


A replacement for the Celtic Explorer
Initial design requirements

Aodhan Fitzgerald , Research vessel Manager

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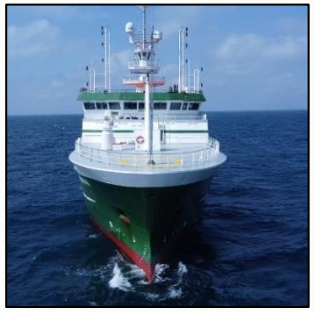
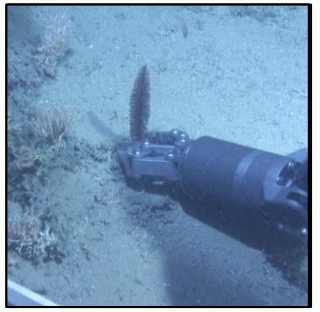
Department of Agriculture, Food and the Marine
An Roinn Talmhaíochta, Bia agus Mara

NDP National Development Plan
Transforming Ireland

Foras na Mara Marine Institute



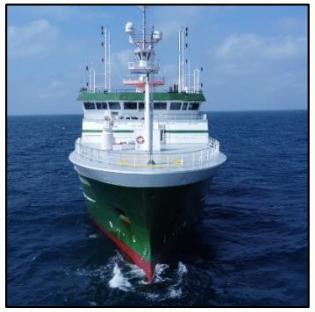




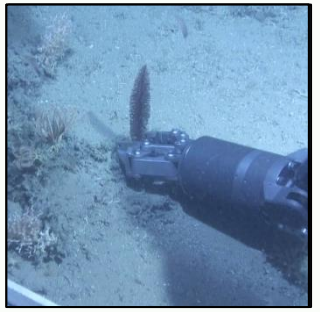

Marine Institute Research Vessel Fleet

RV Tom Crean

- Delivered in July 2022.
- Replacement for RV Celtic Voyager
- Length Overall: 52.8m.
- Service Speed: 9.5 knts, Max speed c. 12.5kt Accommodation: (13 scientists, 11-13 crew) - Total 26 personnel.
- Dry & Wet Laboratories, Storage & Freezer space.
- Oceanographic, hydrographic and fisheries scientific instrumentation.
- Endurance: 21 days at sea.



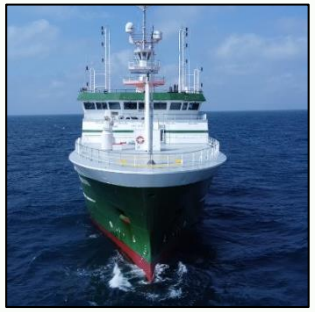




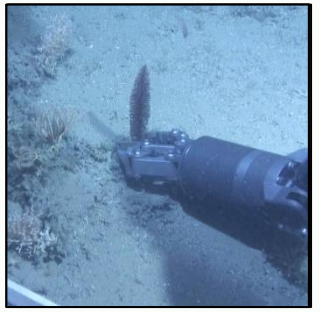

Marine Institute Research Vessel Fleet

RV Celtic Explorer

- Built in 2002.
- Length: 65 m Beam (width): 15 m.
- Service speed 10 knots, max speed ~16 knots
- Accommodation: 35 (20-22 scientists/13-15 crew).
- 3 acoustically mounted Engines (diesel-electric), bow and stern thrusters.
- Dynamic Positioning (DP1).
- Oceanographic, hydrographic and fisheries scientific instrumentation.
- Endurance 35 days at sea (max)
- Ability to accommodate up 8 20’ containers
- Capable of accommodating work class ROV

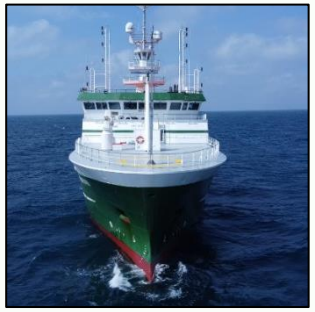




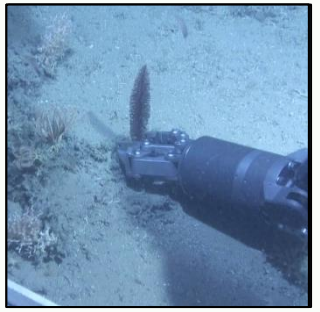



Why a replacement?

