



# Maritime Safety

## Coupling Next Gen Technology with Talent

CEMS

**SP** Centre of Excellence  
in Maritime Safety



**Revisiting Change**

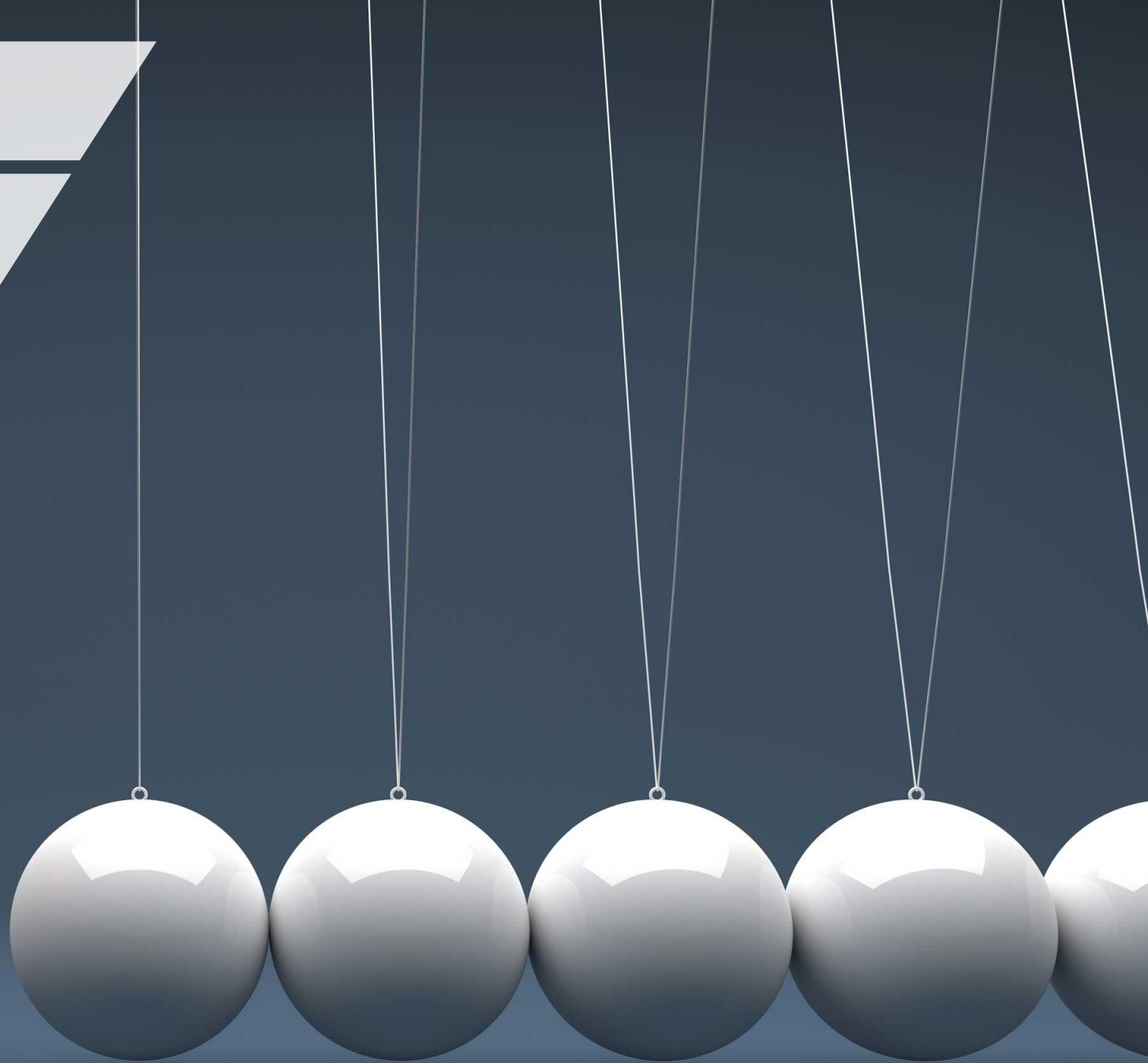
**Next Gen Technology & Talent**

**Building Partnerships**

**Conclusion**



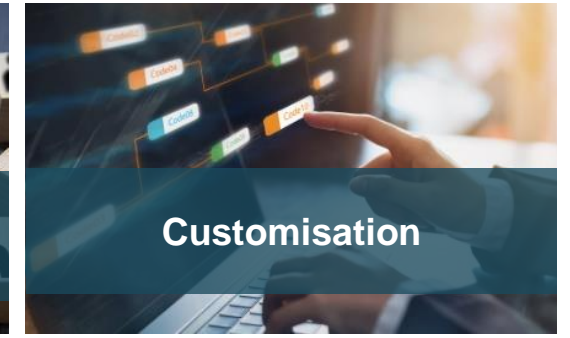
**CONTENTS**



# REVISITING CHANGE

Official (Closed), Sensitive (Normal)

