

Executive Summary

This report results from a one-day workshop to assist the Technology Strategy Board, BIS, UK Marine Industries Alliance and the Transport KTN to develop a roadmap to identify future priority opportunities and capability needs for the UK Marine Industries. The workshop was the fourth of five “Deep Dive” explorations of the sector, focussing on Shipbuilding and Repair. The workshop took place in Bristol on 16 November 2011, with input from over 20 experts drawn from across the Marine Industry, academia and other stakeholders. The workshop took a sub-set of the landscape roadmap, developed in June 2011, which was then developed further to identify priority trends & drivers and then to identify and characterise around 40 Market Opportunities in Shipbuilding and Repair.

Participants contributed before the workshop by providing their perspectives in a roadmap template – identifying priority Drivers, Opportunities, Capabilities and Enablers in the Short, Medium and Long timeframes. These were consolidated ahead of the workshop to provide a start point to which further issues were added and priorities identified. The most important market opportunities were then highlighted, where UK capability could deliver against major global market needs. These assessments were based on defined criteria for Value (global & UK market, competitive strength, added value and impact on societal and environmental challenges) and Capability (in the marine industry, academia, research organisations and from adjacent industries – see Appendix C for details.)

In prioritising relevant Trends & Drivers (see section 1), there was a strong emphasis on energy & fuel scarcity/cost, EU regulations and climate change mitigation all driving the need for low carbon / “green” shipping with reduced fuel consumption, requiring new propulsion energy solutions. Skills shortage (and prevention of further loss of scarce skills) was seen as a key challenge, particularly at a time of economic downturn, declining UK Naval market and resulting pressure on initial and through life costs. Responses to these would see an increased demand for autonomous systems and new business models around through life support & servitisation. The changing nature of military threat and other security risks (eg piracy) would see a need for more versatile, agile and reconfigurable systems. Increasing global (& low cost) competition might result in increasing international collaboration, particularly at an EU level.

Executive Summary (continued)

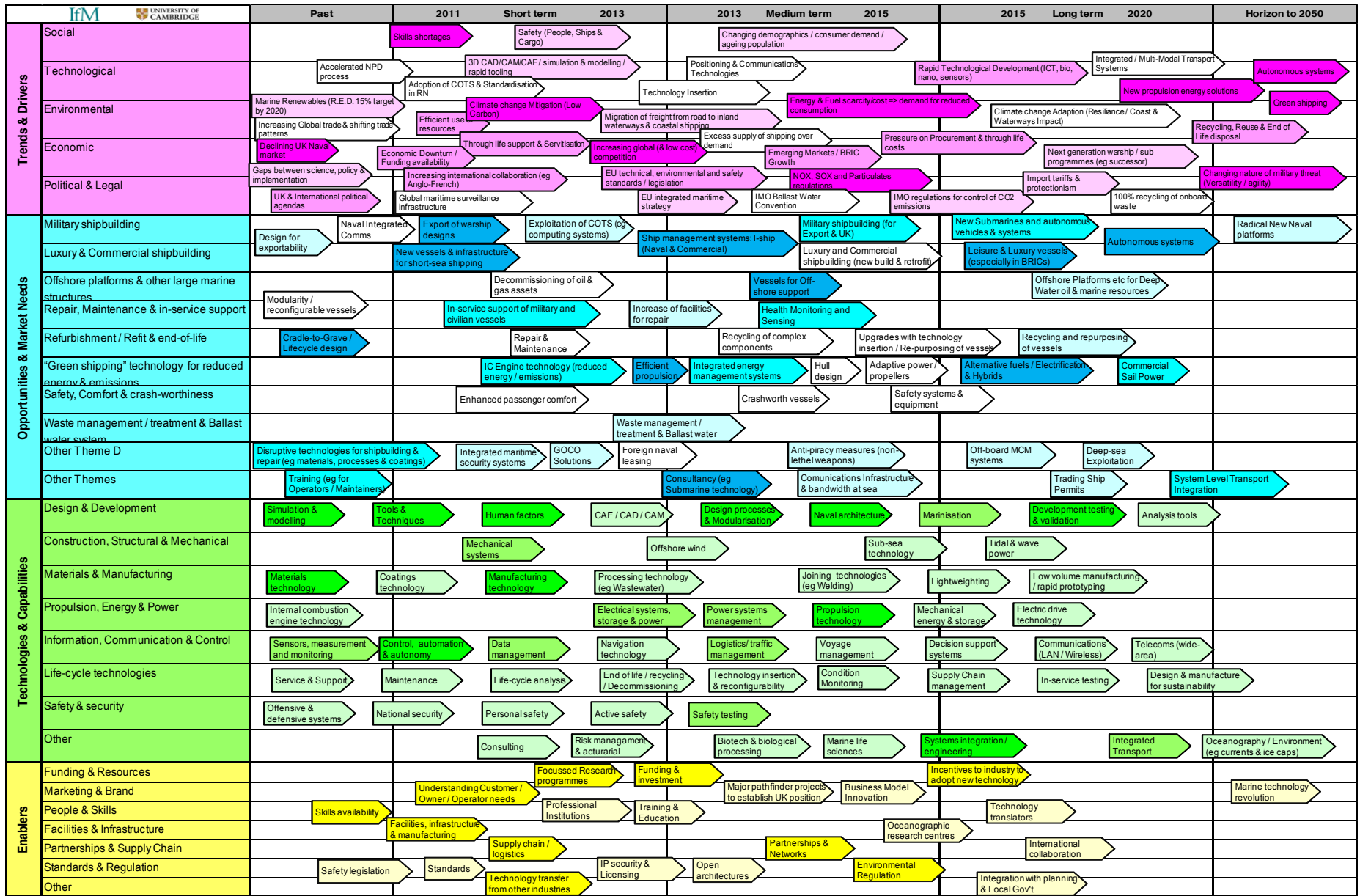
Priority Opportunities (see section 4) were identified across a range of areas, though largely focussed on design and ship systems / equipment rather than build (due to the relative lack of capacity in UK for manufacturing large vessels). The leading opportunities included alternative fuels / electrification & hybrids (including commercial sail); efficient propulsion & energy management; optimised multi-modal transport including short-sea shipping; vessels for offshore support; unmanned autonomous vehicles; export of warship designs & military ships; in-service support of military and civilian vessels (incl. lifecycle design); new submarines (military & commercial including for deep-sea exploration). Opportunities for consultancy (eg Green ship services); luxury, commercial and leisure vessels (especially for BRIC markets); ship management systems: I-ship; and training (eg for operators / maintainers) were also prioritised but have already been explored in earlier workshops.

