

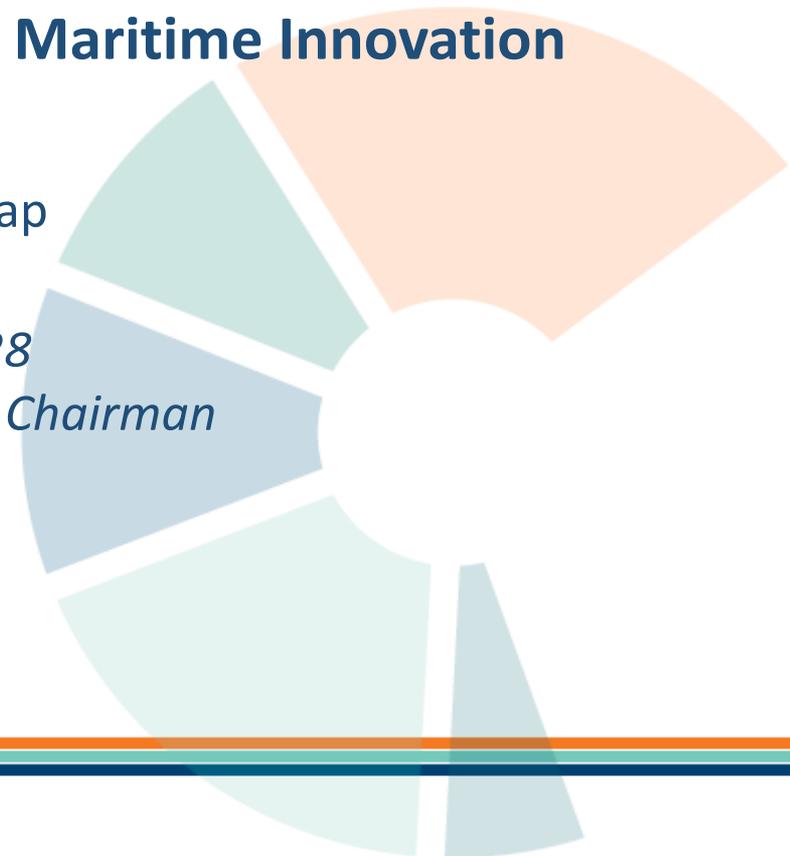
# VESSELS for the FUTURE

## Sustainable Growth through Maritime Innovation

RDI roadmap

*2016-06-28*

*by Pierre C Sames, Chairman*



## **Our objectives**

**Quantified risk and emission targets**

**Maritime trends towards 2030**

### **Priority areas for H2020**

- Enhanced ship safety
- Greening of maritime transport
- Connected and smart ships
- Improved production processes



## Safer maritime transport

- Working on new built ships becoming as safe as equivalent onshore operations

## Cleaner and efficient maritime transport

- Meeting required IMO and proposed EU emission reductions
- Supporting modal shift and blue growth
- Delivering more fuel-efficient vessels

## A competitive industry to create new jobs

- Sustaining leadership in ship and ship system development and production
- Using the innovation potential of SMEs
- Embracing digital business opportunities

