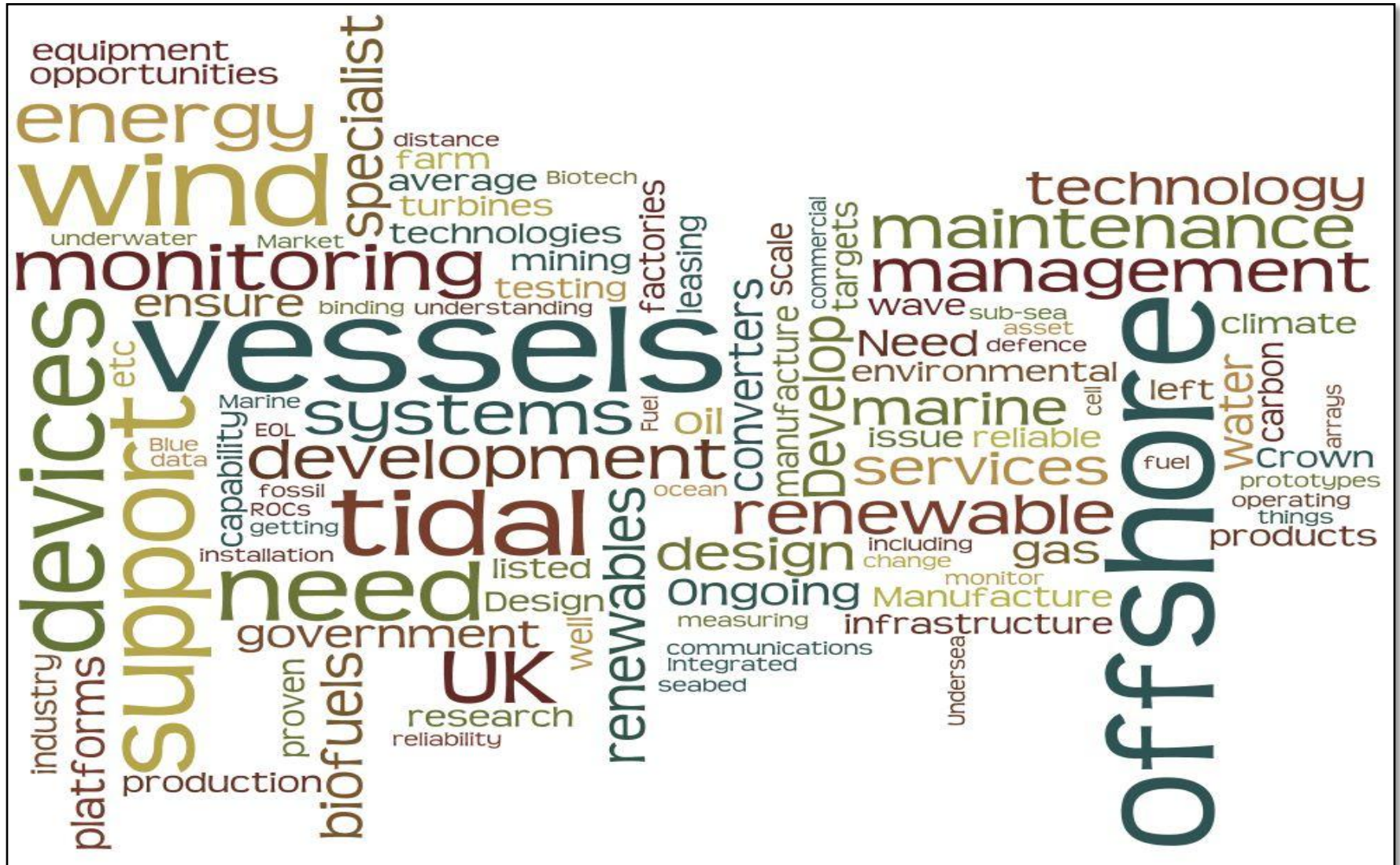


UK Marine Industries Roadmap & Capability Study

Workshop B: Offshore Renewables & Marine Resources, 1 November 2011



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 second of five “Deep Dive” explorations of the sector, focussing on Renewables and Marine Resources. The workshop took place at the University of Strathclyde on 1 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 Renewables and Marine Resources.

