



Western Norway
University of
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HUMANE project

Human-centred autonomy

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HUMANE – what, why and who

A human centred perspective on

- › System safety & cyber security
- › Legal implications
- › Skill sets, competence and knowledge
- › Organisational & job design issues

Why?

- › Most of the technology is in place...?
- › Everyone wants safe and efficient shipping
- › How can we support and enable?

Project leader

- › Western Norway University of Applied Sciences, HVL

Project group

- › NTNU Trondheim, Ålesund and Gjøvik
- › University of Southeast Norway, USN
- › The Arctic University of Norway, UiT
- › BW Gas
- › Kystverket
- › Sjøfartsdirektoratet
- › Lloyd's Register



Forecasting workshops

System safety and cyber security

October 2018 in Trondheim



Legal implications

January 2019 in Oslo

- > CIRM
- > SINTEF
- > Inmarsat
- > Massterly
- > BW Gas
- > Wärtsilä
- > Rolls Royce
- > Wilhelmsen Ship Management
- > MTI-NYK
- > DNV-GL
- > Lloyds Register
- > Kystverket
- > InterManager
- > ABB
- > Kongsberg Seatex
- > Kongsberg Maritime
- > Norcontrol
- > EXMAR
- > F-Secure
- > RISE
- > Maritime Robotics
- > Norwegian Maritime Authority
- > Danish Maritime Authority
- > Swedish Transport Agency
- > BIMCO
- > Gard
- > NTNU
- > University of Southeast Norway
- > Åbo Akademi University
- > University of Southampton
- > Bellona foundation

Levels of autonomy...

...or a new model?

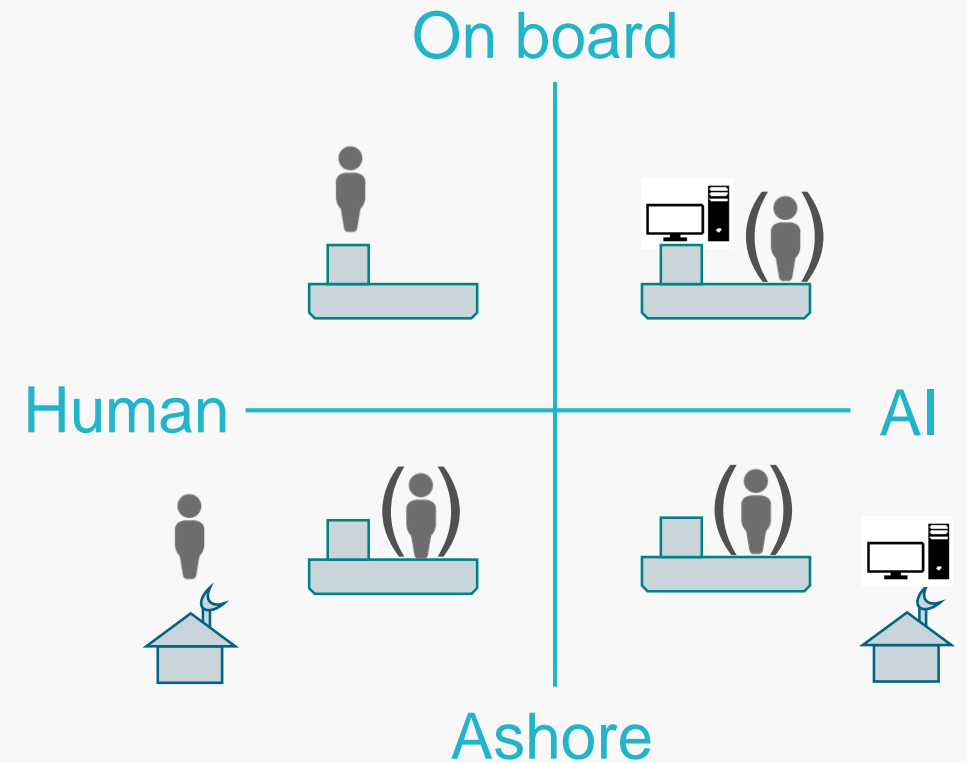


Dominant technical view



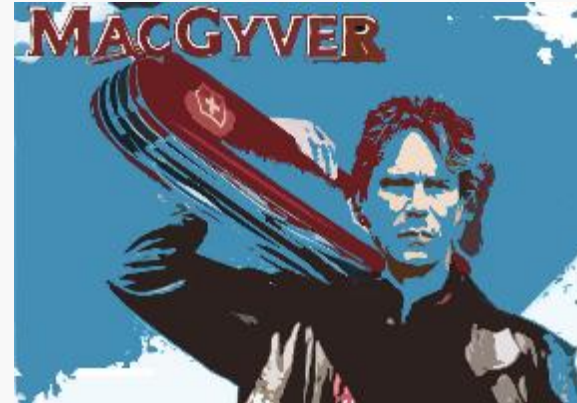
Different business models

Where decides



Crewing, skills and competence - drone or expert?

