climate change on river regime>>>***goal IWT***
- Coping with lower water heights: the fleet
  - Important aspects deal with respect to navigation
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    - **2. Optimization of loading depth**
    - **3. Follow defined depth contours**
      - **Consequences for the crew**
    - **4. Increase the capacity of the fleet**
    - **5. Design and build wider & lighter ships**
- Recommendations

Cleanest Ship is a project of:

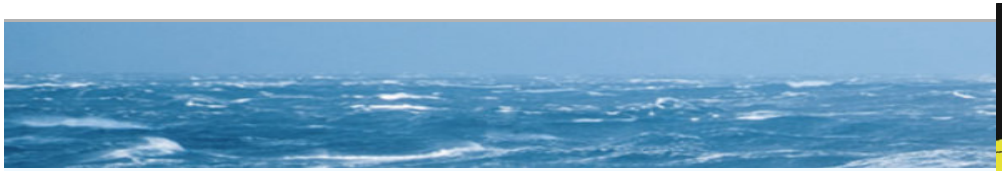
CLEANEST SHIP

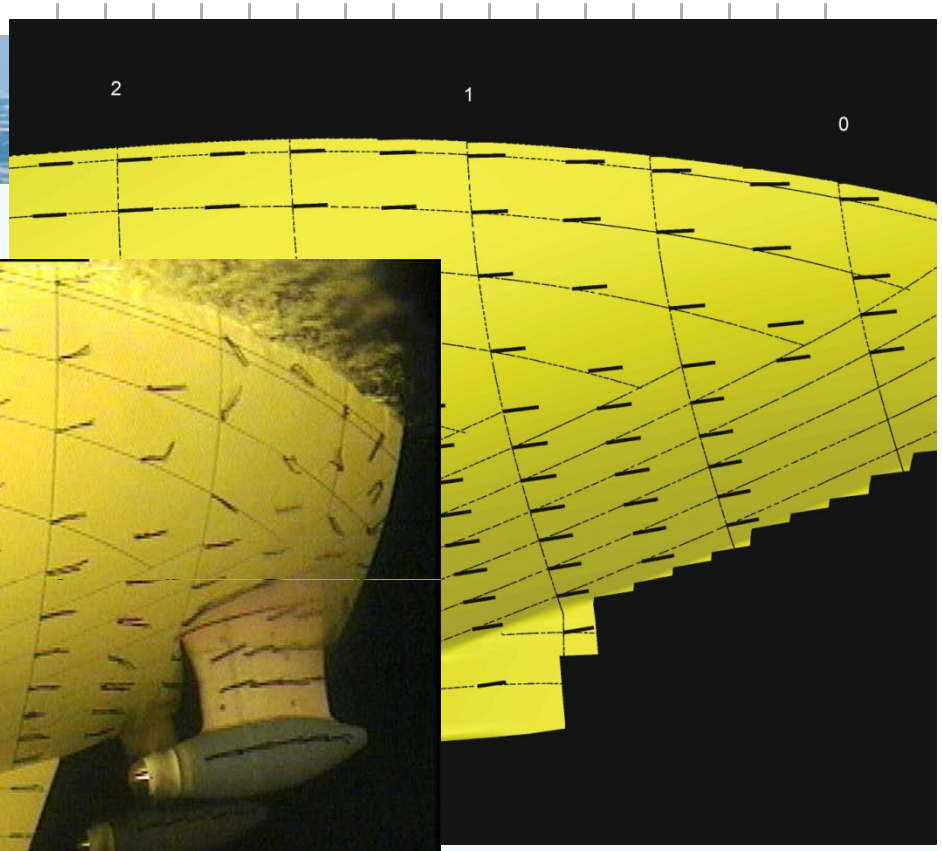
CREATING Inland shipping

bp

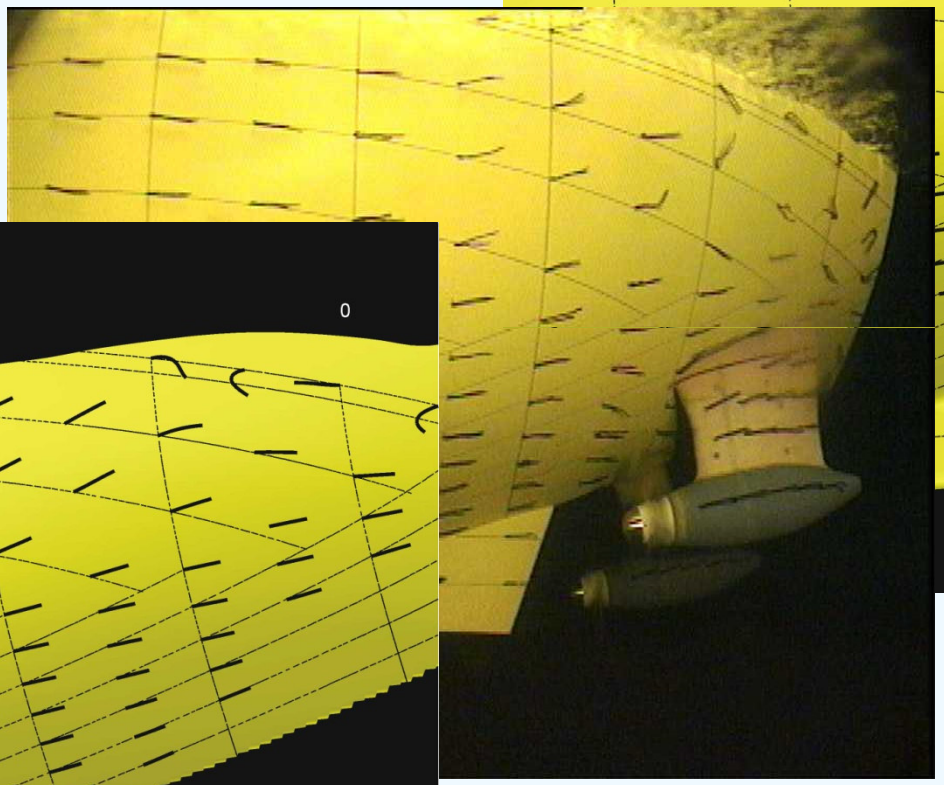
Marin and IWT: three main working fields

- Determination of **feasibility of integrating ships** in transport chains
  - Conceptual design of door to door **transport chains** and **ships** followed by
  - Design of ships
- **Environmental impact (ships ⇔ environment)**
  - “CO2 optimal” ships
- **Nautical safety and efficiency (MSCN)**