- Celtic Explorer is now 22 years old
- Vessel has been in continuous use delivering >>300 days per annum since 2003 and averaging 40,000nm distance travelled per year
- All Generators are approaching 100,000 hrs of use
- Main prop motors and other components >150,000hrs use
- Winches in heavy use over last 22 years, some failures encountered and several rebuilds , Hydraulic winches throughout
- Replacement process including business case, design, procurement and build process likely to take 4- 6 years. Vessel then 28 years old
- Celtic Explorer will still have some useful life remaining and consequent commercial value at sale offsetting build costs of replacement vessel

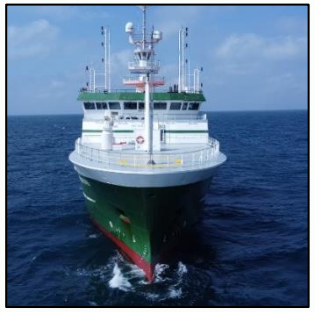




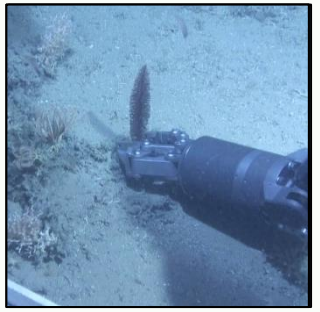



Shortcomings of existing vessel

- Some deck hydraulic pipes and internal steel piping occasionally failing and will eventually require more replacement (all fw pipes replaced with plastic in 2012)
- Replace it (vessel) before it breaks!
- Deepwater Multi-beam was a post delivery add on , some bubble issues in heavy seas due to hull flush mount and vessel bulbous bow
- No permanent USBL system (mounted on Drop keel) as no deployment pole onboard , requires Removal at end of survey and risk of impact when deployed
- ROV: Post delivery add on, ROV location is very far aft on vessel with increased motion . Also cannot remain permanently onboard (75t tonnes equipment) and has to be demobbed after each survey

