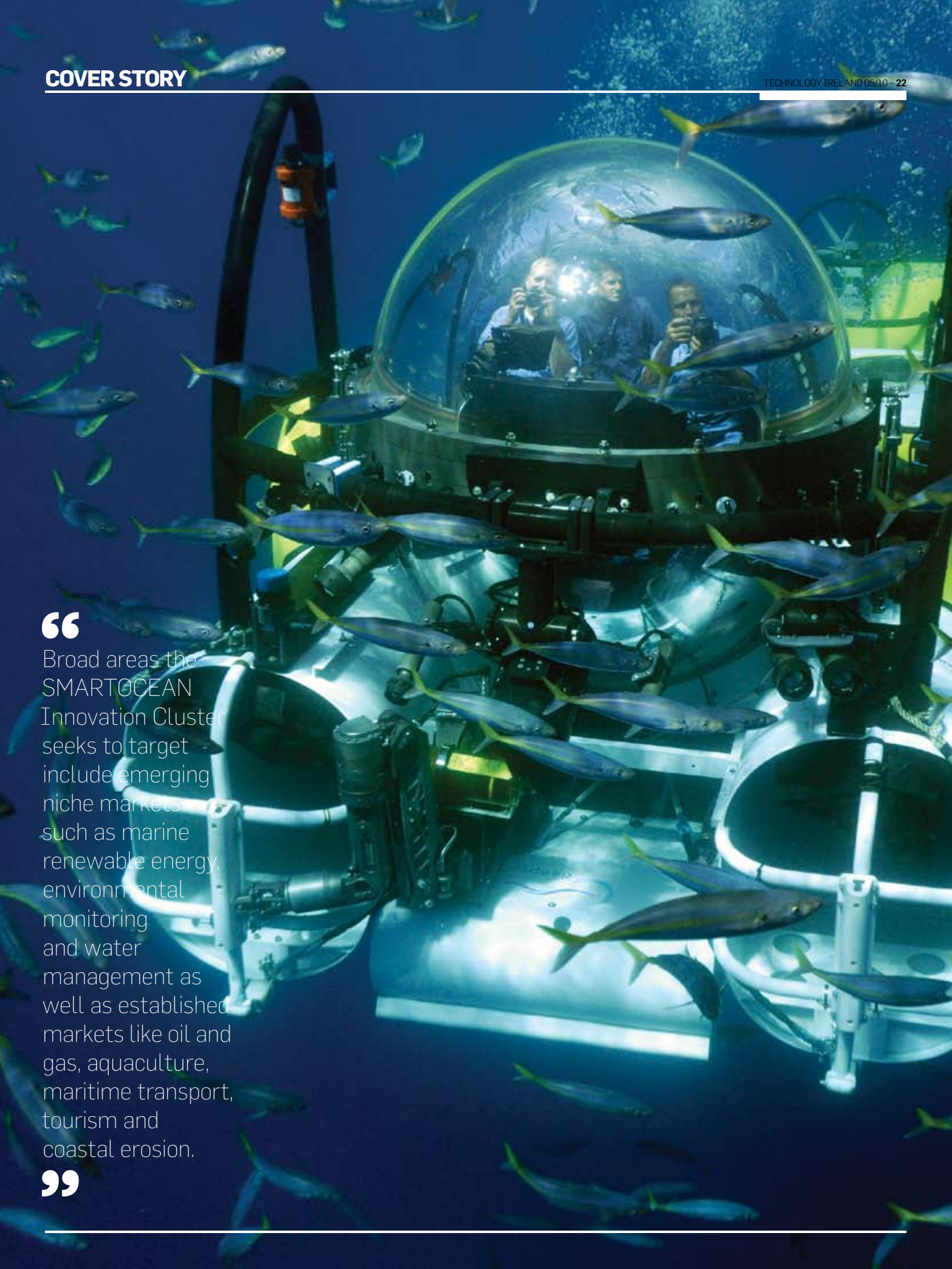


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Anthony King reports on Irish innovation in the ocean, and a new strategy and innovation cluster seeking to marry our marine resources with established ICT capability.

DIVING IN TO OCEAN INNOVATION

Ireland has an ocean territory ten times the area of its landmass. While the full exploitation of our fishing potential has frustratingly been hamstrung by ground ceded during early EU negotiations, a new strategy aims to open a fresh chapter on marine exploitation, by establishing ocean innovation as a possible 'game changer' for Ireland. The SMARTOCEAN Innovation Cluster Strategy, launched for consultation in Galway last month, aims to bring together existing ICT knowhow and significant science and technology investments in our 220 million acre marine environment to develop new products and services for global markets.

At the Galway workshop, Professor John Delaney, an oceanographer at the University of Washington, told attendees that ocean exploration was on the threshold of a new era. "About 3,000 plus years ago, we began using ships to cross the ocean and study the ocean; in 1957 the second major tool was added, the satellite," he said. "Now for the first time ever, humans are on the threshold of entering the oceans comprehensively, volumetrically and interactively."

The US government has invested \$700 million in ocean measurements, with a goal to launch a scientific era of discovery utilising interactive telepresence, said Delaney. "There is a technological convergence taking place that will

allow humans to be interactive throughout the oceans; it is not just a camera somewhere in the oceans. This is a distributed sensor network that is constantly communicating at the speed of light with humans on land. This is very powerful. It is time for boldness, ability and bandwidth." He told the audience that the technological challenges are global and will not yield to national solutions.

