Challenges and solutions for integrating ships and boats

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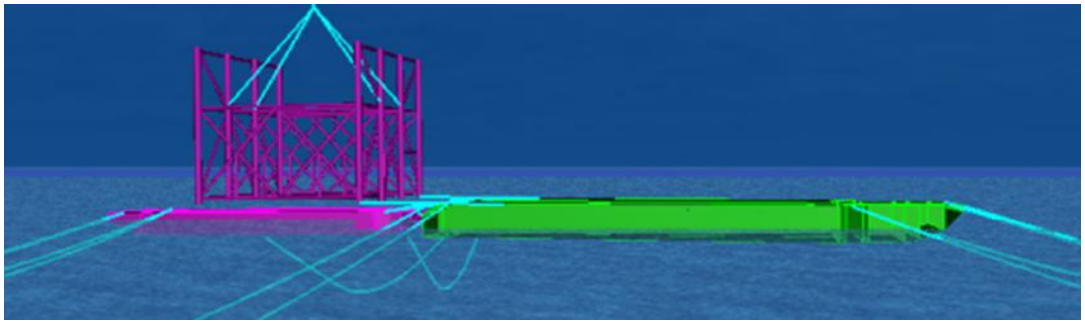
BAE Systems Small Boats

- Specialist military craft 6m – 18m
- New build and through-life support
- Halmatic legacy products

LOC/ Longitude Engineering

- London Offshore Consultants established 1979
- Casualty investigation, Survey, Expert witness – wide services
- 200+ Engineers and Master Mariners
- 20+ offices worldwide

- Longitude Engineering established 2006
- Design, analysis, mooring, structures, stability, conversions
- 40+ Engineers
- 5 offices worldwide



Longitude Engineering – Small Craft/ Defence

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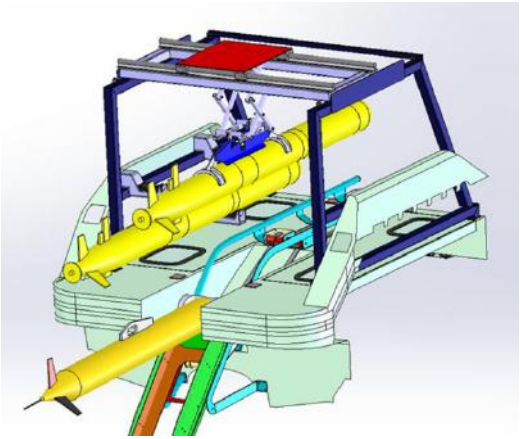
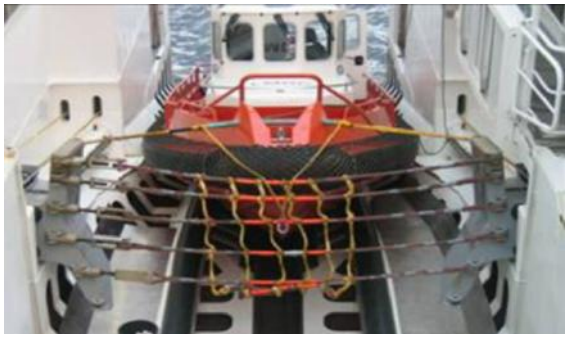
Engineering

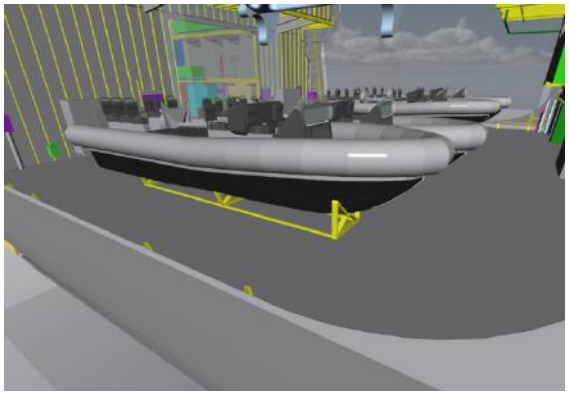
- Established in 2012
  - Independent engineering support
  - Special marine projects
  - Engineering project management
  - Concept and detailed design
  - Naval Architecture
  - Product development and bid support
  - Application of new technologies
- Focus on small and medium sized vessels
- Military, commercial and rescue backgrounds
- Boats-ships-equipment-operations-environment