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 scarcity and the needs to mitigate and adapt to climate change, driving the importance of renewables; and the importance of government policy (joined up between departments and across the UK) directing funding, incentives and regulation in creating an environment where public and private funding will be directed at to this area. Challenges around cost-effectiveness and through-life costs need to be overcome but the potential impact in delivering UK leadership in this key area of the “Green Economy” was seen as tremendous.

Executive Summary (continued)

Priority Opportunities (see section 4) were identified across a range of areas, though largely focussed on renewables. The leading opportunities included: Logistics, services, asset management & operation for offshore renewables (inc new business models); Grid integration & electrical systems; Deep Water - extending operations into more challenging locales; Underwater sensors & monitoring systems; Specialist vessels for offshore renewables construction/support; Technology for and construction of affordable & reliable wind, wave & tidal power devices; Submarines and autonomous vehicles; and Integration of offshore renewable assets at the "Power station" / systems level. Opportunities for other marine resources were highlighted, including marine biofuels; mariculture; blue-biotech and underwater extraction / factories; however these were not highly prioritised as the necessary expertise were under-represented in the workshop participants.

Of these opportunities, the first six 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: Simulation & modelling; Control, automation & autonomy; Sensors, measurement and monitoring technology; Data management; Condition Monitoring; Systems integration / engineering; Sub-sea technology; Service & Support; Maintenance; and Decision support systems.

The workshop also identified other key enablers for success, underpinning these capabilities as: Facilities, infrastructure & manufacturing capacity; Funding & investment; Supply chain / logistics; Skills availability; Training & Education; Partnerships & Networks; Major pathfinder projects to establish UK position; and Technology transfer from other industries

2. Landscape Linkages

Trends & Drivers												Capabilities																				Enablers																																
Efficient use of resources	Energy & Fuel scarcity/cost => demand for reduced consumption	Safety (People, Ships & Cargo)	Through life support & Servitisation	Autonomous systems	Pressure on Procurement & through life costs	Marine Renewables (R.E.D. 15% target by 2020)	Sea level rise, acidification, increasing temp & extreme weather	"Green Economy": environment as a business opportunity	Green shipping	Climate change Mitigation (Low Carbon)	New propulsion energy solutions		Simulation & modelling	Control, automation & autonomy	Sensors, measurement and monitoring technology	Data management	Condition Monitoring	Systems integration / engineering	Sub-sea technology	Service & Support	Maintenance	Decision support systems	Development testing & validation	Analysis tools	Electric drive technology	Human factors	Supply Chain management	Power systems management	Joining technologies (eg Welding)	Consulting	Oceanography / Environment (eg currents & ice caps)	Electrical systems, storage & power infrastructure	Facilities, infrastructure & manufacturing capacity	Funding & investment	Supply chain / logistics	Skills availability	Training & Education	Partnerships & Networks	Major Pathfinder projects to establish UK position	Technology transfer from other industries	Standards	Incentives to industry to adopt new technology	Integration with planning & Local Gov't	Focussed Research programmes																				
1	2	3	4	5	6	7	8	9	10	11	12	Market Opportunities												1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12									
1		1	1	1	1							A	Logistics & Services for Offshore Renewable Operations	5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	56									
1	1				1		1					B	Grid Integration & Electrical Systems (inc Power Station Scale Ops)	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	1	2	3	3		1	3	2	3	1	3	1	3	1	1	1			1	1	1			1	1		1	1	56			
	1								1			C	Deep Water - 760m? (Extending operations to more challenging geographies) Offshore wind	2	3	3	3	3	3	3	2	2	2	2	3	3	3	3	3	3	3	2	3	2	3	2	3	1	3	1	1	1	1			1	1	1			1	1			1			1		1	63			
1	1	1	1	1	1		1	1				D	Sensors/Monitoring & Autonomous underwater vehicles	8	3	3	3	3	3	3	3				3	3																													1					1			1	33
1									1		1	E	Specialist Vessels for offshore renewables construction support	3	3	2			1			3	2					2	3	2	2	3				2	1	1				1	1	1				1					1					1			31			
1					1	1						F	Technology for wind, wave & tidal power (more affordable & reliable)	3	3	3	3	3	3	3	3	3	3					3	3	3		3	3	1			3	3	1	1	1	1	1	1									1								1		55	
5	3	2	2	2	2	2	2	2	1	1	1													18	17	15	15	16	15	14	14	13	10	11	12	13	9	12	11	11	9	8	11	6	6	4	4	3	3	3	3	2	2	2	2	2								

