

R.V. Tom Crean  
“Knowledge Gained -  
12 months of Operation”

Frank Armstrong  
Marine Institute Research Vessel Operations

25<sup>th</sup> Annual ERVO Meeting





# Vessel Overview

## RV TOM CREAM

MODERN VESSEL DELIVERING MODERN SCIENCE



FISHERIES SURVEYS  
OCEANOGRAPHIC SURVEYS  
ENVIRONMENTAL MONITORING  
SEABED MAPPING  
DEPLOYMENT OF OBSERVATIONAL  
INFRASTRUCTURES AND ROVS

Silent Research Vessel (ICES 209 noise standard for fisheries research)  
Class Notations: Lloyd's +100A1, UMS, Ice Class 1C FS, DP(AM)

## RV TOM CREAM

The RV Tom Cream is used by the Marine Institute and other State agencies, universities and international users to undertake fisheries research, oceanographic and environmental research, seabed mapping surveys; as well as maintaining and deploying weather buoys, observational infrastructure and Remotely Operated Vehicles.

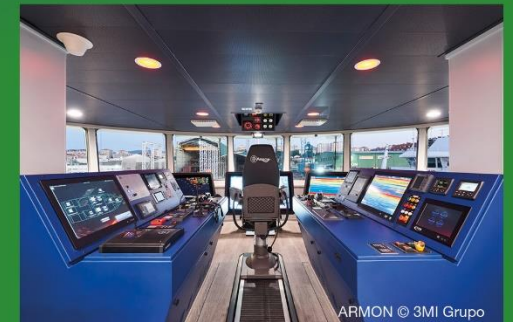
The vessel is a silent research vessel, designed to meet the stringent criteria of the ICES 209 noise standard for fisheries research.

The vessel is designed to operate in the harsh conditions encountered in the NE Atlantic and the vessel can spend 21 days at sea.

The Tom Cream has the capacity to support Remotely Operated Vehicle (ROV) and Autonomous Underwater Vehicle operations, which enable the exploration of our deep ocean down to 3,000m. Equipped with state-of-the-art scientific equipment, it provides increased accommodation for scientists and for researchers.

### VESSEL OVERVIEW

Vessel Specifications	Power
Length Overall: 52.8m	Power Generation: 2 x 1350kw 1 x 400kw
Length PP: 48m	Main Propulsion Motor: 2000kw INDAR
Beam: 14m	Bow Thruster: 780kw Schottle SPJ 132 RD
Draft: 5.2m	Stern Tunnel thruster: 400kw Schottle
<b>Endurance</b>	Imo Tier III compliant
21 Days	DP1 Dynamic Positioning
8000 nautical miles	3 x 20ft Containers





# Vessel Overview

## OCEANOGRAPHIC CAPABILITIES

- Heave Compensated CTD system with 4500m wire. 24 bottle Carousel
- Underway T+S, Fluorescence, PC02 in dedicated sea water laboratory
- CTD Hangar, CTD Laboratory , 45 khz ADCP
- Controlled temperature Chemical Lab
- Bow Mast for Meteorological sensors
- Oceanographic winch for Towed samplers/Side scan sonar
- Hydrographic winch for Plankton Sampling
- 20 and +4 degree refrigeration

## FISHERIES SURVEYS

### Fisheries Acoustics

- EK80 Fisheries Echosounder on Drop keel - 5 frequencies
- SU92 Omnidirectional Sonar
- FS 70 Headline system

### Egg/Larval Surveying

- Oceanographic winch with 2500m wire

### Trawling Capability

- Marport net mensuration system
- Trawling capability: 2500m 22mm trawl wire, 25 Ton Pull
- 2 x 7m<sup>2</sup> split net drums (Demersal)
- 1 x 9m<sup>2</sup> Net Drum (Pelagic)
- 1 x Headline winch with 2500m Headline wire

### UWTV Survey

- UWTV survey with Q5/Oceanographic winch
- Sonardyne Ranger 2 USBL system on retraction unit
- Dedicated Video Playback Lab

### Catch Handling

- Net Hauler, Gilson Winch, Hopper system

### Fish Lab

- 36.7m<sup>2</sup> with 6m Long conveyor system, 4 Measuring stations, -20 Freezer, separate 6m<sup>2</sup> freezer store

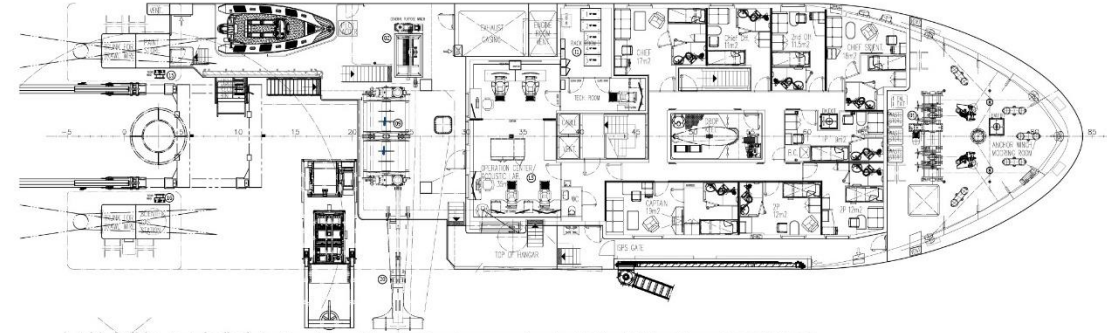
## HYDROGRAPHIC/ GEOLOGICAL CAPABILITY

- Multibeam No.1: EM2040 Dual Head
- Multibeam No.2: EM2040 Single head (Drop keel)
- Capable of accommodating a EM712 1 x 1 degree Multibeam
- Sub Bottom profiler: Knudsen 3260, 9 x 3.5Khz, 1 x 12Khz
- Moving vessel profiler: AML MVP 30-350, Edgetech Side Scan
- MRU: Seapath 380 RGC 3 /RGC 2 Haps System
- GNSS: Cnav 5000 High Precision GPS
- Usbl: Sonardyne Ranger 2 USBL on retraction unit
- Can accommodate 12m Piston /Gravity Core, 6m Vibrocorer, CPT
- Can accommodate ROV Etain (UL) and ROV Holland
- Optimised for AUV Deployment /Control

