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# MASS & Navigation

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# IoT World Today

## SUPPLY CHAIN, TRANSPORTATION & LOGISTICS



## Autonomous Marine Drone Carrier Revealed

It can deploy boats, subs and drones and communicate with them while they are operating autonomously.

Written by Graham Hope 25th May 2022



As the world gets used to the idea of self-operated cars and aircraft, China is taking things to the next level with an autonomous sea vessel that carries an army of more than 50 drones and unmanned ships and submersibles.

The Zhu Hai Yun was produced in Guangzhou by the Huangpu Wenchong Shipyard, a subsidiary of China's largest shipbuilding company the China State Shipbuilding Corporation, and is being hailed as a new kind of "marine species," according to the South China Morning Post, which cited the state-run Science and Technology Daily.

### Related Content

[Argo AI to Run Driverless Robotaxis in Austin and Miami](#)

[IoT Product Roundup: PTC, Nokia, Arm and More](#)

[Tesla Plans 'Many Cool Updates' at Annual Event](#)

[Kia to Build Massive Factory for Autonomous, Electric PBVs](#)

### ROUNDUPS

[View all](#)



**IoT Deals, Partnerships Roundup: Google, Arm, Senet and More**

26th May 2022



**IoT Product Roundup: PTC, Nokia, Arm and More**

19th May 2022



**IoT Deals, Partnerships Roundup: Intel, Nauto, Helium and more**

14th May 2022





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# Degrees of autonomy



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- **Degree 1 - Ship with automated processes and decision support (most likely to be a conventional ship):** seafarers are on board to operate and control shipboard systems and functions. Some operations may be automated.
- **Degree 2 - Remotely controlled ship with seafarers onboard:** the ship is controlled and operated from another location, but seafarers are on board (which would include a Periodically Unmanned Ship and a ship with a Periodically Unmanned Bridge).
- **Degree 3 - Remotely controlled ship without seafarers on board:** the ship is controlled and operated from another location. There are no seafarers onboard.
- **Degree 4 - Fully autonomous ship:** the operating system of the ship is able to make decisions and determine actions by itself.





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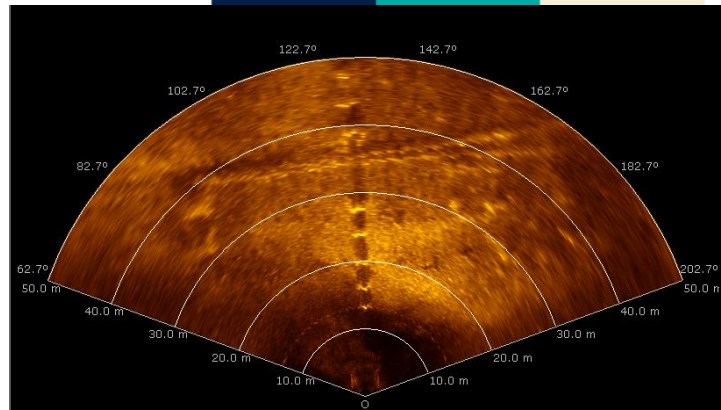
# Why do we need navigation data!



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- Spoke to operators - nobody looking at future navigational data!
- Focus is on sensor technology (sense and avoid)
- Colreg algorithms
- Forward looking sonar
- Where is the need for data?





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# Current CHARTS not fit for purpose for MASS navigation



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Charts (ENC) are still fundamentally designed to be viewed and interpreted by a human being