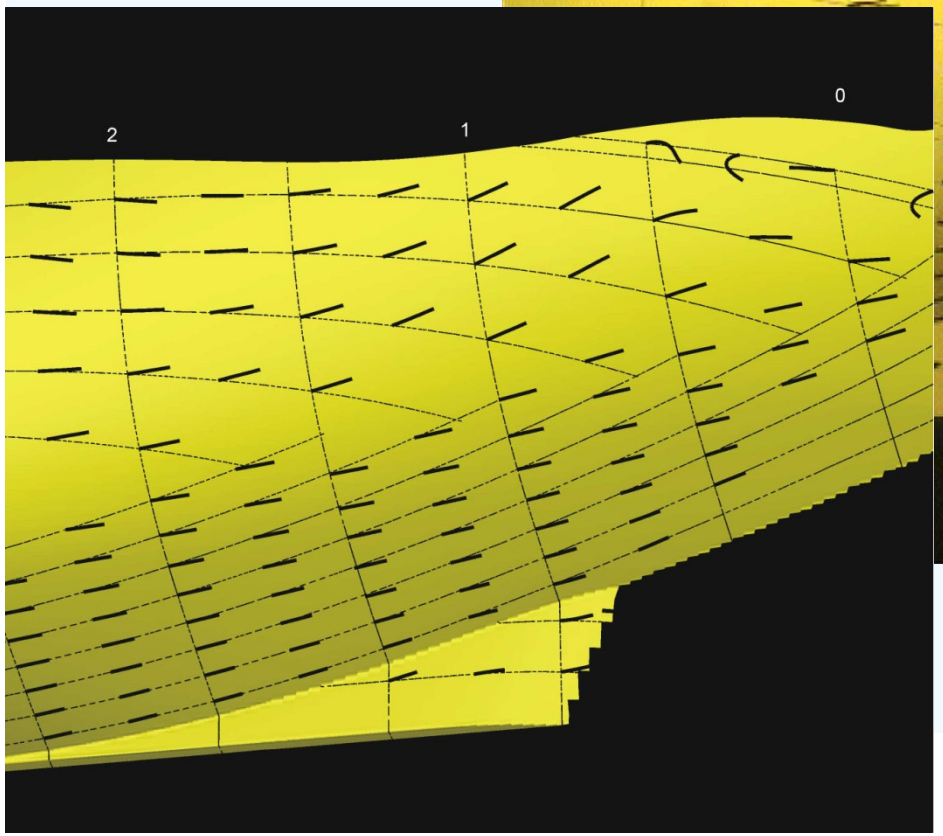




PARNASSOS,
Double body



Model test



PARNASSOS under
wave pattern from
RAPID

Main conclusions on basis of climate scenarios

- On basis of the sensitivity analysis carried out the conclusion can be drawn that (starting from the most pessimistic dry scenario) at 2050 every year a dry period as happened in 2003 will take place.

" Klimaatverandering en binnenvaart", Effecten op de binnenvaart van meer extreem lage (en hoge) waterstanden op de Rijn, C.G. Bosschieter, Delft, December 2005

- Coping with dryer periods means:
  - More cargo capacity is required for transport during the period of lower water levels: this results in……..

Impact of the year 2003 (Carpe Diem)

Total number of days in 2003 with less water height than 2.2 m

from 2 to 2.2. m	**58**	**60%**	**34.8**
from 1.8 to 2 m	**34**	**40%**	**13.6**
from 1.6 to 1.8 m	**28**	**35%**	**9.8**
from 1.35 to 1.6 m	**13**	**30%**	**3.9**
less than 1.35 m	**4**	**25%**	**1**
total	**137**		**63.1**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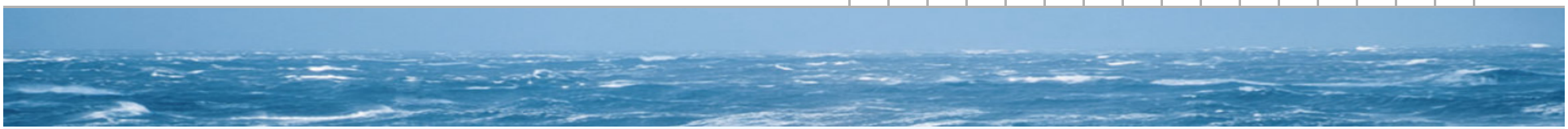
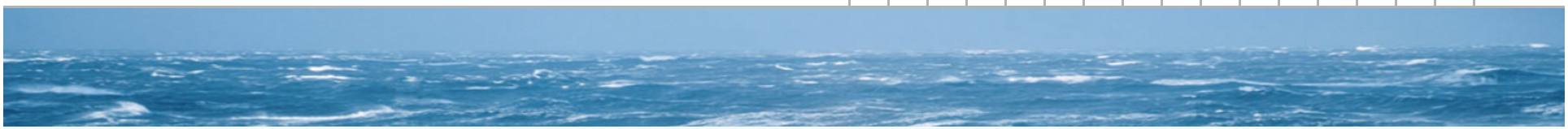


1. Increasing the capacity by continuous navigation

- Full continuous navigation
  - More transport capacity due to shorter turn around times
  - Less time for loading and unloading (!), and
  - Costs of crew increase

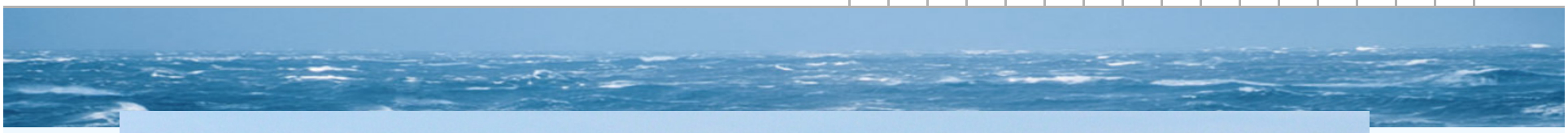
- Challenges:
  - Availability of required extra crew members
  - How to decrease costs of personnel?