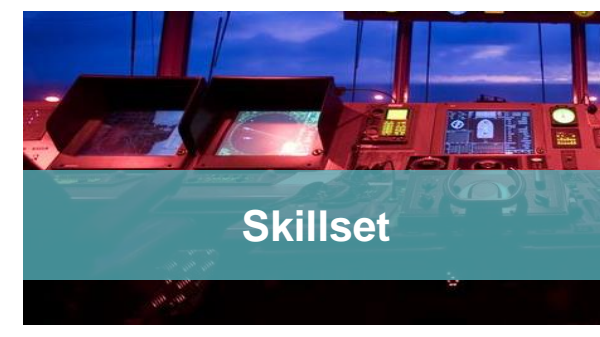
## UNCERTAINTIES



## INTENSIFIED COOPETITIONS



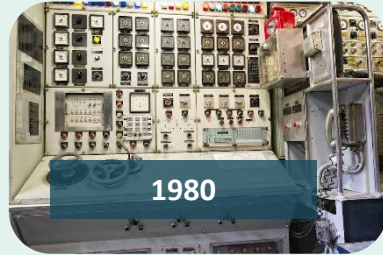
## WORKFORCE EVOLUTION





# SHIP EVOLUTION

ENGINE CONTROL ROOM



1980

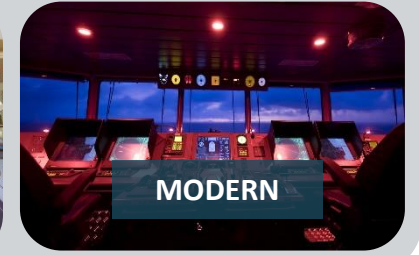


MODERN

NAVIGATION BRIDGE



1980

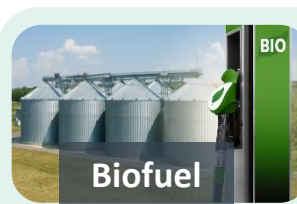


MODERN

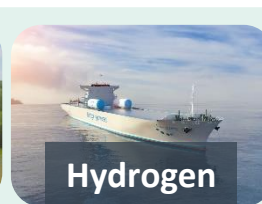
## GREEN INITIATIVES



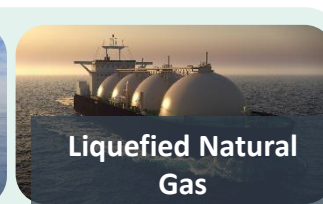
Global Warming



Biofuel



Hydrogen



Liquefied Natural Gas



Electrification

ALTERNATIVE FUELS

## DIGITAL DISRUPTIONS



AI



Blockchain



Cloud



Data



5G

GIG  
WORKFORCE



TECHNOLOGY  
SAVVY

GENERATION Z

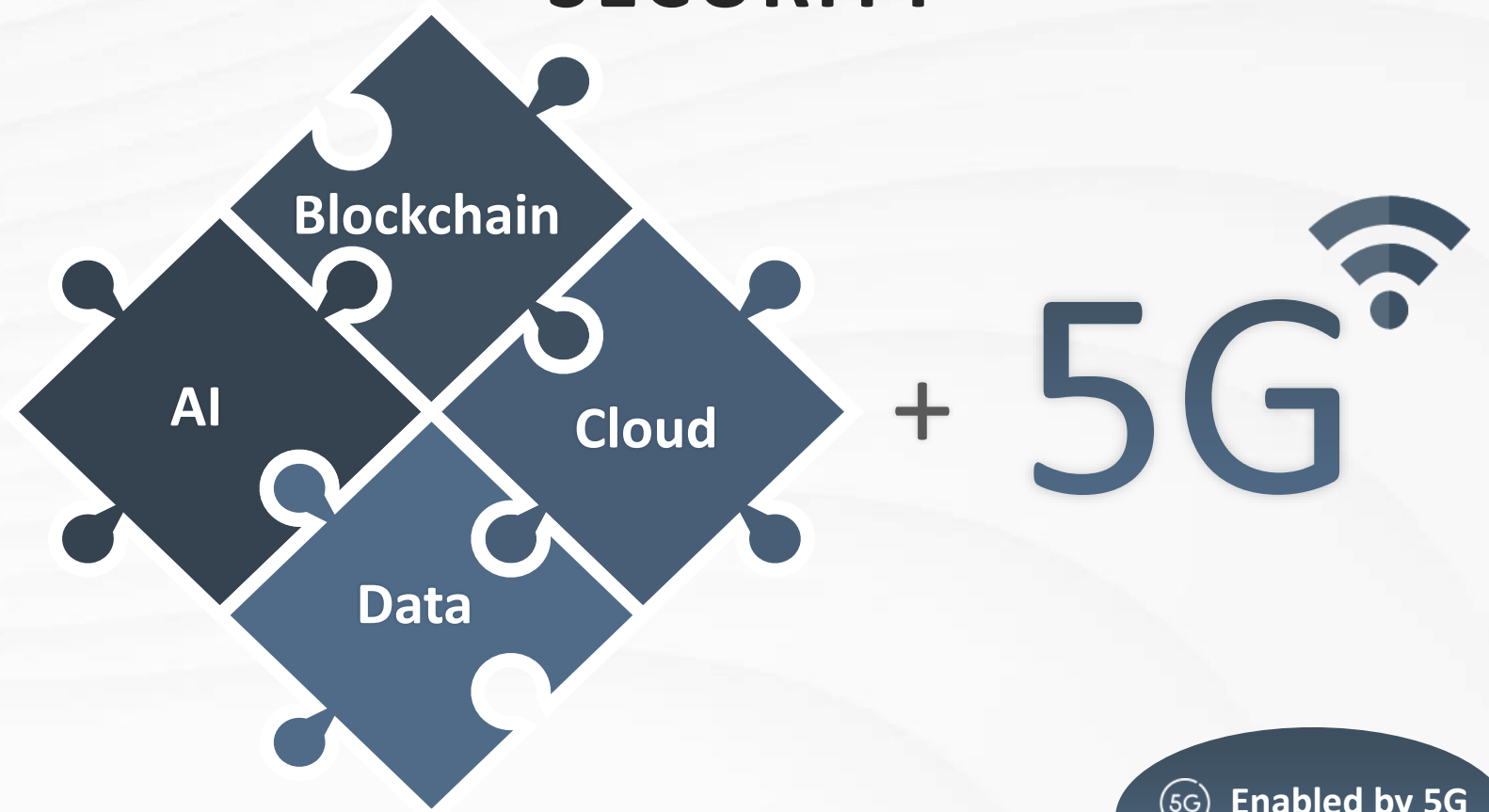


# **NEXT GEN TECHNOLOGIES & TALENTS**



# TECHNOLOGIES FOR SAFETY AND SECURITY

**EMBRACE  
TECHNOLOGY  
IN MARITIME  
SAFETY**



**AI Competency  
Assessment**

**Block Chain  
Enabled Smart  
Contract**

**Cloud Based  
Training**

**Data Driven  
Decision Making**

## Vision

Global Leader for Research & Innovation in Maritime Safety

### OUR MISSION



Improving maritime safety through  
***Next Gen Technology:***  
World class applied research & novel innovations for technology transfer to the industry