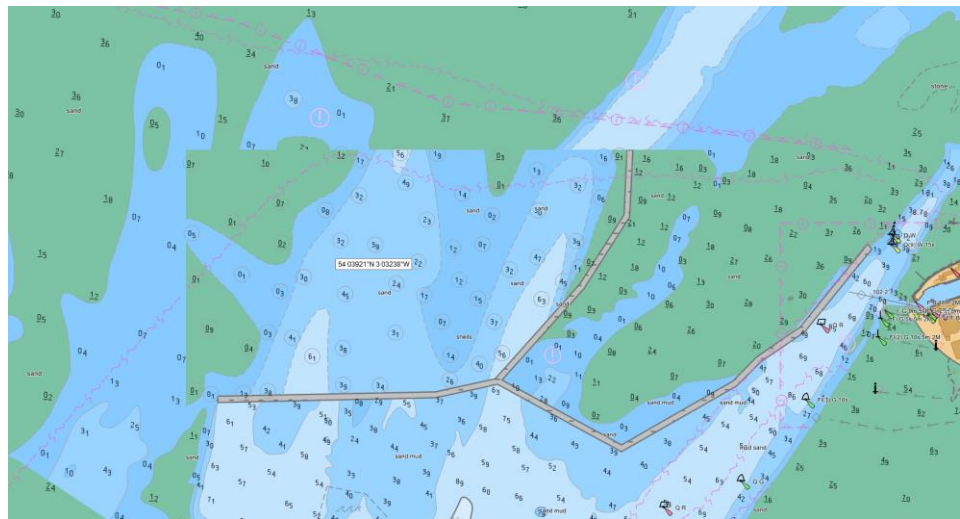
Charts are a subjective cartographic representation of the real world

Charts suffer from data inconsistencies

Charts suffer from horizontal inconsistencies

A lot of contextual information is captured in text notes

S-57 will no longer be developed - frozen





# Current CHARTS not fit for purpose for MASS navigation



## APPENDIX I

### *Speed Limits in Certain Areas*

- 10.(1) Except as provided for in paragraph (2) below no vessel shall exceed a speed of 10 knots through the water north of 50° 20'.0 North (the latitude of Plymouth Breakwater) or any waters of the Dockyard Port within 400 metres of the shore, save with a licence in writing signed by the Queen's Harbour Master.
- (2) Vessel;s under 15 metres in length overall may exceed the speed limit specified in paragraph (1) above in the following areas:
  - (a) Such waters of the Dockyard Port that are outside 400 metres from the shore and in the access lane for water skiers and jet-skiers which is bounded to the east by the line joining Fisher's Nose to the western extremity of Mount Batten Breakwater, and bounded to the west by the line joining the western extremity of the Royal Plymouth Corinthian Yacht Club to the West Mallard Buoy;
  - (b) water skiing Areas shown on current Admiralty charts;
  - (c) Such other areas of the Dockyard Port as the Queen's Harbour Master shall from time to time determine and publish as a local Notices to Mariners.
- (3) No vessel within the Dockyard Port shall exceed a speed of 8 knots through the water to the east of a line drawn from Fishers Nose to the western end of Mount Batten Breakwater, save with a licence in writing signed by the Queen's Harbour Master and where authorised in accordance with paragraph (2) (b) above.
- (4) No vessel within the Dockyard Port shall exceed a speed of 4 knots through the water in the approaches to Sutton Harbour north of a line drawn due east from Fishers Nose save with a licence in writing signed by the Queen's Harbour Master.
- (5) No vessel shall exceed a speed of 4 knots through the water in designated Bathing Areas shown on current Admiralty charts.
- (6) No vessel shall exceed a speed of 4 knots through the water in designated Diving Areas shown on current



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# S-100 – maybe?