2. Optimization of loading depth

- **Two important independent aspects:**

- A. Low water prediction model
  - Accurate 48 hours prediction: +/- 10 cm
  - 72 hours prediction: +/- 15 cm
- B. Accurate and continuous knowledge of depth contours on ECDIS (important up to Oestrich, km 515)
  - by frequent measurements by the fairway authorities
  - By info (position, depth) from nominated ships navigating on the river



3. Follow defined depth contours

- Radar system encompassing and integrating:
  - The own radar, electronic chart, AIS and accurate depth contours
- The ships follow defined **depth contours** for the own ships on the chart
- Coordination with other ships mainly on basis of AIS (traffic management)
- Interference with the navigation by the skipper: only when required i.e. by exception


ect
JOWI

Consequences for the crew

- Change in professional skills (cyberspace skipper)
  - More support by instruments
    - Change in required know how

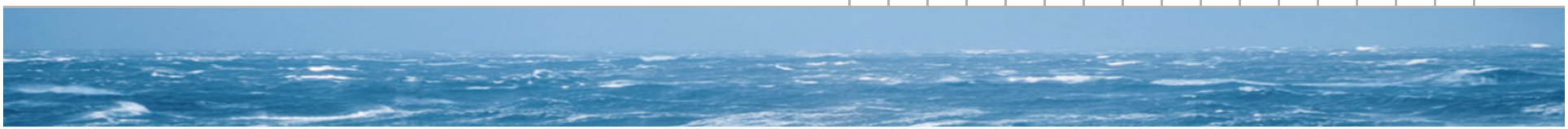
      (Less craftsmanship required of skippers and crew …?)
- Shorter basic education in combination with frequent refreshment training
  - Training on simulators on periodic basis
- For the future: decrease cost of crew on basis of:

  More technical support and less physical work

Departure from a lock

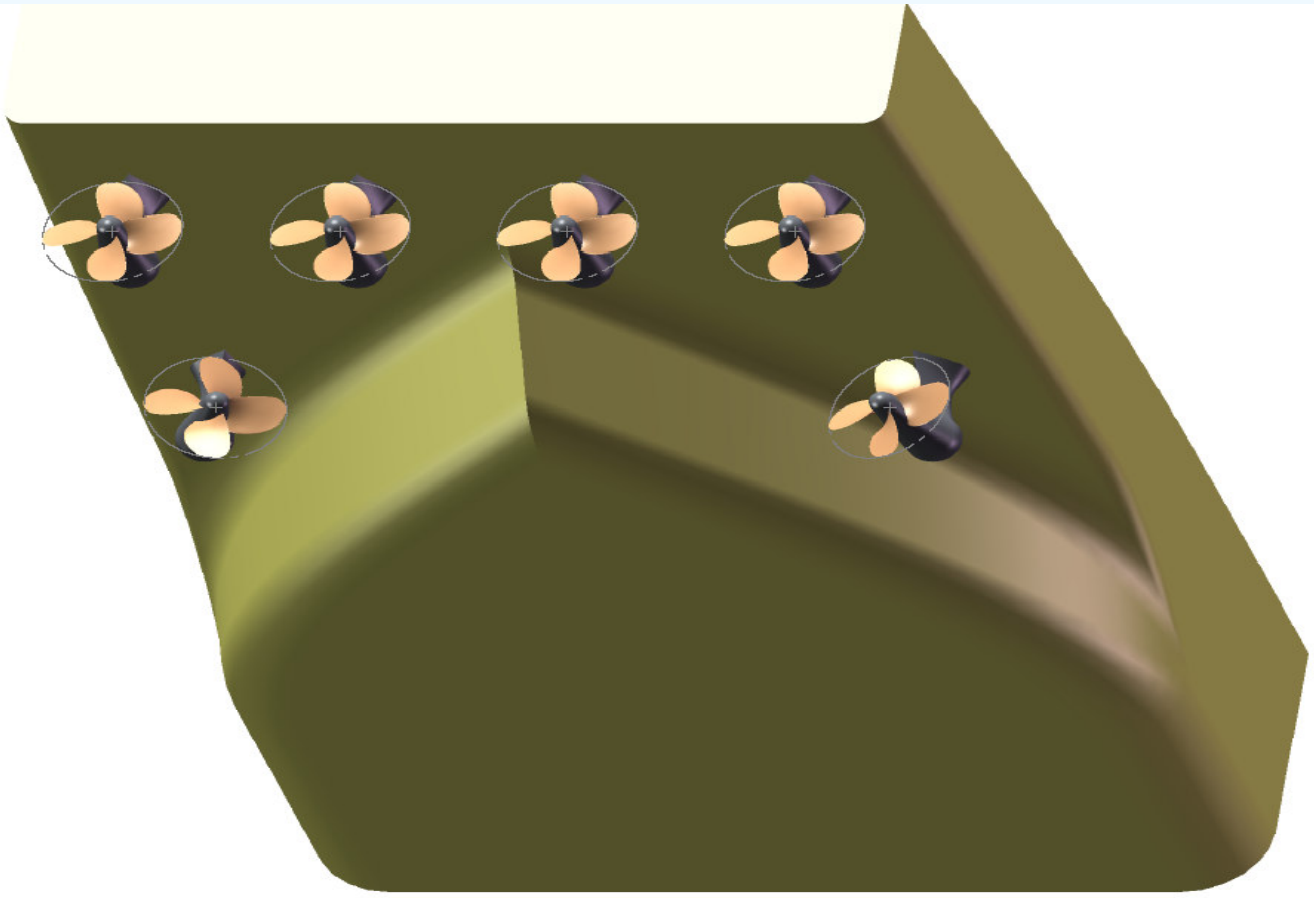
4. Measures to increase transport capacity of fleet