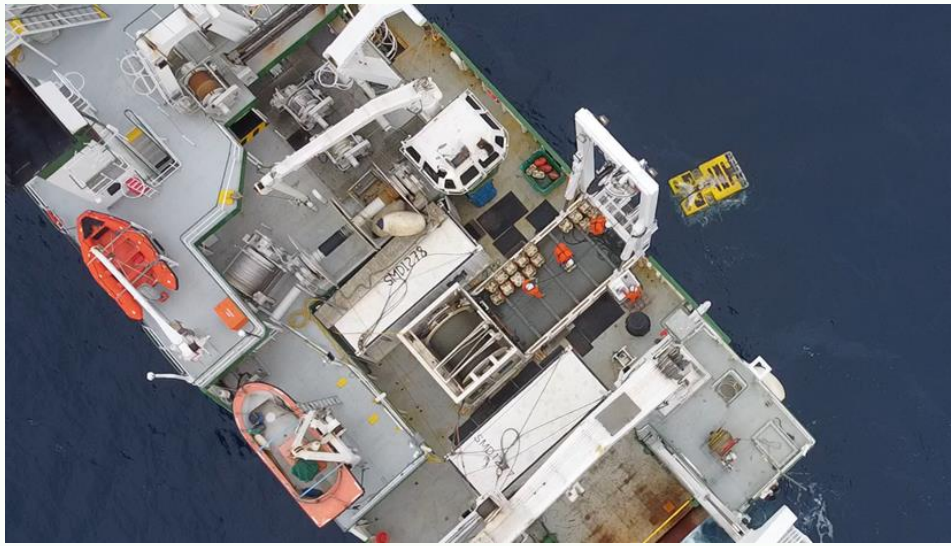


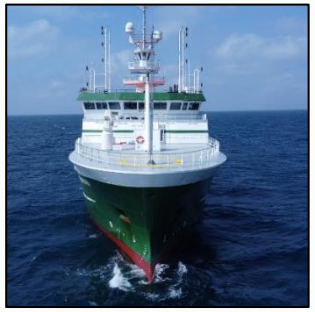




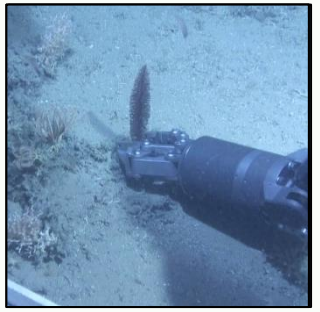

Shortcomings of existing vessel

- Ice class: Current vessel has lightest ice class (LR 1D) which has been restrictive in the operations the vessel has undertaken recently
- Heave compensation : No active heave compensation on key winches (E.G. ctd) . Current system uses Spring compensation which is ineffective >3000m Water depth and in higher sea states
- Fuel consumption/Harbour generator : vessel is not equipped for shore power and has no harbour generator consequent high fuel consumption in port/ high emissions
- Limited space onboard and “blocking” of other activities when ROV mobilised
- Berths : Limited berths in many cases , also limited in terms of crew berths , often no space for cadets, trainees etc
- Vessel has double berths for crew , no longer acceptable



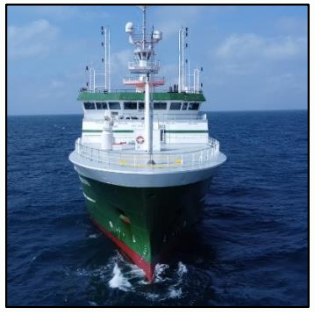




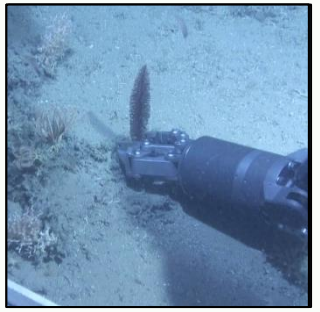



Shortcomings of existing vessel

- Fuel type: Current vessel uses MGO and a % of HVO , No option to utilise Methanol or future fuels , Future vessel can address this or be optimised to avail of future fuels
- Fuel consumption, whilst relatively efficient the vessel is 22 years old and a modern design can be optimised to minimise efficiency of vessel on both hotel and propulsion side.
- No proper ships tender deployable in higher sea states
- Whilst many systems e.g. Marine Automation system , DP system Circuit breakers etc have been upgraded to avoid obsolescence many other systems and equipment are approaching or in obsolescence phase and options not available for upgrade

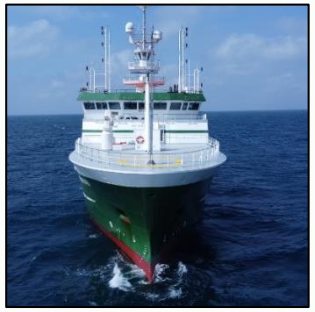




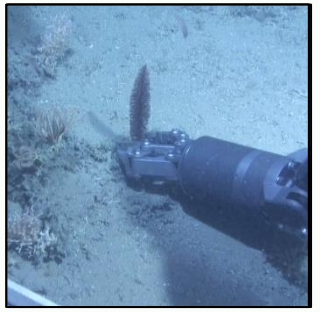



New vessel methodology

- Celtic Explorer and Tom Crean were all acquired through appointment of a designer followed by procurement of a construction yard to construct vessel to completed design .
- This model has worked well so the procurement process will follow the following sequence
- 1. tender for designer,: 3 phases with 1. initial design , then2. basic design for construction process followed by 3. detailed design for construction phase/ construction supervision
- 2. construction tender based on basic design , after signing of construction contract detailed design phase commences
- ***NEW:*** design review phase after construction contract award to allow relevant suggestions/ design changes from yard

