Drones – an aid to increased Situational Awareness in pilotage operations

VesCo Systems, Remote Pilot supported by the Danish Maritime Fond



DanPilot

YOUR TIME, YOUR SAFETY - OUR COMMITMENT

Roadmap of this presentation



The Vision for the use of Drones

VesCo Systems – a joint venture between:

Blue Oceans Robotics





Element Aviation

lot



'IME FOND

ed by the Danish Maritime Fond

The Vision for the use of Drones

COWI concluded in 2014 that the best potential for shore based pilotage would be for sea pilotage relating to specific areas in Danish waters based on safety assessment



The Vision for the use of Drones

"If everything else remains unchanged remote pilotage will always lead to less efficient control of the systems" (Karl Bruno & Margareta Lützhöft)

Conviction: "That the issue of remote pilotage is best

discussed in the context of Control and not in the Technology"

Margareta Lützhöft)

Source: Karl Br

The Vision for the use of Drones Our goal is to take advantage of the increased potential in new technologies and thereby increase the control i.e. Situational Awareness focusing on the marine harbor pilotage operations. <u>Thus the vision</u> for shores based pilotage is that a



otage operation is to be performed at the same level of quality as if the pilot oard the vessel ensuring: ed safety for marine pilots harbor pilotage available for more

fficient pilotage operations

The process of using new technologies

Control = Situational Awareness (SA)

We need to define the Situational Awareness Level ation to Shores Based

Autonomy levels (AL) adapted from Lloyds Register

Description

AL 0: Manual steering. Steering controls or set points for course, etc. are operated manually. AL 1: Decision-support on board. Automatic steering of course and speed in accordance with the references and route plan given. The course and speed are measured by sensors on board. AL 2: On-board or shore-based decision support. Steering of route through a sequence of desired positions. The route is calculated so as to observe a wanted plan. An external system is capable of uploading a new route plan. AL 3: Execution with human being who monitors and approves. Navigation decisions are proposed by the system based on sensor information from the vessel and its surroundings. AL 4: Execution with human being who monitors and can intervene. Decisions on navigation and operational actions are calculated by the system which executes what has been calculated according to the operator's approval. AL 5: Monitored autonomy. Overall decisions on navigation and operation are calculated by the system. The consequences and risks are countered insofar as possible. Sensors detect relevant elements in the surroundings and the system interprets the situation. The system calculates its own actions and performs these. The operator is contacted in case of uncertainty about the interpretation of the situation. AL 6: Full autonomy. Overall decisions on navigation and operation are calculated by the system. Consequences and risks are calculated. The system acts based on its analyses and calculations of its own capability and the surroundings' reaction. Knowledge about the surroundings and previous and typical events are included at a "machine intelligent" level.

The process of using new technologies

This means:

- Working with experienced experts
- A Safety II approach why does it work?
- Securing communication stability and redundancy



ure that perception and communication ted visually on board and ashore (the d eye view, helm position, engine orders quirement to the HMI interface effort to mitigate the fact that the of a ship and the marine pilot is not besides each other

System 1: Aerial overview of entrance and berth areas

RemotePilot consists of two systems. System 1 is a fleet of drones dedicated to only provide an aerial overview to the pilot of the entrance and berth areas during port pilotage operations, and possibly to verify/calibrate the positioning of the SafePilot system in combination with an overlay on top of the real-time videofeed.



System 2: Delivery of equipment package enabling shore-based piloting RemotePilot consists of two systems. System 2 is a fleet of drones dedicated to only carry out an equipment package (iPad, communication, GNSS, cameras etc.) for enabling shore-based piloting to vessels requesting pilotage.





Visualization on the Portable Pilot Unit (PPU)



- Still testing Issues like, perception, visibility, weather, language skills, batteries etc.
- Will it work?
- Legislation?



ships use the product? Is in port, it will also be at path to ised pilotage for sea pilotage d safety for marine pilots d pilotage availability for more ships ower cost iant and efficient operation



Thank you 😳