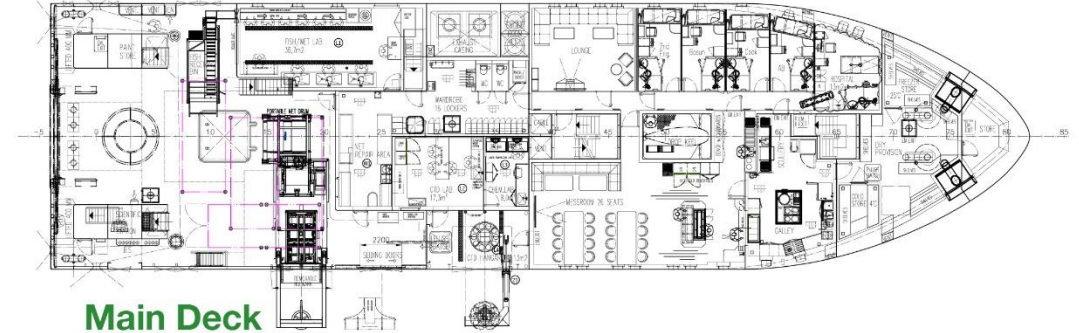
## FACILITIES/CAPABILITIES

- 11 – 13 Crew including permanent technician, 13 scientists. Total 26
- Gymnasium (12m<sup>2</sup>)
- TV lounge
- Additional Lounge area in messroom
- Equipped with shore generator for fuel efficiency
- Electrical drive winches throughout (Ibercisa)
- Multipurpose design with removable net drum to increase deck space
- DP 1 (Praxis Mega Guard)
- Hoppe Anti Roll system
- 170 Degree 10 T A Frame /8 T Side T frame
- AUV/Glider "Step" in hull to allow easy access to water surface
- Can accommodate 3 x 20' Laboratory containers
- Shore power connection to allow shutdown of all gensets when in suitable port
- Drop keel (c.2.5m below keel)
- Ability to utilise low carbon HVO as a replacement for MGO

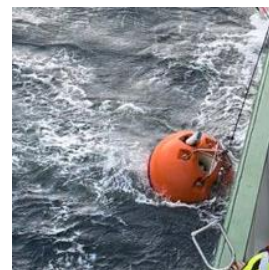
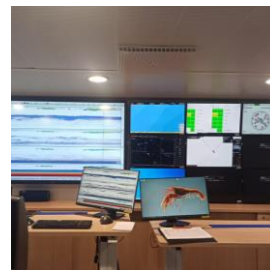
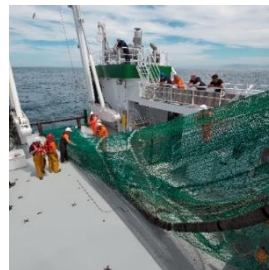
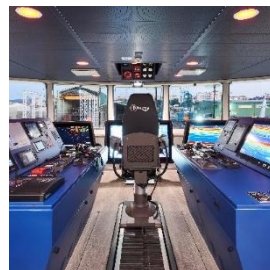
## First Deck



## Main Deck





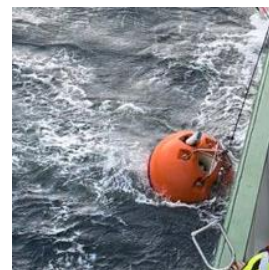
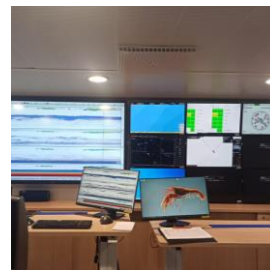
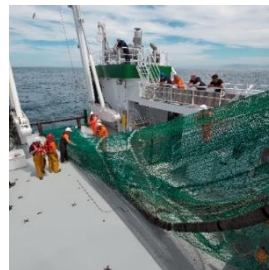


# Timeline

- ❖ Design awarded to Skipsteknisk (ST) design in January 2019
- ❖ Ship build contract awarded to ARMON, Vigo in December 2019
- ❖ Main equipment selection/procurement finalized in the period January – June 2020
- ❖ Steel cutting commenced 20<sup>th</sup> August 2020
- ❖ Keel Laid 4<sup>th</sup> November 2020
- ❖ Vessel launched November 19<sup>th</sup> 2021
- ❖ Arrived in Galway July 18<sup>th</sup> 2022
- ❖ 1 week of crew training & trials
- ❖ 1<sup>st</sup> survey sailed on 25<sup>th</sup> July 2022 – INFOMAR Seabed Mapping

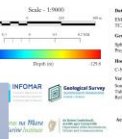
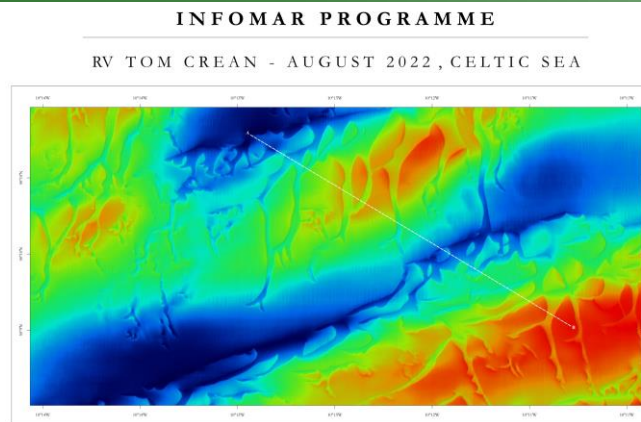