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	Logistics & Services for Offshore Renewable Operations	4	4	2	4	2.5	2	3		4	2.5	3	4	3.5	3		
B	Grid Integration & Electrical Systems (inc Power Station Scale Ops)	4	4	1	1	0	3	1		3	3	3	2	1	3		
C	Deep Water - 760m? (Extending operations to more challenging geographies) Offshore wind	4	4	1	1	4	2	3		3	4	4	2	1	2		
D1	Sensors/Monitoring	2	1	1	3	3	3	2		2	2	2	3	4	1		
D2	Autonomous/Underwater Vehicles	2	1	2	3	1	1	1		1	1	2	4	4	1		
E	Specialist Vessels for offshore renewables construction support	4	3	1	1	0	1	3		2	3	3.5	1	3	1		
F	Technology for wind, wave & tidal power (more affordable & reliable)	4	4	2	3	1.5	3	2		3	4	4	3	3	2		

See over for outputs from breakout group exploration of Priority Market Opportunities.

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

4. Capability - Ranked

Capabilities	A	B	C	D	E	F	G	TOTAL Theme A Marine Services & ICT
	Marine Consulting (Submarine)	Ship Management Systems - I-ships	Training & Education incl. Virtual training	In-service Support of Military & Civilian Assets	Marine ICT & Information Infrastructure	Decision Support Services	Marine & Coastal Environmental Services	

Ranked capabilities (top-level grouping)								
I Total	Information, Communication & Control							
A Total	Design & Development							
L Total	Life-cycle technologies							
O Total	Other							
P Total	Propulsion, Energy & Power							
M Total	Materials & Manufacturing							
C Total	Construction, Structural & Mechanical							
S Total	Safety & security							

Ranked capabilities (detail)								
A1	Simulation & modelling	3	3	3	3	3	3	3
I2	Control, automation & autonomy	3	3	3	3	2	3	2
I1	Sensors, measurement and monitoring technology	3	3	3	3	0	3	3
I3	Data management	3	3	3	3	0	3	3
L6	Condition Monitoring	3	3	3	3	1	3	1
O7	Systems integration / engineering	3	3	3	3	0	3	2
C4	Sub-sea technology	3	3	2	3	0	3	2
L1	Service & Support	3	3	2	0	3	3	2
L2	Maintenance	3	3	2	0	2	3	2
I7	Decision support systems	3	1	3	3	0	0	3
A8	Development testing & validation	0	2	3	3	0	3	2
A9	Analysis tools	3	3	3	0	0	3	3
P2	Electric drive technology	0	3	3	2	2	3	0
A3	Human factors	3	0	3	0	3	0	2
L7	Supply Chain management	3	1	3	0	2	3	0
P5	Power systems management	0	3	3	0	2	3	1
M5	Joining technologies (eg Welding)	3	2	2	0	3	1	0
O3	Consulting	3	3	3	0	0	0	3
O6	Oceanography / Environment (eg currents & ice caps)	2	1	2	0	0	3	3
P4	Electrical systems, storage & power infrastructure	0	3	3	0	2	3	0