***Talent:***  
Development of next-generation training systems & solutions for a future-ready workforce



#### FUTURE OPERATIONS

Mix Environment Operations



#### FUTURE COMPETENCIES

Navigating Navigator to Shore Based Navigator



#### FUTURE SYSTEMS

Visualization and Analytics

Our Vision

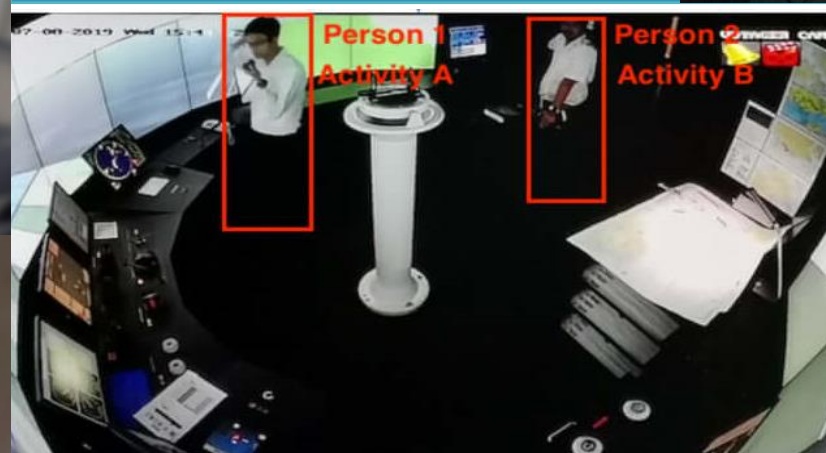


## Maritime Navigation

**ANRS/NGNS**  
(Digital Platform for  
Future Competency)



**AI Assessment**  
(Digital Assessment of  
Competency)



**On Board  
Human Operations**

**AR/VR/Immersive**  
(Digital Delivery of  
Training)





Official (Closed), Sensitive (Normal)