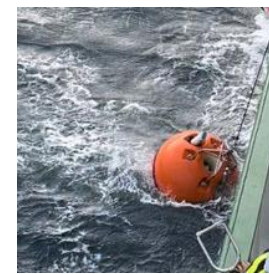
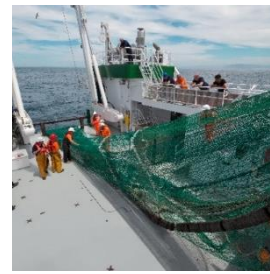
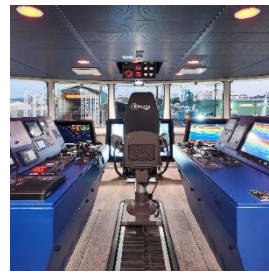
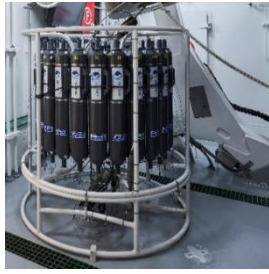


# Work undertaken in the previous 11 months

- INFOMAR Seabed Mapping (57 days)
- Underwater TV Surveys – Nephrops (47 days)
- Student Training Surveys (35 days)
- Environmental Monitoring Surveys
- Mesopelagic Surveys
- Herring Acoustic Surveys
- Biological Oceanography and Phytoplankton Studies
- Commercial Jobs





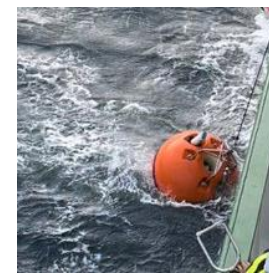
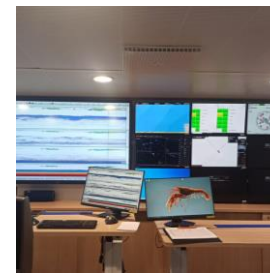
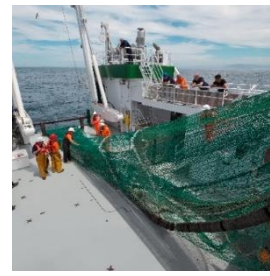
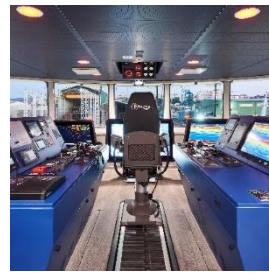


## Operational Challenges – trying new equipment

- Very short commissioning period. Vessel arrived in Galway on 18<sup>th</sup> July, with work commencing on the 25<sup>th</sup>.
- Lots of operations were carried out for the first time on survey, e.g., Deep CTD casts, exposing things we hadn't seen before.



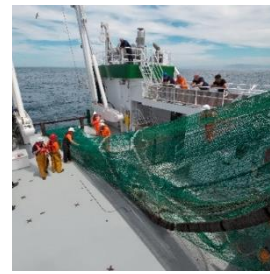
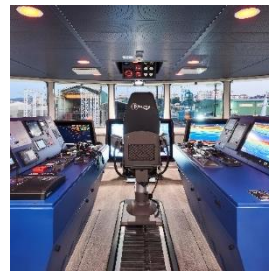




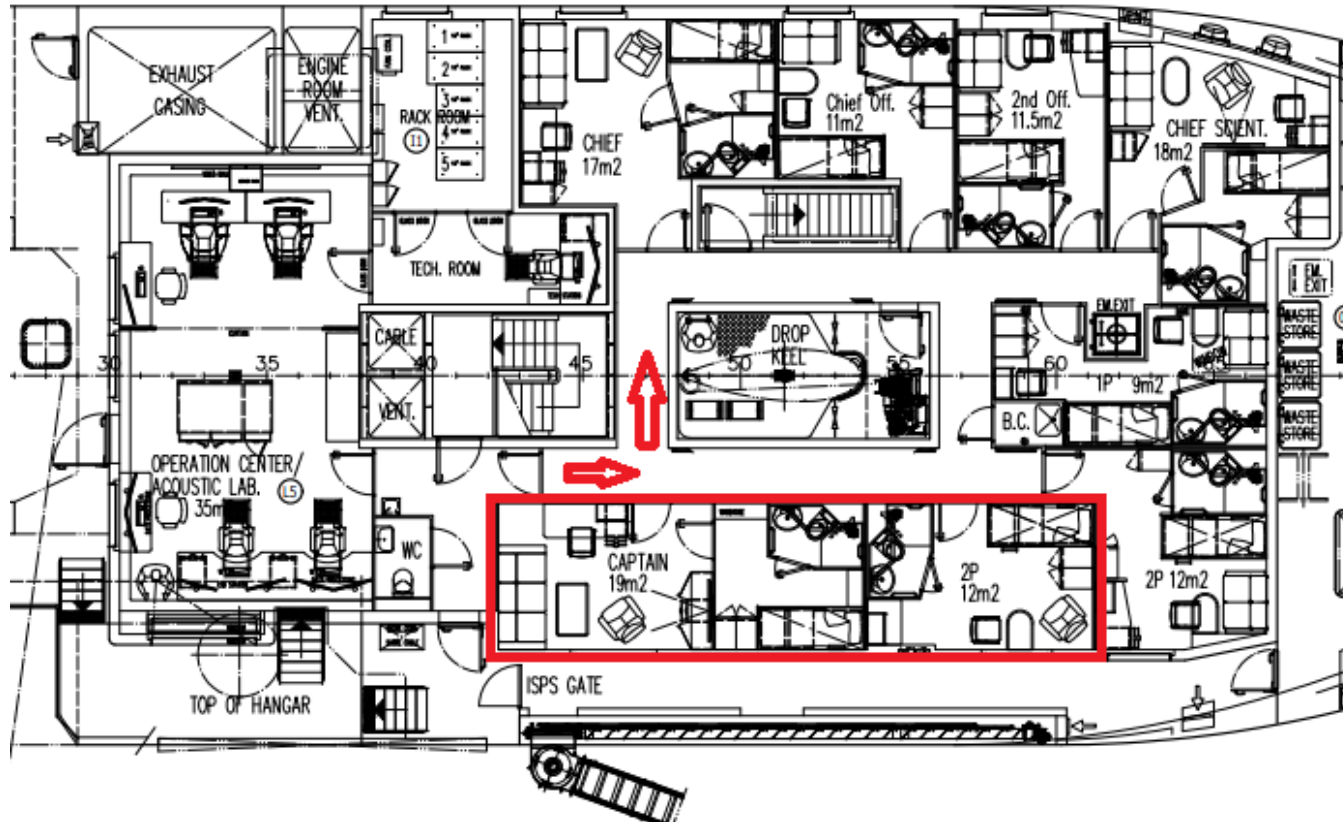
## Operational Challenges – cabin arrangements