- Intensify the possibilities to use **coupled units**:
  - Pushed by the own ship, or
- Consider the ongoing application of **pushed units**:
  - One push boat, **two** (or more) barges in front
  - Cargo can be discharged when convenient
    - Barges can be used as floating stock outside dry period
- Coupled units may have a very large capacity
- Challenge: optimization of lines of units (Fuel!)



5. Design wider & lighter ships with restricted draught

- Design wider and lighter ships: less draught
  - More cargo at lower water depths
  - Advantageous during low waters but less optimal for higher water levels:
    - Proper design under water ship very important
    - More volume by optimization of the lines
    - Restricted navigational area outside the Rhine
- Lighter ships: use components of composite on ship where possible



Result of measures for capacity of fleet

measure	effect on capacity	effect on costs
continuous navigation	30%	20%
optimization loading depth	10%	5%
(up to the Oestrich)		
increase loading capacity	15%	5%
design wider, lighter ships	20%	10%
overall effect	75%	40%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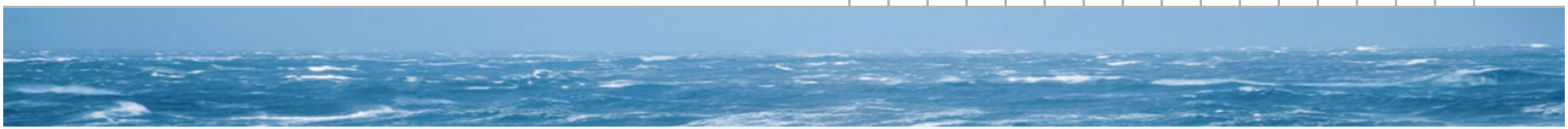

Main conclusion

- It is **not easy but possible** to cope with the changes imposed on inland navigation by climate, but a lot of work has to be done in the next decades
- A survey of **recommendations** in this respect follows.