Of these opportunities, the first eight were explored in more detail – to characterise the market value and identify relevant sources of UK capability for delivery (and potential gaps that will need to be filled – see section 7)

In support of these opportunities, a wide range of capabilities were identified from within the Marine Industries but also in academia and research organisations. The most relevant areas of capability to support these market opportunities were: naval architecture, systems integration / engineering; simulation & modelling; tools & techniques; human factors; materials technology ;development testing & validation; control, automation & autonomy; design processes & modularisation; manufacturing technology and propulsion technology

The workshop also identified other key enablers for success, underpinning these capabilities as: funding & investment ; understanding customer / owner / operator needs; skills availability; environmental regulation; facilities, infrastructure & manufacturing capacity; focussed research programmes; supply chain / logistics; partnerships & networks; incentives to industry to adopt new technology and technology transfer from other industries.

1. Roadmap Landscape



3. Priority Market Opportunities (summary)

Opportunities		Market Attractiveness:					Triple bottom-line		Value	Fit with UK Capability					Fit	Total	
		Global Market Size	Home (UK) market size	Strength of competition	Added Value / Margin	Cross-sector opportunity	Planet / Environmental	People / Societal		Weighted Value	Marine Industry	University / Academic	RTO / Design Services	Other Industry			Other UK resources
A	Alternative fuels, Electrification & Hybrids including Sail	4	3	3	3	4	4	3		2	2	3	3	3.5	2		
B	Efficient Propulsion & Energy Management	4	2	1	1	0	3	3		2	3	3	3	4	1		
C	Optimised Marine Transportation (inc Short Sea Shipping)	4	3	1.5	0	2	2.5	2.5		1.5	3	1.5	1.5	0	1		
D	Offshore Support Vessels	4	3.5	1.5	1.5	3	2	2.5		2	2.5	1.5	0	0	1.5		
E	Unmanned vehicles operated from / instead of ships	3	1	1.5	3	2	1	3		2.5	2.5	1	2	1	1		
F	Export Naval Ship Design & (surface) Military ships	4	1.5	1.5	3.5	2	3	3		3	3.5	3	3.5	3.5	1.5		
G	In Service Support of Ships & lifecycle design & systems	3	1	2	2	3	2	3		2	1	1	2	1	1		
H	New Submarines & U/W Systems	4	3	1	3.5	3	2	3		3	1	1	3	1	3		

Key: **Black text – original team input**
Red text – carousel group comments

4. Capability - Ranked

Capabilities		A	B	C	D	E	F	G	H	Total
		Alternative fuels, Electrification & Hybrids including Sail	Efficient Propulsion & Energy Management	Optimised Marine Transportation (inc Short Sea Shipping)	Offshore Support Vessels	Unmanned vehicles operated from / instead of ships	Export Naval Ship Design & (surface) Military ships	In Service Support of Ships & lifecycle design & systems	New Submarines & U/W Systems	
Ranked capabilities (top-level grouping)										
A Total	Design & Development									
I Total	Information, Communication & Control									
M Total	Materials & Manufacturing									
L Total	Life-cycle technologies									
P Total	Propulsion, Energy & Power									
O Total	Other									
C Total	Construction, Structural & Mechanical									
S Total	Safety & security									
Ranked capabilities (detail)										
A6	Naval architecture	3	3	1	3	2	3	1	3	
O7	Systems integration / engineering	3	3	0	2	3	3	3	2	
A1	Simulation & modelling	3	3	3	0	2	0	3	2	
A2	Tools & Techniques	3	3	1	0	0	3	2	2	
A3	Human factors	3	1	0	3	1	2	2	1	
M1	Materials technology	3	3	0	0	3	2	3	1	
A8	Development testing & validation	3	3	0	0	3	2	1	2	
I2	Control, automation & autonomy	3	3	0	2	3	0	3	3	
A5	Design processes & Modularisation	3	2	0	0	0	3	2	0	
M3	Manufacturing technology	0	3	0	2	0	3	1	1	
P6	Propulsion technology	0	2	0	1	2	3	1	2	
I5	Logistics/ traffic management	0	2	3	0	1	0	2	1	
P2	Electric drive technology	3	2	0	0	0	2	1	2	
S5	Safety testing	3	1	0	2	2	0	3	3	
C1	Mechanical systems	3	2	0	2	0	0	2	2	
P5	Power systems management	3	3	0	0	2	0	2	3	
O5	Integrated Transport Systems	0	2	3	0	0	0	0	0	
I1	Sensors, measurement and monitoring technology	0	3	0	2	3	0	3	3	
A7	Marinisation	3	1	0	0	0	2	1	0	
I3	Data management	3	3	0	0	3	0	3	1	