- MLC complication with cabin plan arrangements meant we were limited with how many scientific personnel could sail.
- Under the MLC for particular surveys, each member of crew require their own cabin, taking away from scientific berth availability.

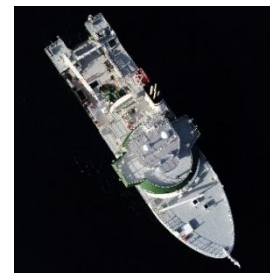
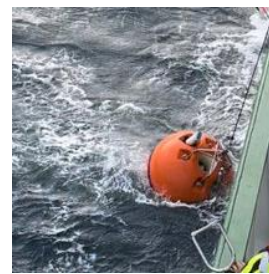
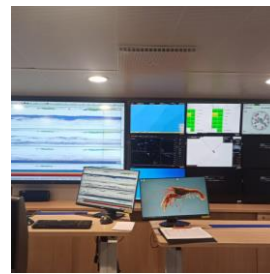
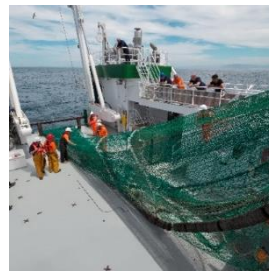
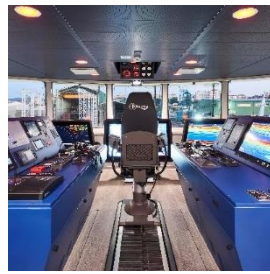
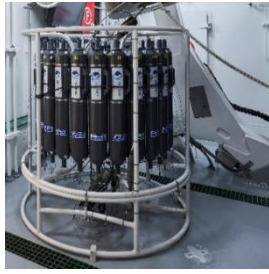


## Operational Challenges – floor layout



- Layout of the cabins needed reconsiderations as the captains cabin is adjacent to a lot of activity, i.e., 24 hr dry lab operations.
- Noisy part of the ship, lots of foot traffic, banging doors etc.



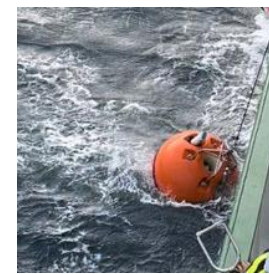
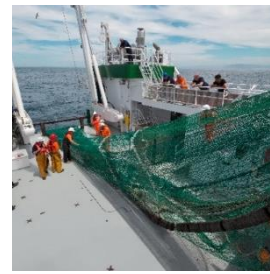
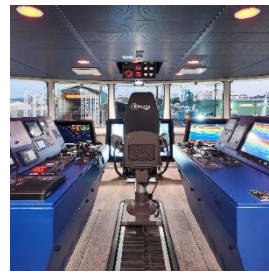
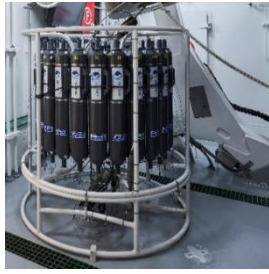


## Operational Challenges – warped windows

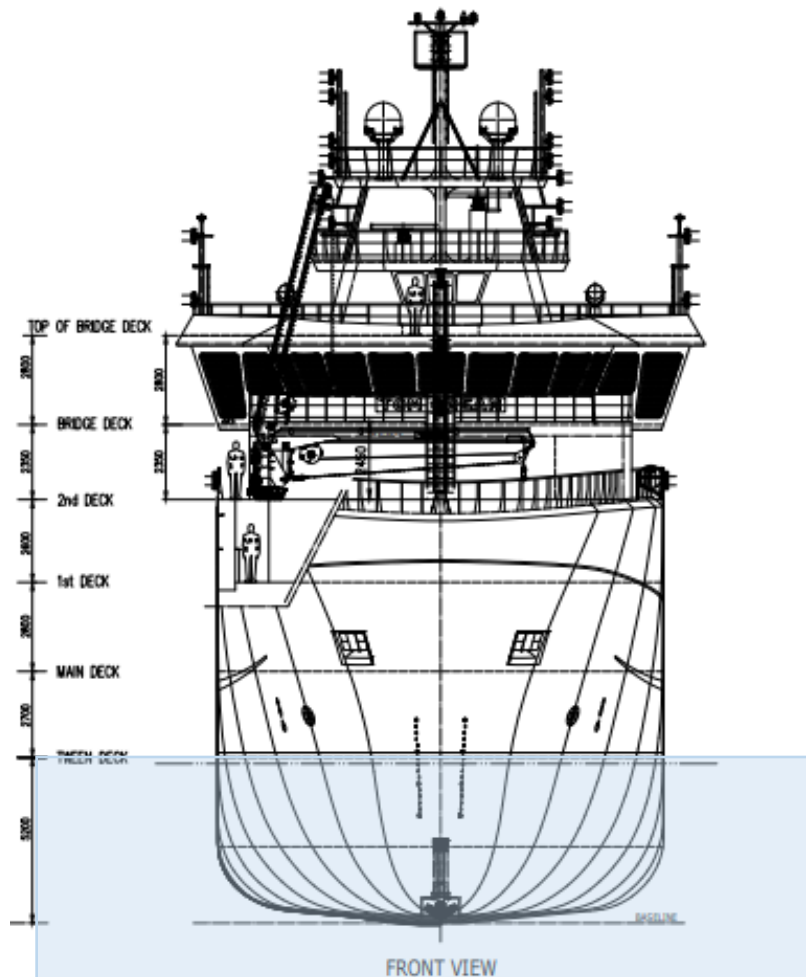
- Bridge windows: after use of heating elements within them, some bridge windows became warped and optically imperfect.
- This was causing distortions, particularly at night with harbour lights and navigational markers.
- Shipyard/window supplier changed these out immediately.