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# IHO MASS PT



## The objectives of the Project Team are:

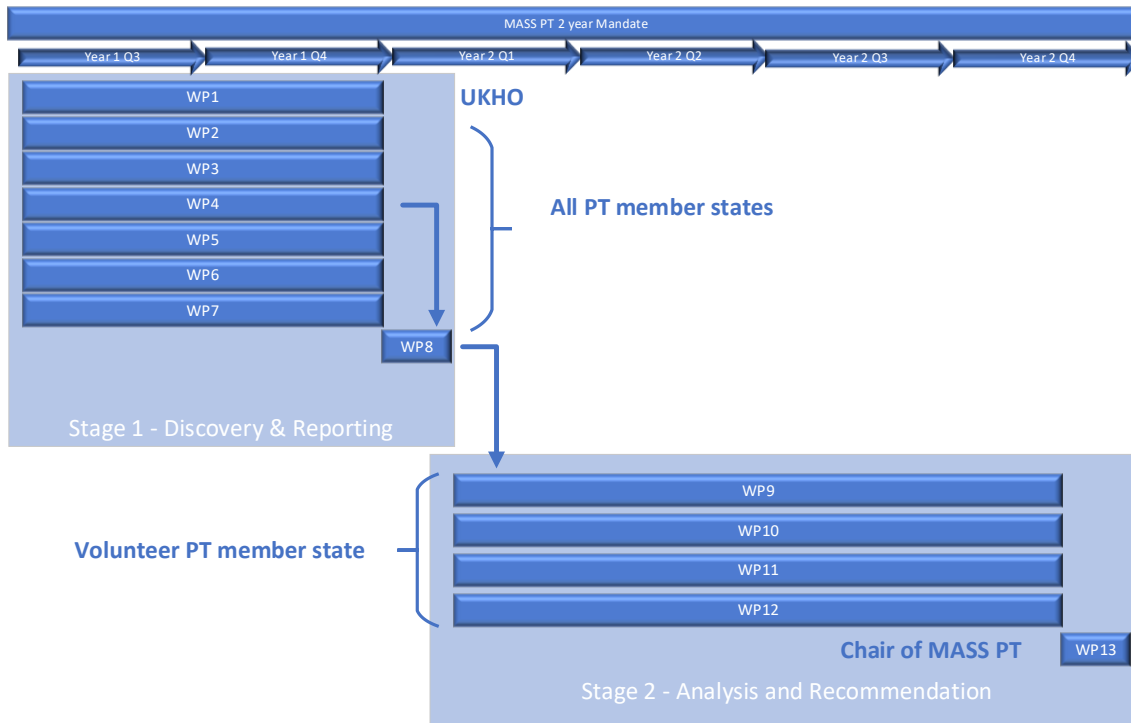
- a. to identify and prioritize MASS navigation requirements.
- b. to analyse their impacts on hydrographic standards and services (i.e. S-100); and
- c. to develop a set of recommendations/issues to be addressed by existing working groups.







# Project Team Plan





# Discovery questions

Identify and report what test bed activities are happening in each member state's region and which degree of autonomy is predominantly used.

Report on what data MASS operators and MASS navigation systems are using today in each member state's region.  
Have any data limitations been identified?

Report what navigational data each member states' regulators (e.g. MCA in the UK) are specifying should be used for MASS navigation in either trials or operations of MASS.

To what degree are member states Hydrographic Offices involved in MASS trials or operations and what data are they currently providing.

Have any data limitations been identified?

Report on what trailing has been done with new navigation standards (e.g. S100) for MASS, or what research into machine readable data has been carried out in each member state's region.

Have any data limitations been identified?



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## The PT has now met its remit – however:-



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- There's a number of issues we encountered that don't fit into the current S-100 standards which will need addressing
- So far we have seen a snap shot of the MASS industry which is still evolving
- We didn't get membership from all parts of the globe and may be missing out on developments in some regions
- There's complimentary and related work in IALA and WMO which we could support
- We never had representation from the MASS community in the Project Team
- Recommendation for HSSC next year will be to continue





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- Current Navigation Products and Services are not fit for Degree 4 Autonomy
- The next generation navigation standards (i.e. S-100) do solve some of the problems with existing products and standards
- The IHO has recognised a need to ensure S-100 is going to be fit for MASS navigation as well as human navigation
- There are still challenges to overcome as MASS matures to capture new and emerging navigation requirements
- UKHO along with the IHO are in the right place to meet these challenges



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# Thank you.

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