# 1<sup>st</sup> Dedicated Research Platform for Mixed Environment Operations

Digital Testbed for New Concepts of Operations in a Safe Simulator Environment

## MANNED

Integrated Sensors  
for Human Factors  
Analysis



E-Nav  
Compatible



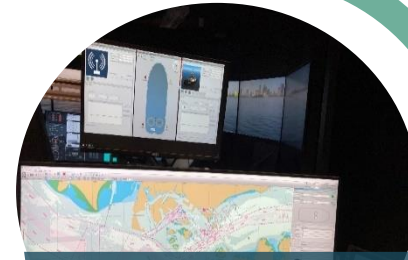
Access to Training  
Database for  
Analytics



Advanced Navigation  
Research Simulator  
(ANRS)



KONGSBERG



Integrated Next Gen  
VTS Simulator



WÄRTSILÄ



Next Gen  
Navigation  
Simulator (NGNS)

## REMOTE AND AUTONOMOUS

Modular and  
Reconfigurable



Next Gen  
Operations -  
Remote Ops



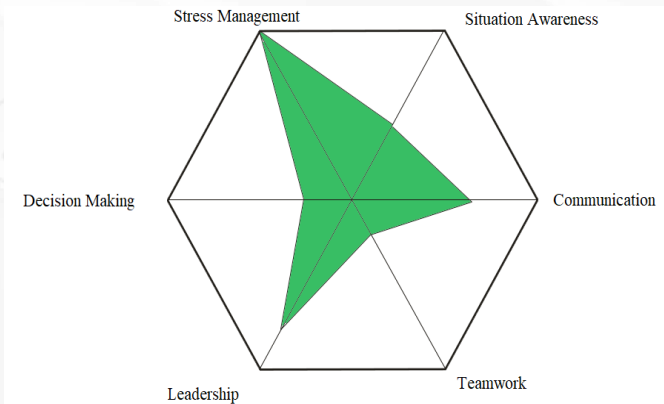
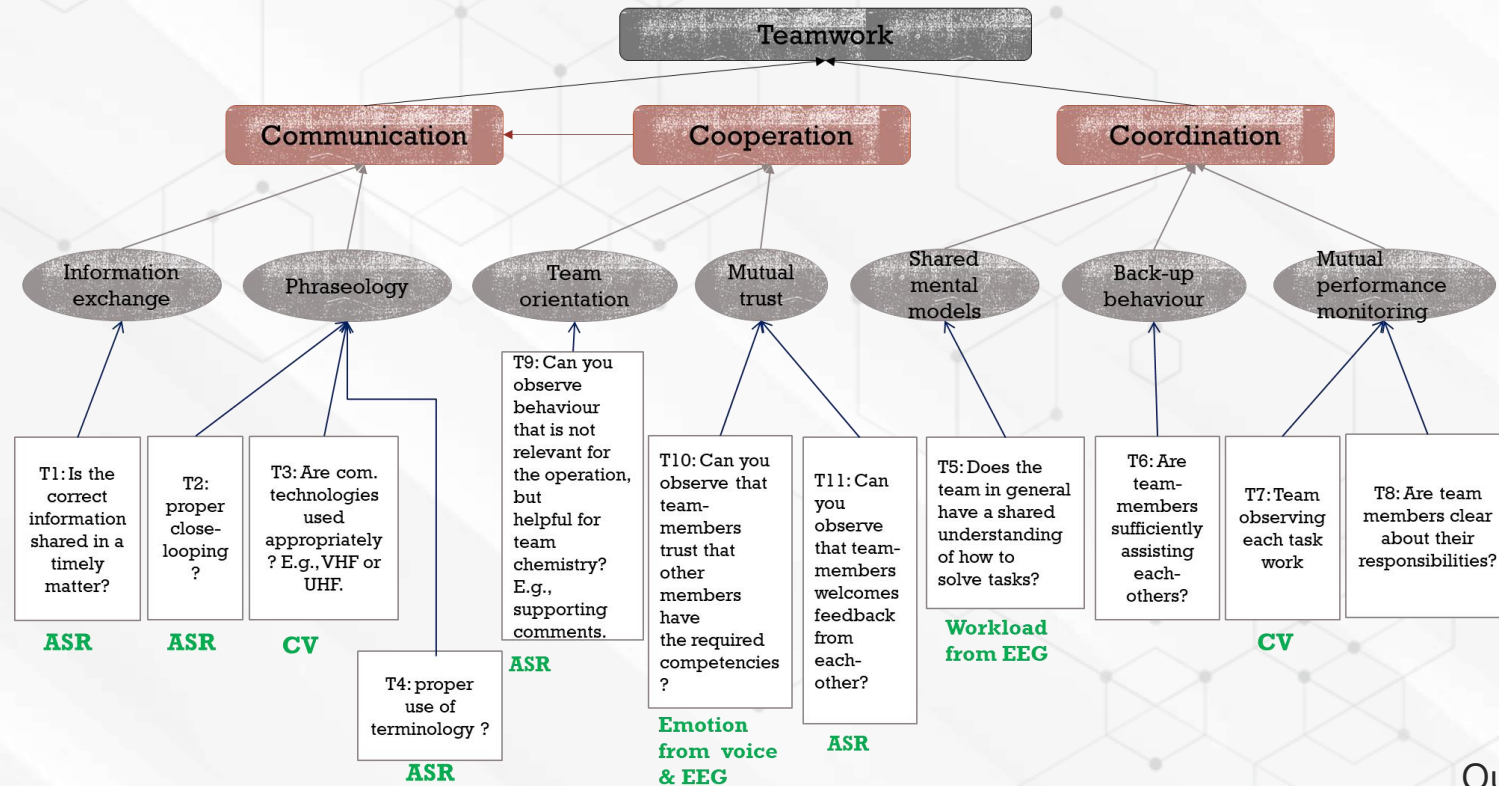
Intelligent  
Vessel Targets