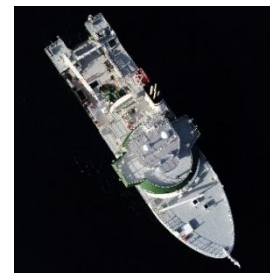
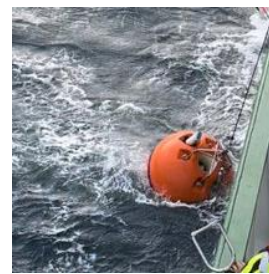
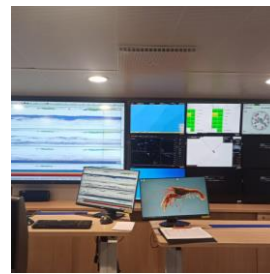
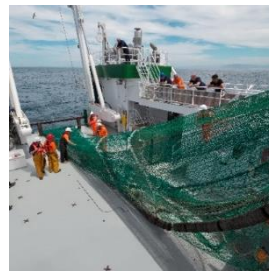
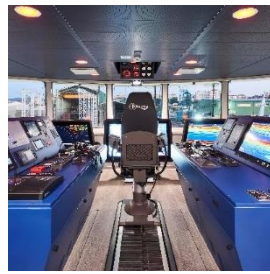
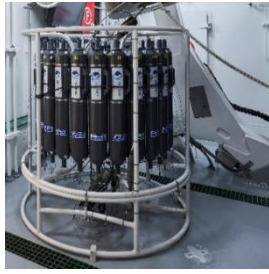


## Operational Challenges - ballasting



- In practical use ships crew tend to ballast the vessel quite heavily.
- Resultant draught is much deeper than designers intended with consequent change to speed and efficiency.



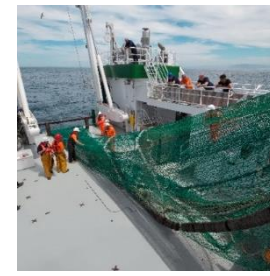
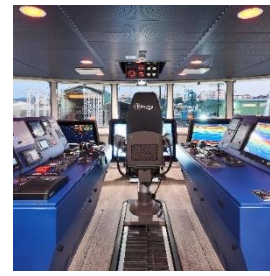


## Operational Challenges – different equipment suppliers

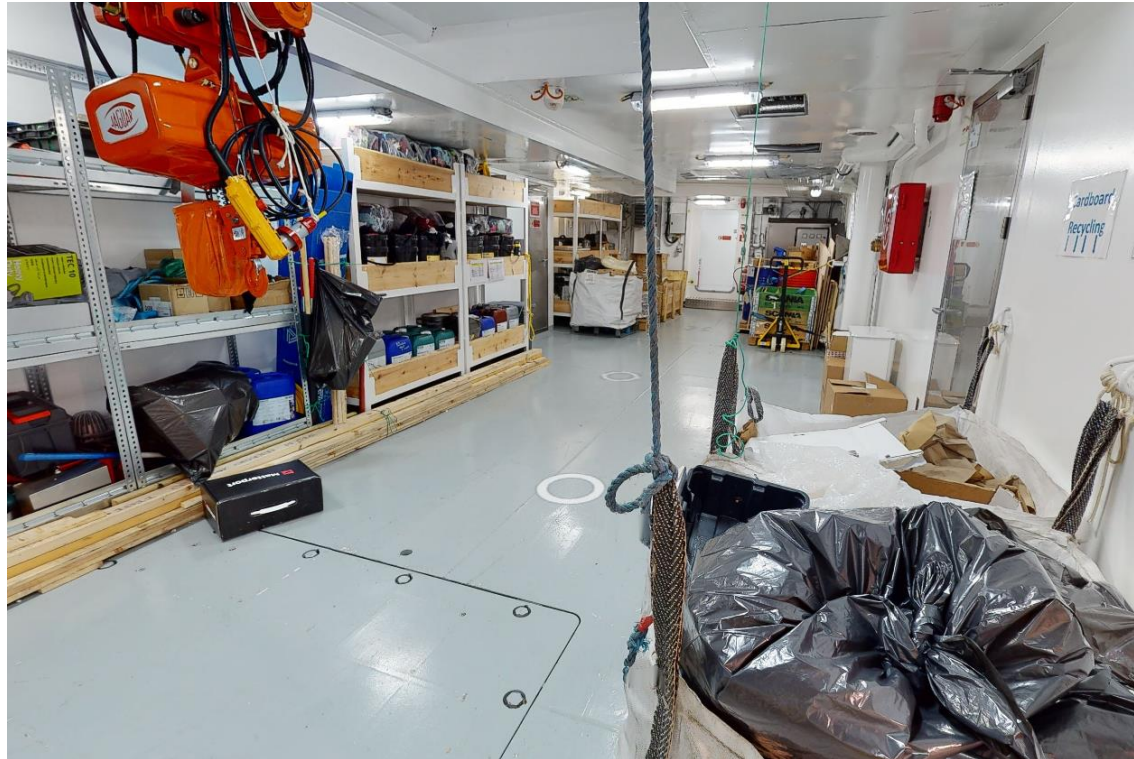
- Systems from different suppliers - difficulties were encountered when trying to marry two together, e.g., different winch manufacture to frame manufacturer.
- This adds to crew training time in the early stages