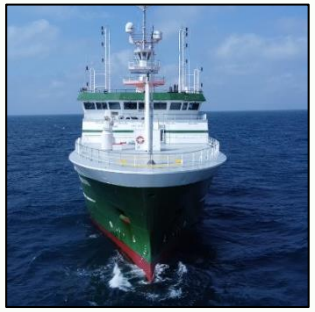




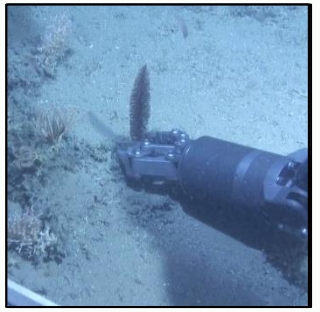



Lessons from Tom Crean

Tom Crean was built using the design, procure, build model… worked very well
Vessel was a replacement for a smaller regional vessel
What went right with design : comfortable working spaces, comfortable communal spaces , well designed scientific equipment installation , excellent drop keel , excellent hull mounted transducers, no bubbles! Multipurpose aft deck, excellent visibility , Amazing sea keeping (roll), excellent DP performance/ station keeping , low hotel load , low harbour energy usage. HVO usage, Excellent CTD Hangar , AHC works well
Bow jet/ single screw/ stern truster a good solution for DP/Passage/ ICES 209
separate Harbour set engine room.
What we could have done better: More single cabins for crew, more single /larger cabins for scientists , should have moved some technical spaces into " lower value" spaces e.g. ECR, laundry, winch drives ..
Could have slightly larger science spaces….
But would have probably required a larger vessel
Fuel consumption on faster passages is a little high , Vessel can be "pitchy " in higher head seas

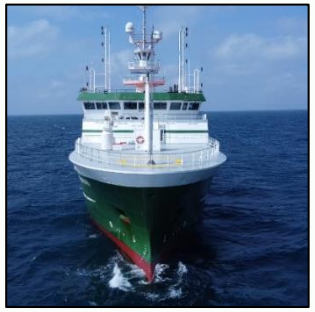




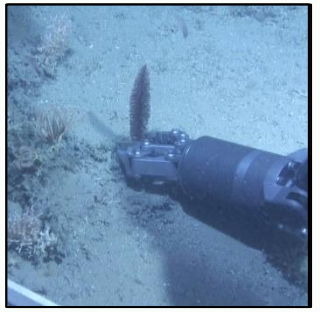



Lessons/requirements applied to new vessel

- New vessel will require more Cabins: 30 scientists and 15 crew, 15 single cabins for crew and a mix of singles/doubles for Scientists
- Require larger science spaces
- Accommodation for Lab containers without compromising aft deck functionality
- Enclosed CTD area
- Ideally enclosed / integrated ROV winch and A frame (control van can be 20') (keep deck functionality)
- Ice Class 1 B
- Design for fuel efficiency at passage speeds: Hydrodynamic/ aerodynamic
- Focus on Hotel load minimisation/ shore power and smaller harbour set
- No Bulbous bow/No Bubbles!
- DP2
- Enclosed tender operated from heave compensated davitt
- Electric and Heave compensated winches