has ambitious objectives to reach in 2050

## Safer maritime transport

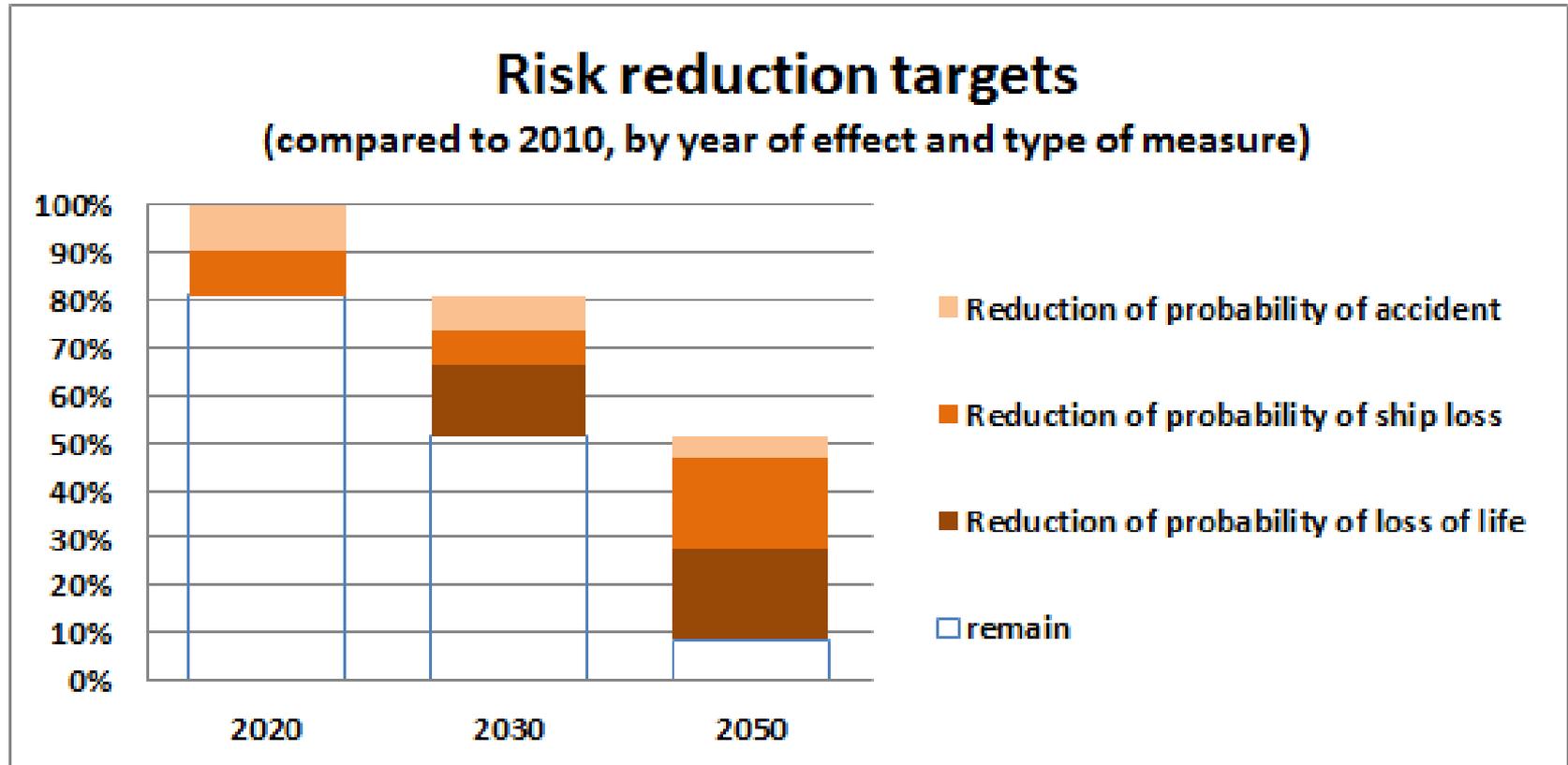
- Reduce risk of people working on board new ships by 90%

## Cleaner and efficient maritime transport

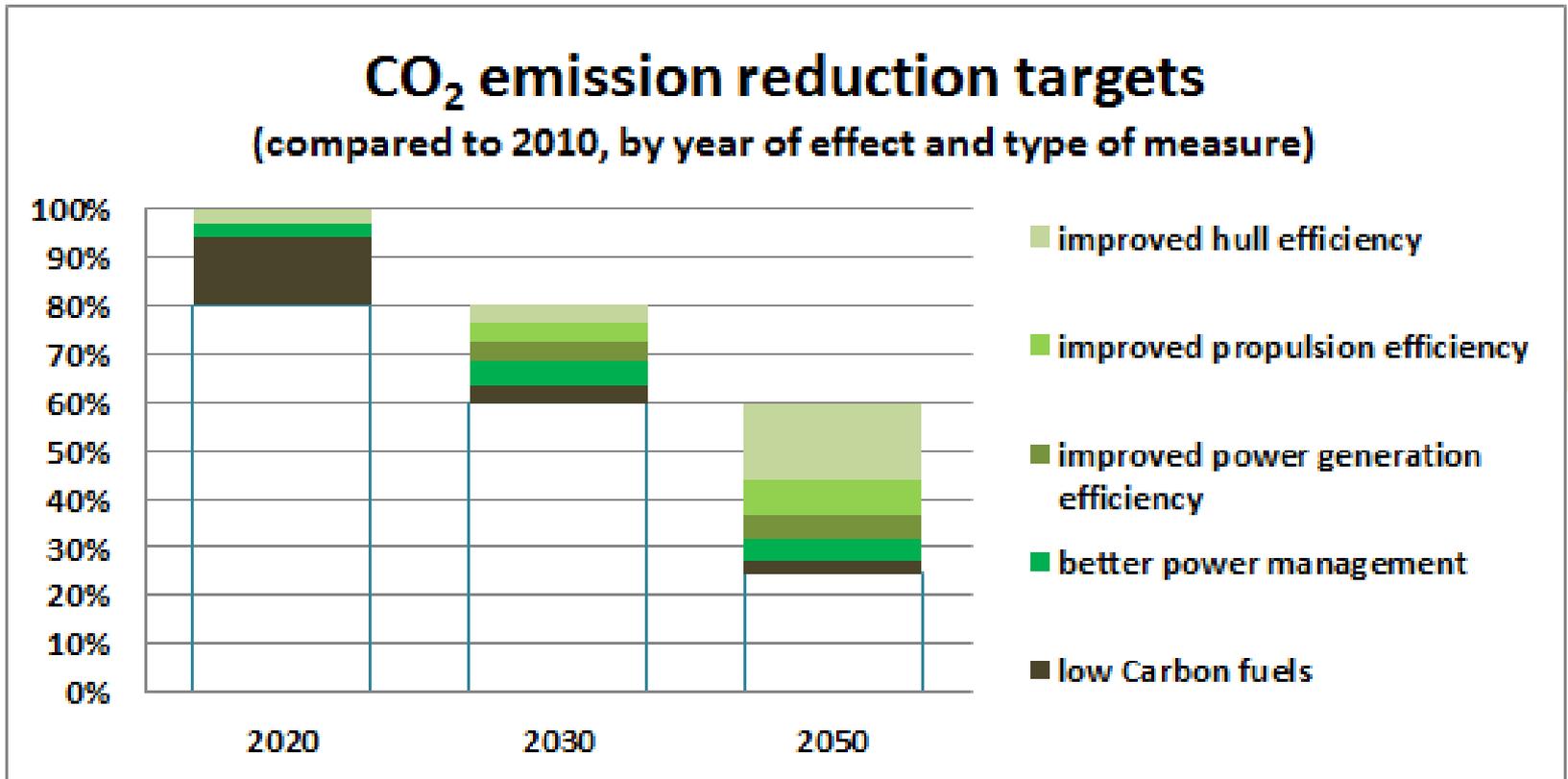
- Reduce ship CO<sub>2</sub>-emissions to air by 80%
- Reduce ship Nox and Sox emissions by 100%
- Reduce underwater noise levels by 10dB