Geest
UASC
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HANJIN
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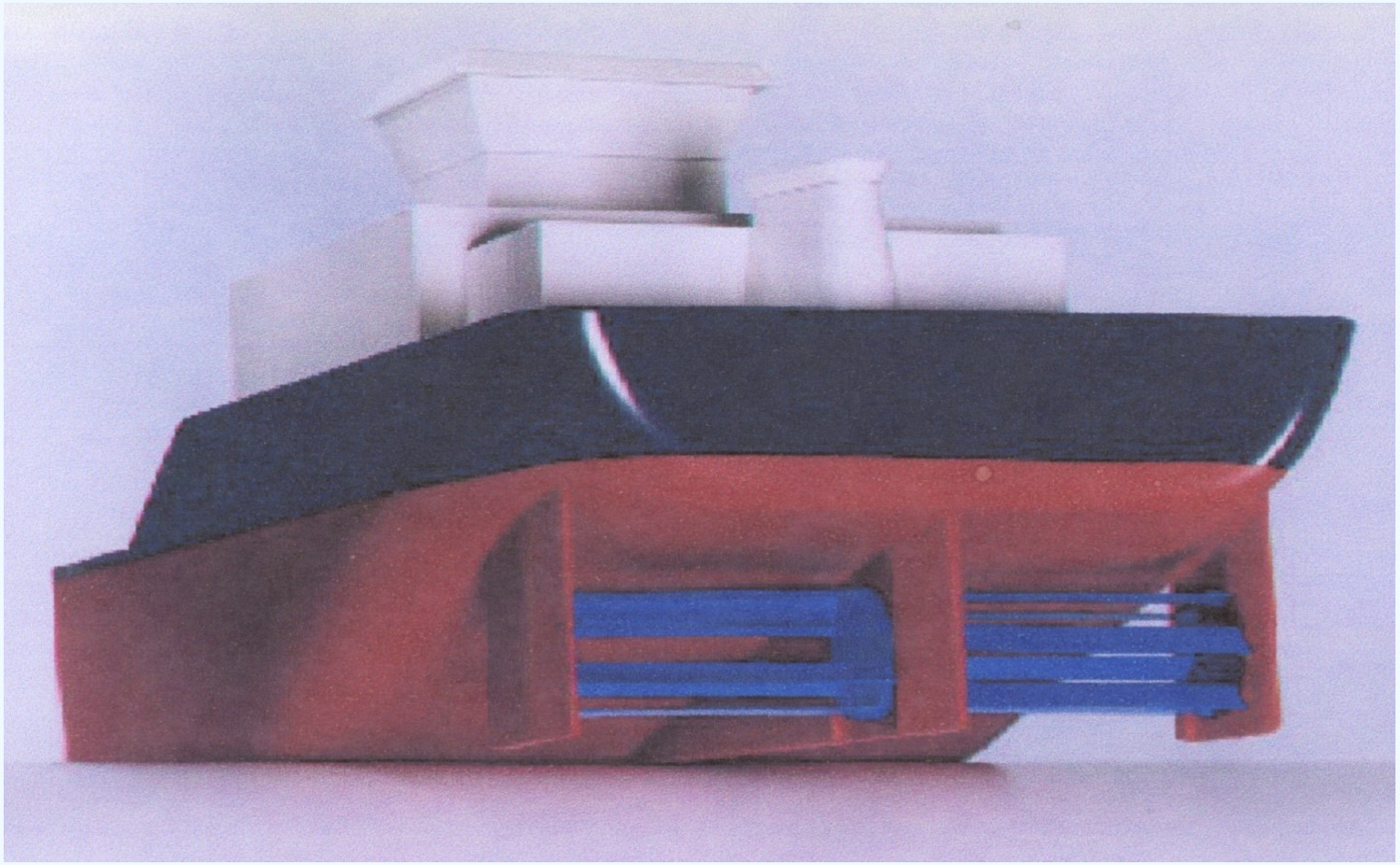
The Green Transport

Recommendations for the industry

- Develop **integrated Radar/ECDIS/AIS/Depth information** such that in time only relevant information is shown
- Develop systems with **coupled units** to reduce waiting times on cargo
- Use in ship building as much **composite components** as possible to built lighter ships



Recommendations for the politics

- Intensify studies to **decrease the required number of crew** on board taking further automation and less physical work into account
- Stimulate and organize that **depth information** of various sources can be applied to optimize loading depth (RIS)
- **Shorten education** for inland vessel crew members and require **refresher courses** on simulators to keep skill up to date


ACR
ACR Electronics, Inc.
MOB
SRM
M1
M2
M3
M4
Menu
M5
M6
M7
M8
ATIS Code :PF2945
ShipName :RPA10
Length Conv:28m
Beam Conv:8m
RefPtExt :N/A
RefPtInt :N/A
Length Ship:28dm
Beam Ship:30dm
Save
Back
Shift
Fn
Space
Del
NAUTICAST
UNIVERSAL AUTOMATIC IDENTIFICATION SYSTEM

Recommendations for R&D

- Make accurate **low water prediction model** and link this to the RIS server
- Make **fit for use design tools** for restricted water
- Develop **energy efficient coupled units**
- Develop **wider ships** with optimal performance
- Assist ship building industry in application of **composite materials**
- Develop **training modules** for skill training taking into account new developments as described
- Start working on the **unmanned bridge**

Artist impression of the Barge Truck

Thank you for your attention

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