Scope of presentation

- Routinely performed across the maritime industry
- Potentially hazardous evolution
- Various approaches are available for launch and recovery
- Safe systems must be ensured
- Repeatable and predictable evolution
- Meet operational requirement
- Cope with environmental conditions
- Time and cost efficient
- 3 x case studies – common issues and potential solutions





Case study 1: Basic Davit systems

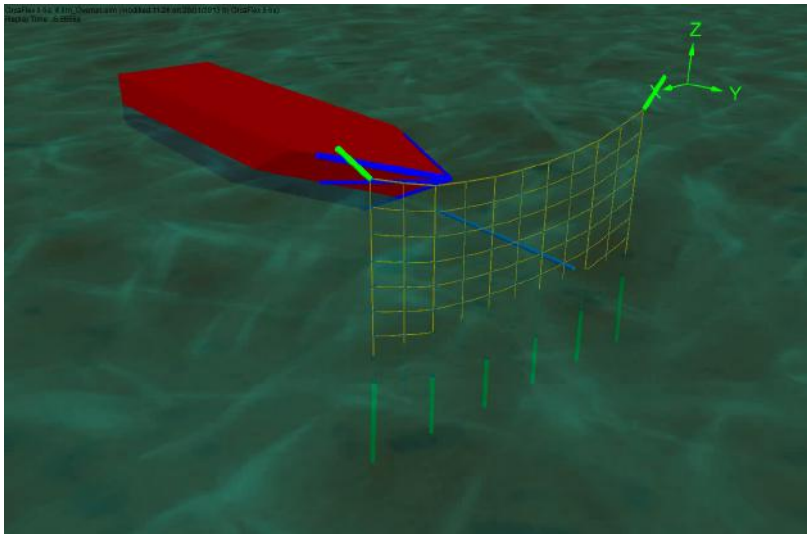
- Often different providers for boat/ davit/ ship
- Davit and boat may not match
- Solution can be constrained by ship decisions made prior to the boat/ davit selection
- Development/ purchase cost vs functionality can be driven by procurement
- A single davit type may not suit across a fleet of ships
- Through life changes effect system

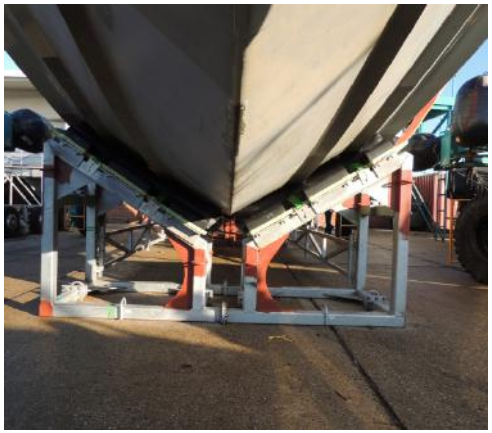
- Potential for damage to craft
- Potential for human error and crew injury

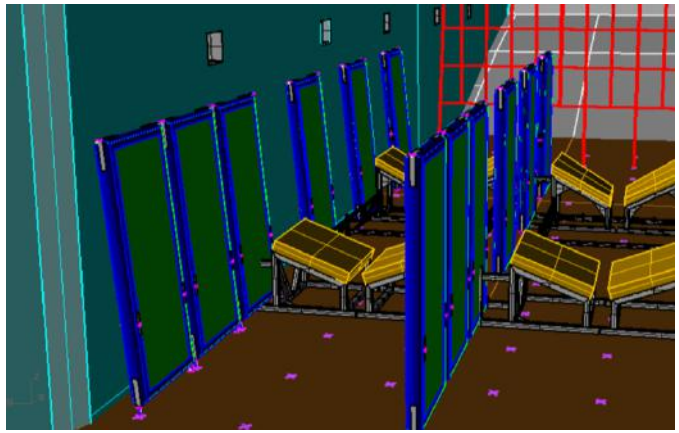
- Develop design as an integrated system
- Design for safety

Case study 2: Military docking system

- Very onerous docking system requirement
- High speeds, low space envelopes, craft size and weight, high sea states
- Critical dynamic load prediction
- Innovative concept and detailed solutions required
- Integration of ship, boats, crews and equipment
- Design for Safety – risk mitigation
- Composite structural analysis