MIXED ENVIRONMENT OPERATIONS

# Human Factors with AI Assessment

Human factors contributes to more than 80% of maritime incidents but it has not been well understood or studied



Quote by SMS Chee Hong Tat "it is not just the **first navigation research simulator in Southeast Asia**, I believe it is also **one of the first in the world to combine the use of Artificial Intelligence, together with a simulator for training purposes.**"





# Immersive Delivery of Training with Build-in AI Assessment

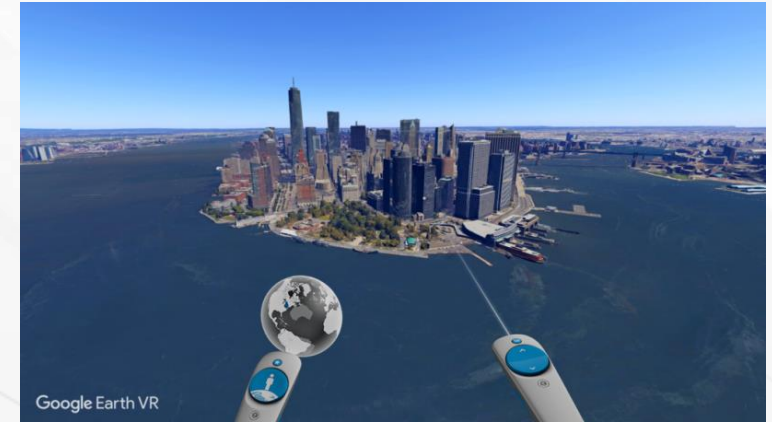
## Infuse Digital Technologies to Enhance Safety

### Multi-user VR Training



Scale up VR training for multiple users and collaborative actions in single session