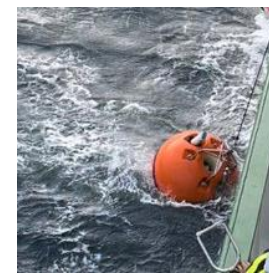
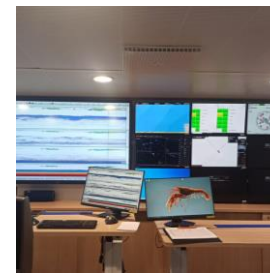
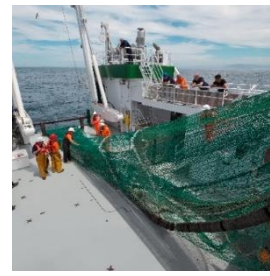
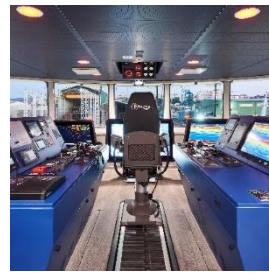


## Operational Challenges – scientific equipment storage



- Limited space for storage of scientific equipment. Storage room below hatch is used more for larger, heavy ships equipment rather than scientific equipment, and therefore is not particularly safe or suitable.
- Whichever room is not in use now becomes de facto storage room, but instances will occur when all rooms are in use.



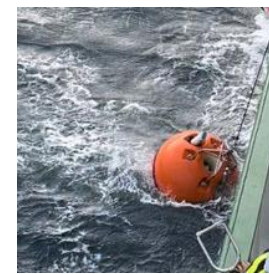
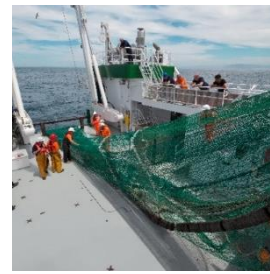
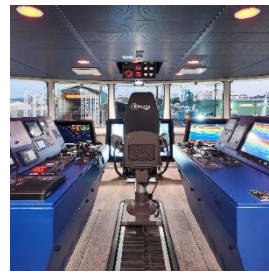
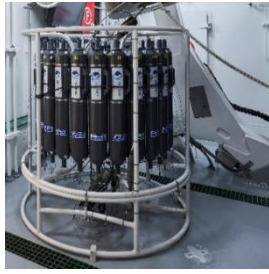


## Operational Challenges – electric winches

- Electric winches (IBERCISA) systems were new to all the crew, this took additional training to get used, i.e., no aural feedback like with a hydraulic winch.
- Also experiencing some electrical interference arising from electrical winches on certain data from winch, e.g., Drop Camera, Side Scan Sonar Data. Potentially needs filtering to resolve. Only discovered this while undertaking analogue survey for the first time



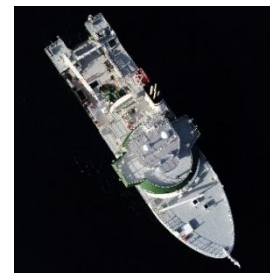
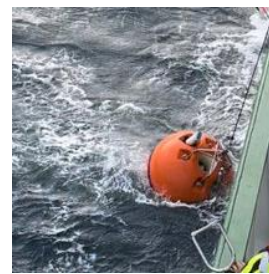
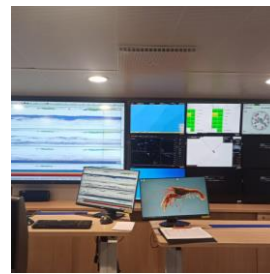
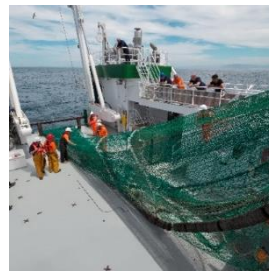
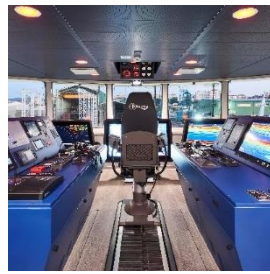
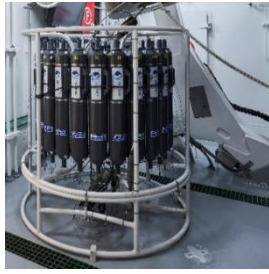




## Operational Challenges – ongoing complications

- **USBL** – (Sonardyne Ranger 2) pole begins vibrating when travelling too fast (8 knots), better to raise and lower the retraction unit between stations.
- **Certification** – Completed initial Lloyds and Flag certification in January 2023, relatively smooth process, some minor differences between Lloyd's Register Spain and Lloyd's Register Ireland interpretation of rules. What was acceptable in Spain may not have been acceptable in Ireland. Lloyds will be done in Spain during warranty.
- **Signal Loss** – Positioning of antenna for internet and TV have been causing issues with shadowing, lots of blind spots. This is still in need of reconfiguration...



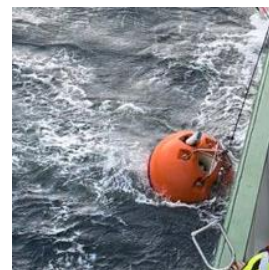
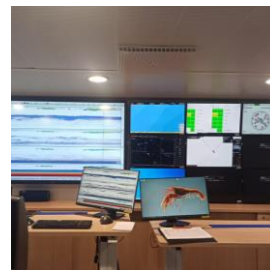
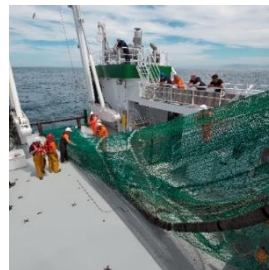


## Achievements – stuff that worked well!

- Vessel is operating very effectively for Hydrographic surveys excellent in terms of weather – no bubbles!
- Planning our end of warranty works period in ARMON Vigo as majority of supplier are based in Vigo/Spain.
- Remoting in for tech support for certain systems e.g. propulsion system & electric winches - excellent service so far.
- Drop keel mounted camera – excellent cetacean footage and also useful for inspecting hull/propeller. Going to look into a data collection framework for the cetacean footage.