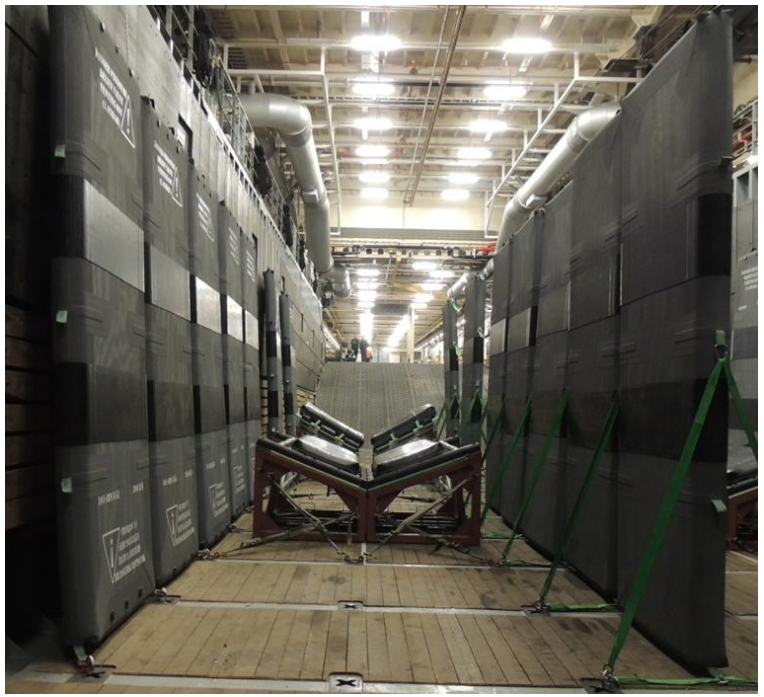


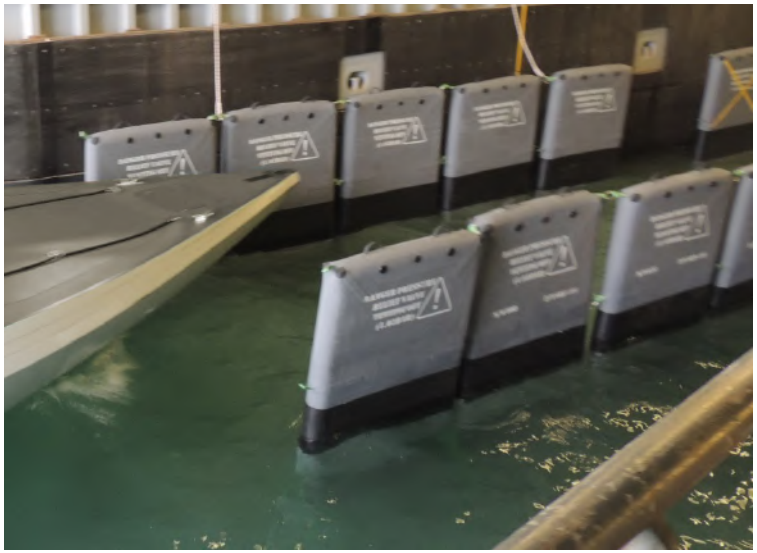




Case study 2: Military docking system

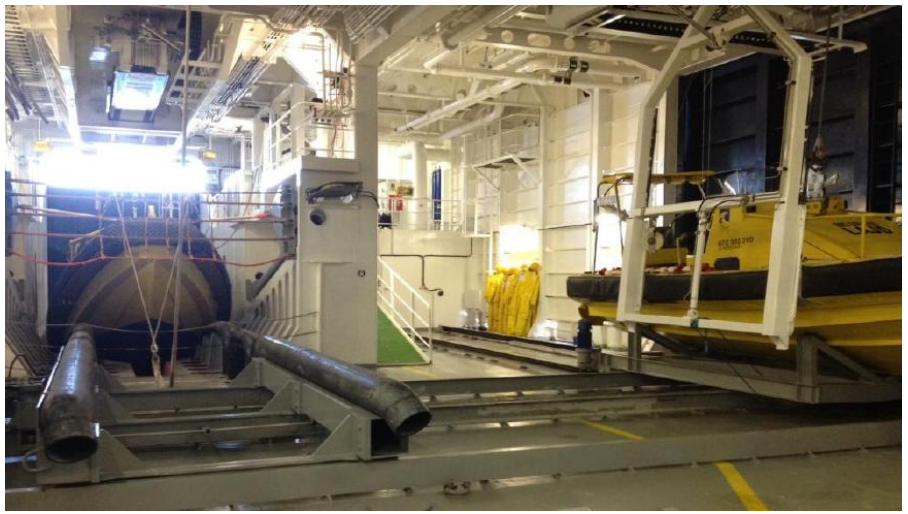
- Significant new capability in 5 months
- Deployable containerised system, with through-life support
- Cost effective, modular design
- Patented solution and inherent technologies
- Advanced inflatables, impact limiting technology
- Wider applications