- › Automation & advanced IT comes in
 - › Keeping and maintaining competence and skill set
 - › Human plus Machine – integration - is greater than human and machine
 - › Number of sailors may remain the same
 - › Or ultra low - more external assistance and decision support
 - › Are they drones or experts?



The business case

- › Owners are not interested
- › Investment
 - › Increased cost of equipment
 - › Redundancy is expensive
 - › Reduced crew costs, but not much
 - › Cost means large fleets are needed
 - › Retrofit won't work, only newbuilds?
- › Make sure we are not paying for someone else's gain.



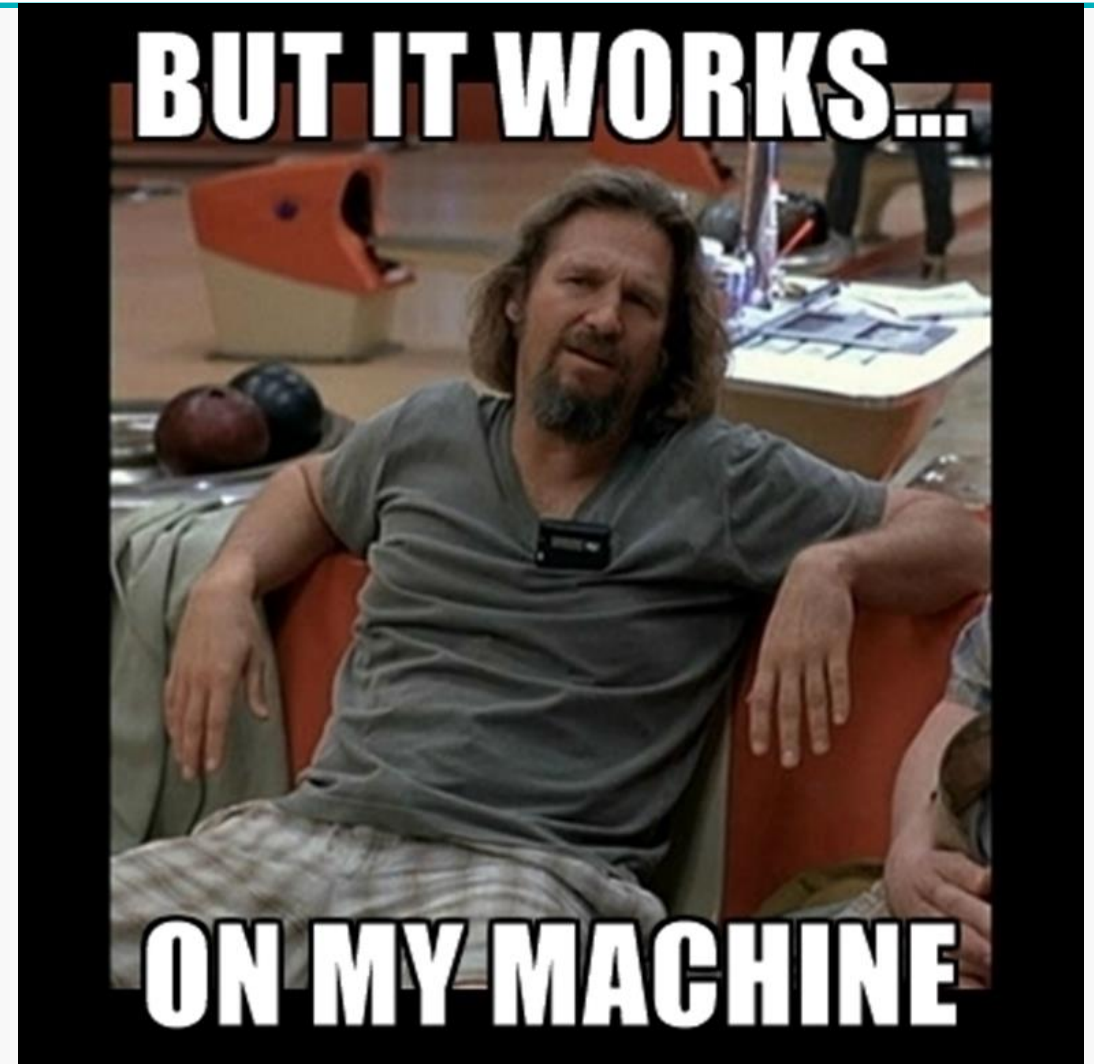
Communication and cybersecurity

Communication

- › Remote control is not feasible due to lack of communication infrastructure
- › We need autonomy AND shore
- › Risks of remote access maintenance, people ashore don't know what's going on

Cyber

- › Cyber security for remote and autonomy – currently mismanaged and misdesigned
- › Cybersecurity maturity is low
- › Security updates are urgent, high risk of being rushed out without testing



Summary of challenges and possibilities



- › New business cases and models are needed
- › Safety and security concerns are real. Addressing them is not trivial or a solved problem
- › There is a big difference between technology demonstration and routine use
- › Find ways for innovation and standardisation to coexist
- › Marine human-centred design — involve people and find ways to iterate within the implementation processes
- › Choice of technology will affect manning numbers and skills
- › Resilient integrated solutions are not achieved by building and adding