## A competitive industry to create new jobs

- Improve technology supplier productivity by 80%
- Reduce ship operating costs by 80%



For reasons of visualization, multiplicative effects have been scaled and shown in an additive manner in this diagram. Figures are indicative.



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## - maritime trends towards 2030

### **Increased use of the maritime space**

- Seaborne trade, coastal trade, offshore energy, blue growth

### **Continued greening of ships**

- Focus on emissions to air

### **Continued drive to higher safety**

- Focus on passenger ships

### **Connected and smarter ships**

- More efficient and safe transport
- Automation and remote control

### **Smarter production**

- Automation and robots



## - enhanced ship safety

### **Reduce accident frequency**

- Continue on collision and grounding avoidance, improve cargo safety

### **Reduce loss of ships and systems**

- Performance of safety and security critical systems with software
- Tools for emergency response

### **Reduce loss of life**

- Rethinking escape, evacuation and rescue, novel life saving solutions incl. real time support tools

**Work towards life-cycle risk and quantification of cost effectiveness, link to future IMO GBS-SLA**



## - greening of maritime transport

### **Improve propulsion efficiency**

- Next generation propulsors
- Design for off-design conditions

### **Improve power generation efficiency**

- Integration of renewable energy and storage solutions
- Prime mover efficiency

### **Reduce hazardous emissions**

- Engine retrofiting
- New exhaust gas treatment systems
- Particulate matter emission

### **Reduce Carbon content of fuels used**

- Safe use of multiple fuels



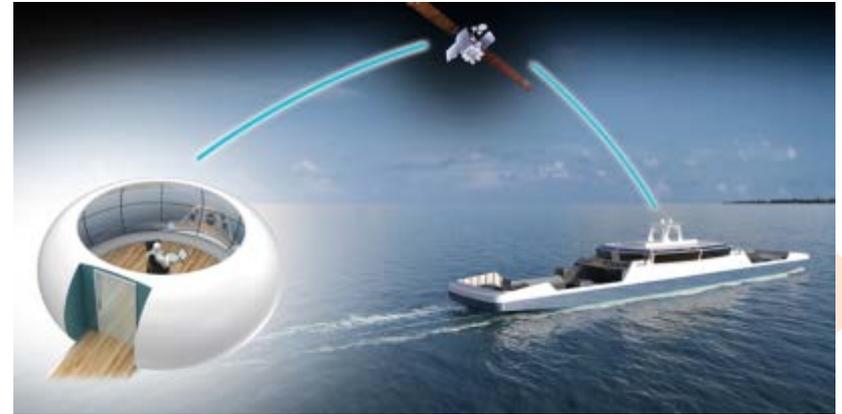
## - connected and smart ships

### Towards smarter ships

- Data collection on board
- Vessel energy performance
- Predictive maintenance
- Operational optimization

### Towards autonomous ship

- Application concepts for connected ships (communication, security, human factors)
- Remote and autonomous operations (safety critical operations, low-manning concepts, automated operations, security, regulations)



## - improved production processes

### **Integrated production simulation**

- Concept development & validation, integration with planning & control

### **Visionary materials and manufacturing**

- radically new lightweight materials, coatings and processes

### **Automation of assembly & outfitting**

- Machine learning to automate production, collaborative robots, multi-material production

### **Virtual vessel demonstrator**

- Roll-out phase of current concept



## - RDI roadmap

A detailed RDI roadmap has been prepared addressing

- the societal and industrial challenges
- our objectives towards 2050
- RDI priorities for 2018 to 2020 and their impact



**Thank you for your kind attention.**

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