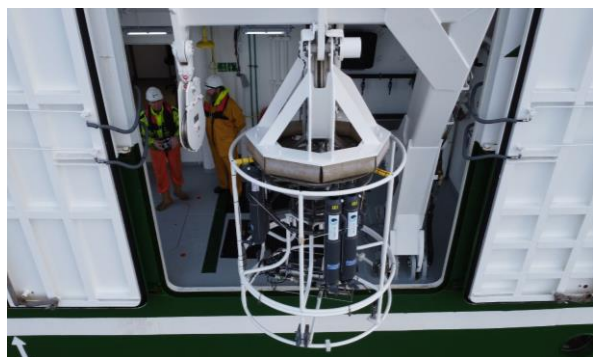






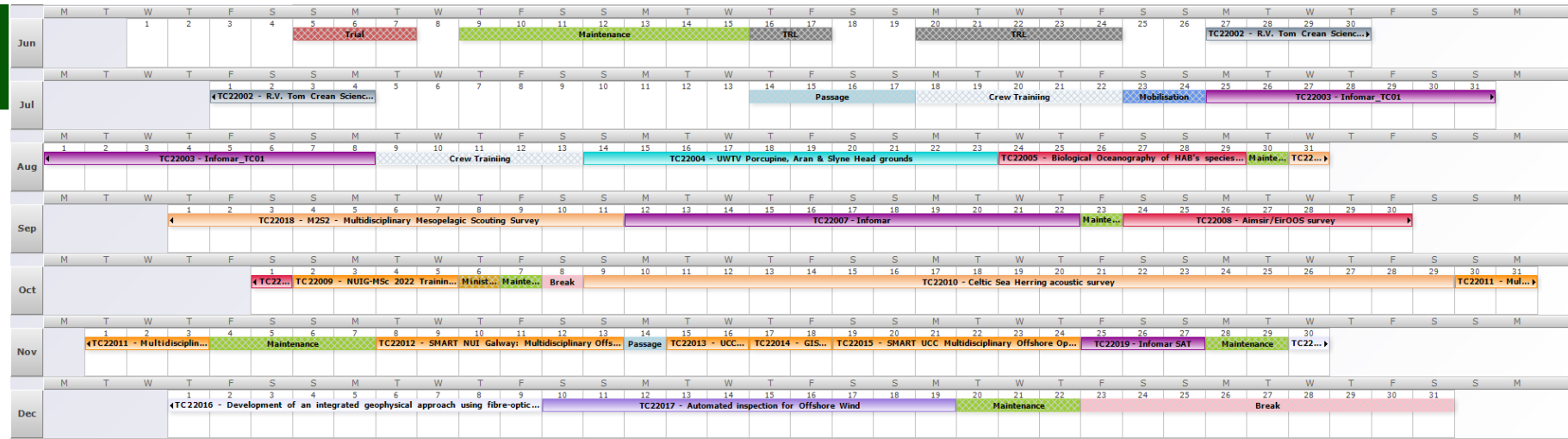
## CTD Hanger

- Controlled deployment and provides shelter and safety while arming/collecting samples