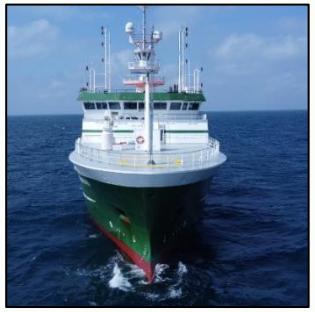




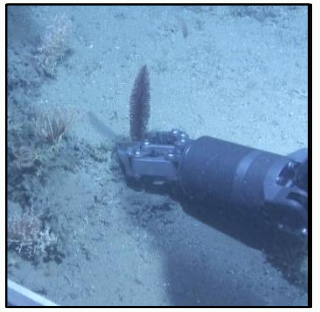



Requirements new vessel

- Good seakeeping essential
- Larger vessel required for operations in Mid Atlantic
- Ability to utilse or be converted to Future Fuel? E.g Tanks/ Nitrogen for methanol?
- Dual fuel engines/ ability to exchange engines ?
- Incorporate solar/ wind?
- Maintenance Hatches sized to overhaul / replace large components
- Special purpose ship? (Issues with Flag) Excessive beam? Excessive cost?
- 15 Crew for normal 24 hour operations
- Stainless steel piping ondeck, plastic piping where able
- Plan for the future , wiring installed, space for wiring / technical spaces …
- 2 x Drop keels , Retraction units for USBL , Multibeam ….
- Big multipurpose aft deck
- Bridge more forward to allow extra accomodation./ larger aft deck ?



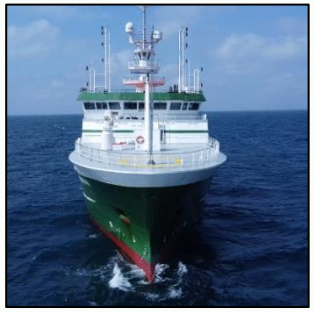




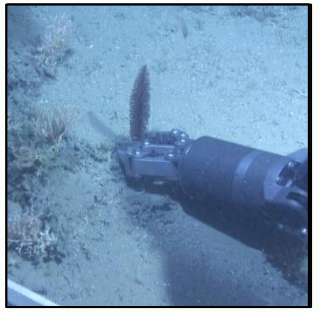

So what will it look like ?

Final product may be a little smaller and less fancy then CHAT GPT imagines!
Budget will be a constraint….
Vessel will naturally be longer due Cabins, Integrated ROV, more integrated Container storage/ This will also aid seakeeping

- c.75m -80 long?
- 3 x 1.6MW Diesel+ 400KVA Harbour set
- 3 MW prop motor/Pump Jet/Stern Thruster
- Beam? 15- 16 m
- Sps??
- DP2





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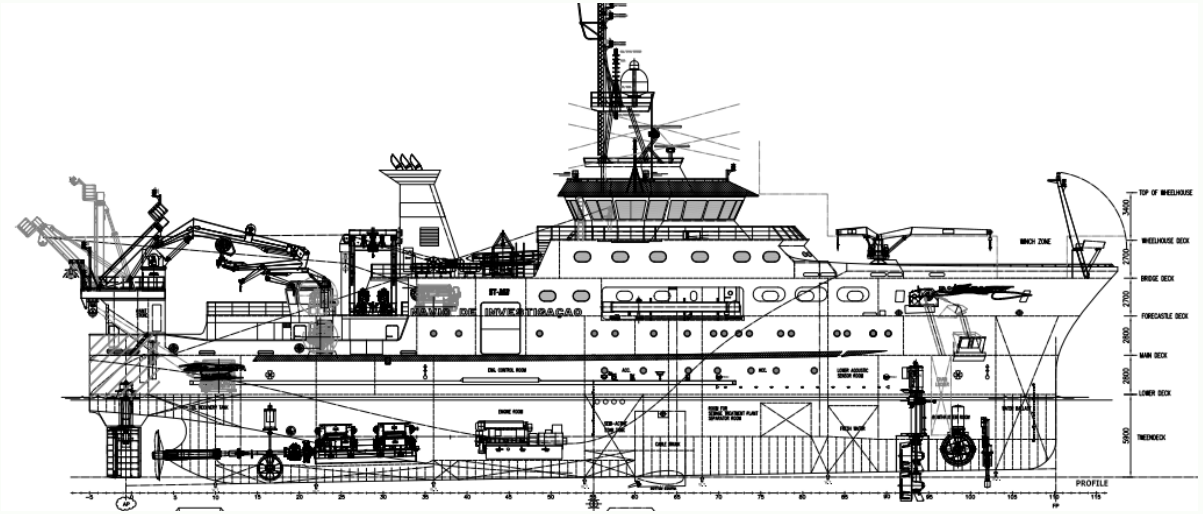

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