### Cloud based VR Training



Enable immersive training anywhere, anytime

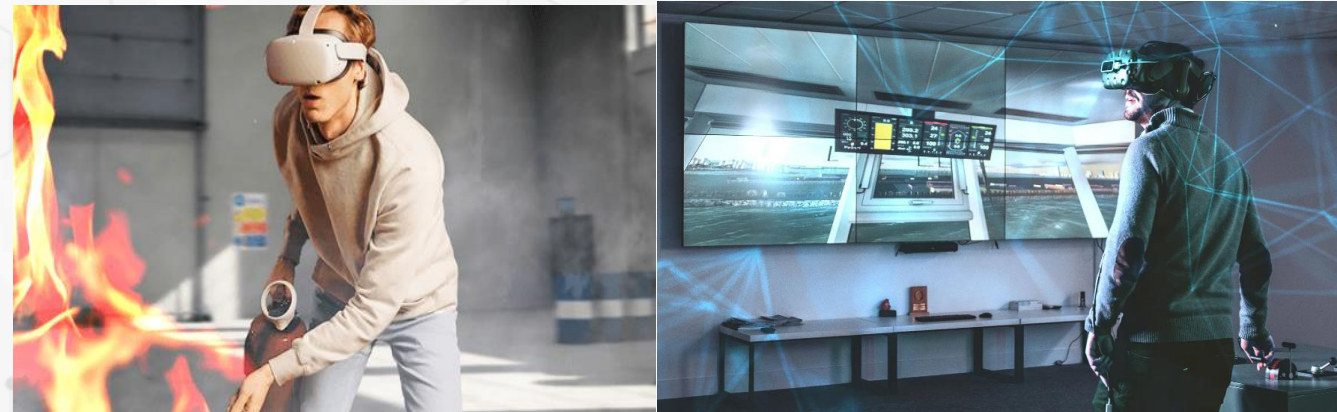


### Immersive Asset Library for Industry



Enable Fast creation and deployment of VR Training Scenarios

### Multi-Sensory Mixed Reality



Infuse more realism with a mix of physical and virtual interactions



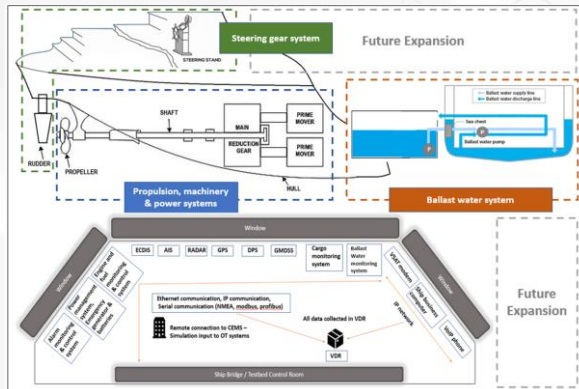
# Future Competencies for Safe and Secured Operations

## Next Gen VTS Operations



Facilitate smooth transition to the Next Gen VTS

## Cybersecurity Competency



Level up cybersecurity capabilities for a more cyber-connected industry

## Remote Operation Control Centre



Prepare for emerging skillset for remote and autonomous operations

## Future Fuels Handling



Ensure safety for seafarers handling fuels with high risk

WÄRTSILÄ



KONGSBERG



SUTD  
SINGAPORE UNIVERSITY OF  
TECHNOLOGY AND DESIGN

# Infuse Next Gen Technologies for Digitally Ready Talents

Infuse leading edge technologies into maritime industry

Prepare maritime industry for future technologies

## Navigation Safety (@Next Gen Port)

Leverage AI to develop human centric technologies and competency framework for CONOPs

Enhance existing training methodologies

## Ops Safety for New Fuel Handling (Decarbonisation)

Develop immersive training solutions for new fuel handling

## Ops Safety for New Concepts of Operations (Future System and Competency)

Ensure human centric design for next generation systems

Pave the path for remote and autonomous

Co-develop cyber resilience framework for maritime industry

Support SG to be a Maritime Talent & Innovation Hub

**BUILDING  
PARTNERSHIPS**





# Building Partnerships

## International Partnership

International Collaborations with Leading Maritime Nations

- Sweden
- Norway
- Finland
- Germany

With International Regulatory Bodies

- IMO
- IALA



## Partnership – Building a National Research Ecosystem

### Position Competency for Future



Cybersecurity Training  
**SUTD**  
SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN



Advanced Navigation Research Simulator (ANRS)



Remote Simulator Training



High Fidelity Hydrodynamic Models



### Enhance Skillsets Today



Full Mission Ship-handling Simulator (FMSS)



AI in Human Factor Studies  
**IHPC**  
A\*STAR



Training and Assessment



**SMA**  
Singapore Maritime Academy  
SINGAPORE POLYTECHNIC



Competency Framework with Industry  
**PSA MARINE**

# National Innovation Ecosystem Beyond 2023





# CONCLUSION

- EMBRACE TECHNOLOGY
- BE HUMAN CENTRIC
- FUTURE READY OUR TALENTS



**SP** Singapore Polytechnic



**mi** SINGAPORE MARITIME INSTITUTE