Case study 3: Offshore rescue systems

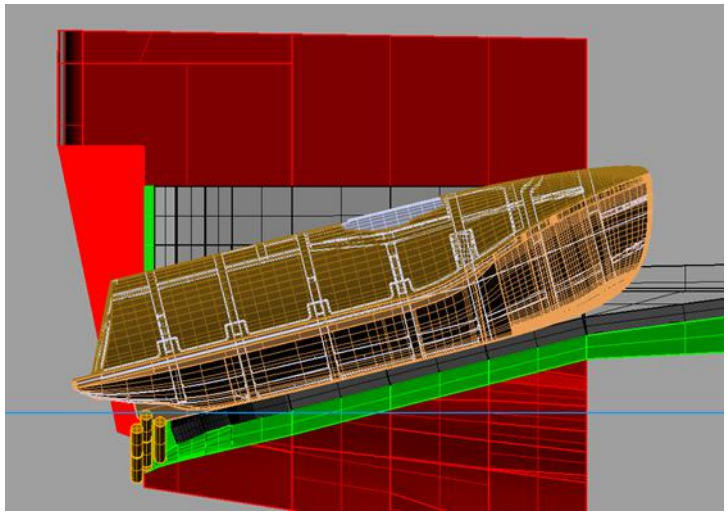
- Extreme offshore operational requirement
- FPSO lifeboat (TEMPSC) recovery to ERRV
- 15m+ craft, 70 people, 6.5m+ significant wave heights, 75+ miles offshore
- Limited crew capability – unmanned similarities
- Stern ramp cost-benefit-capability study
- Sea state assessment
- Sequencing and recovery times
- HAZID – risk reduction, safety critical
- Operational assessment with Seacroft Marine



Risk Classification A – Intolerable B – Undesirable C – Tolerable D – Broadly Acceptable				Total loss of capability Boat not repairable Mission aborted	Loss of capability but repairable with help Partial loss of mission	Loss of capability repairable in situ	Minor restriction of capability	Some damage but no effect on capability
				More than 100 deaths	10 to 100 Deaths	1 to 10 deaths	Permanent RIDDOR	Recoverable RIDDOR	Non – RIDDOR
Frequency Definition	Accident Frequency	Accident Frequency for Group at most risk	Catastrophic	Disastrous	Critical	Major	Marginal	Negligible
Repeatedly	Frequent	>10⁻¹	A	A	A	A	A	C
From time to time	Probable	10⁻¹ – 10⁻²	A	A	A	A	B	C
Once during its life	Occasional	10⁻² – 10⁻³	A	A	A	B	C	D
Unlikely during its life	Remote	10⁻³ – 10⁻⁴	A	A	B	C	C	D
Very unlikely during its life	Improbable	10⁻⁴ – 10⁻⁵	A	B	C	C	D	D
Extremely unlikely during its life	Highly Improbable	10⁻⁵ – 10⁻⁶	B	C	C	D	D	D
Extremely rare event	Incredible	<10⁻⁶	C	D	D	D	D	D

Case study 3: Offshore rescue systems

- Initial design activities
- Determine relative motions – simulation tools
- Load prediction – connections, interfaces, dynamic effects when connected
- Design for connection - similarities with unmanned vessels
- TEMPSC structural integrity for recovery impacts
- Ramp interaction technologies for boat protection
- Potential design implications for Emergency Response and Rescue Vessels



Ongoing developments

- Larger commercial daughter craft operating further offshore, in higher sea states
- Increased automation and unmanned systems
- Greater system flexibility required for a range of craft
- Military boat platforms more focussed on offensive roles
- Collaboration between navies – interoperability of boats and systems (cross decking boats)
- Modularity required for ships, boats and systems
- Use of vessels of opportunity

- Bring together shipyard, boat provider, davit supplier and operators: integrated approach to design
- Boat-focused ship design
- Autonomous systems to react to dynamics of recovery
- Development of offshore rescue craft recovery systems
- Challenges of crew training

Thank you – any questions?

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