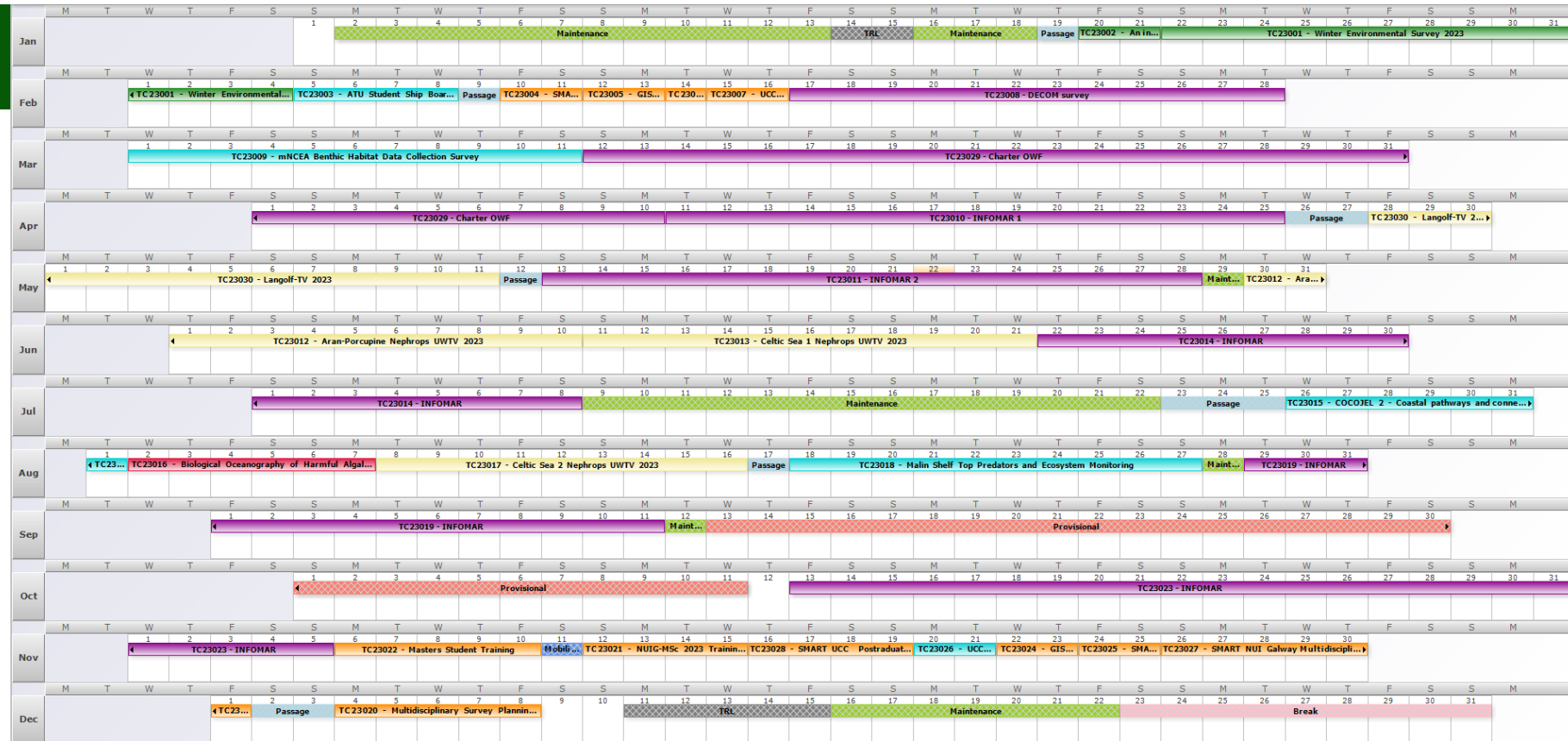


# 2022 Schedule



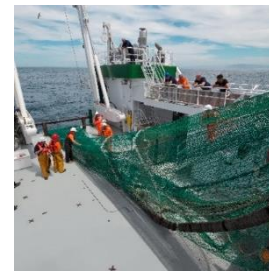
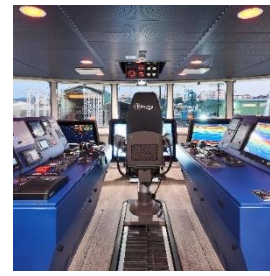
- First survey commenced on the 25<sup>th</sup> July, 15 day seabed mapping survey as part of INFOMAR program - 1000 km<sup>2</sup> of Celtic sea mapped.

# 2023 Schedule



- Busy schedule for 2023 – 294 survey days along with a 2 week warranty maintenance period in Vigo in July.
- Surveys include internal and external scientific research surveys, commercial surveys, and 30 days of student training from different national universities.
- For future scheduling we're going to try aim for less back to back trips, i.e., maintenance day between surveys.





## Looking Ahead...

- Awaiting suitable port with connection to use Shore power.
- Beginning trials using Starlink on Celtic Explorer – if successful extend to Tom Crean.
- Exploring the possibility of incorporating extra berths for students.
- In discussions with Birmingham University to install air quality sensors – looking for advice on this - external instruments or internal air fed equipment bay in bow?

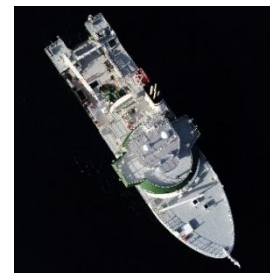
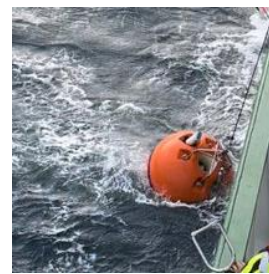
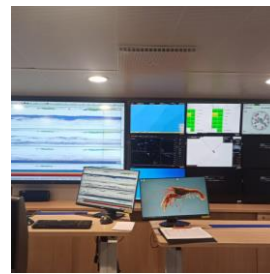
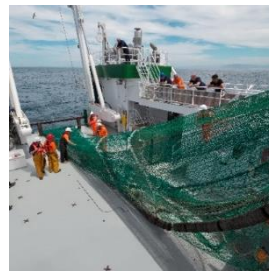
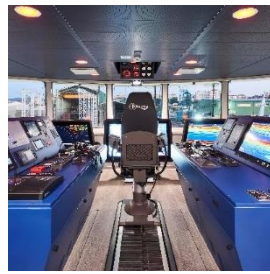
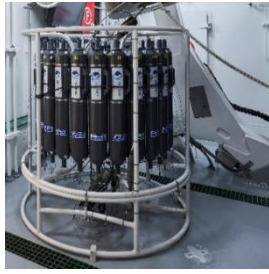


STARLINK



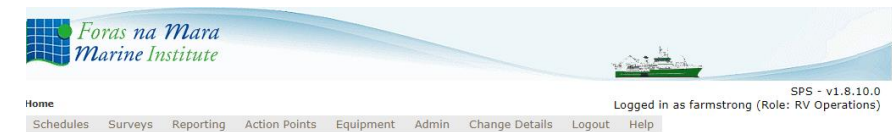
UNIVERSITY OF  
BIRMINGHAM



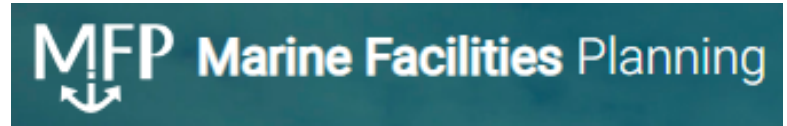
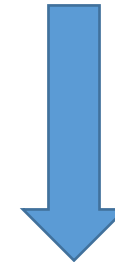


## Looking Ahead...

- Vessel is operating very effectively for Hydrographic surveys - excellent in terms of weather, and NO BUBBLES!
- Planning a end of warranty works period at ARMON, Vigo, as majority of supplier are based in Vigo/Spain.
- In talks with Marine Facilities Planning – will be looking for advice on implementation & experience using this too!



Welcome to the Marine Institute's Survey Planning System







Thanks for  
listening!



*Foras na Mara*  
*Marine Institute*