Aiming to put Ireland at the hub of ocean innovation, the SMARTOCEAN Innovation Strategy seeks to bring together a cluster of expertise, involving government bodies, universities, multinationals and SMEs in this country. Among the current areas of activity is the Advanced Marine Technology Research Programme, co-ordinated by the Marine Institute in association with the National Centre for Sensor Research (NCSR) in Dublin City University (DCU) and a range of industry and research partners. Its aims include creating an industry-oriented research grouping in the field of sensors, intelligent systems and sensor platforms. Facilities at their disposal include SmartBay, a network of sensors on various platforms, including buoys, seafloor cables and tidal gauges in Galway Bay, plus a further set of test platforms in bays, coasts and oceans around Ireland, providing environmental test and demonstration platforms to trial and showcase new concepts, equipment, technologies and solutions in real-life situations.

Cathx Ocean has developed a new high-tech torch for divers.



"We are particularly interested in identifying SMEs that have core capabilities in the areas of distributed sensing, wireless sensor networks, data management and data visualisations," Dr Barbara Fogarty, national co-ordinator of Advanced Marine Technologies told *Technology Ireland*. We want to develop new opportunities for industry and for researchers to apply ICT to marine environments, she said, stressing that prior experience in marine environments was not necessary.

For example, the computer giant IBM is now trialling a package used in financial markets, using the SmartBay facility, as there is an opportunity to deploy the data management capability in the marine environment. Another company using the national network of marine buoys operated by the Marine Institute is Nowcasting, which has been providing high-resolution weather forecasts to the oil and gas sector for the past ten years. Others involved in the Advanced Marine Technology Research Programme include EpiSensor, InTune Networks and Biospheric Engineering.

WHATEVER FLOATS YOUR BOAT Broad areas the SMARTOCEAN Innovation Cluster seeks to target include emerging niche markets such as marine renewable energy, environmental monitoring and water management as well as established markets like oil and gas,

aquaculture, maritime transport, tourism and coastal erosion.

WFS Technologies started out in optics but "stumbled by accident into the area of communications under water," according to CEO Brendan Hyland. The company went back to a technology last looked at during the Cold War, updating the use of underwater radiowaves with modern signal processing, modelling techniques and antennae. Its broadband system can deliver communications 5 metres through seawater, while its low-byte-rate solution travels 100 to 200 metres through water. "We recently completed a project where we networked our system in shallow water in the surf zone to monitor coastal erosion," said Hyland. An advantage here is that radio technology operates at speed.

Another research centre within the cluster is the Tyndall National Institute in Cork, which is working on standalone wireless sensors that can you can "deploy and forget". Dr Cian Ó Mathúna, head of the institute's microsystems centre, identified key research challenges for these sensors as robust packaging, energy harvesting, massive scalability and self-cleaning capabilities. Tyndall is also involved in SHOAL, an EU-funded project that aims to develop three fully functional robotic fish equipped with chemical sensors and a scalable communications infrastructure.

While readers may be somewhat jaded hearing about yet another themed innovation cluster, the earnings potential in ocean innovation became clear during the Galway workshop when Ulf Tisell, R&D director for the major Swedish electricity and energy supplier Vattenfall, announced that his company is to invest €20 billion in wave technology in the coming years, split between Ireland and Scotland. Ireland, where at least half the funds will be invested, was chosen because it has the highest wave energy resource in Europe.

Andrew Parish, whose company Wavebob is engaged with Vattenfall in a joint-energy venture, noted the commercial opportunities in the €20 billion spend should not be overlooked, pointing out that the announcement signalled a tipping point, with vague visions now becoming a reality. It is not every day that we see the opportunity for Irish companies to compete for €10 billion worth of business, he noted. "It's an incredible opportunity for Ireland Inc to maximise its return from a new industry. There's a unique combination here of small and large enterprises, which are engaged with research institutions in this area."

Existing Mace Head Buoy of the SmartBay network.



Technology developed here could profit from a global market for wave energy that has been estimated at \$1 trillion worldwide. Advanced materials and devices for renewable energy systems could be worth \$7.5 billion by 2011, according to the SMARTOCEAN strategy document.

Vattenfall's Ulf Tisell stressed that survivability is a key feature in the marine environment. Conditions are tough out there. Another feature will be impact on the environment – we will be studying impacts on seabirds and fish, but also looking for environmentally benign solutions such as oil that you can drink, he said. Such problems could equal future products.

SURVIVAL OF THE FITTEST Survivability was a theme echoed by Martin Horan. His company BioTector Analytical Systems has developed rugged sensors that survive harsh environments. “We supply a range of online liquid analysers that specifically target dirty applications, saltwater, wastewater, surface water,” he explained. The company sells to the pharmaceutical, chemical, refinery and food processing markets; with a staff of 17, it has a very active R&D programme. It recently signed a distribution agreement with Hach, a global water analysis company, for a self-cleaning analyser.

Durability is also an issue for Cathx Ocean, which has developed a new high-tech torch for



Wavebob – the Wavebob wave energy device.

divers. To show customers how rugged it is, we drove a mini digger over it, explained managing director Dr Adrian Boyle. The company, set up last July, aims to develop a smart robotic vision system for underwater vehicles, mainly targeted at the gas industry. The technology will take decisions away from the operator to the machine itself. This will increase speed and reduce high operational costs for oil and gas companies. Boyle, a physicist by training, believes it could reduce pipeline inspection costs by 80 per cent.

Perhaps the last word should go to the University of Washington's Professor John Delaney, who emphasised the challenges of working in the marine environment. He noted that people often tell him they've been to the beach, they surf, or they love the ocean. “That is a little bit like saying the ‘other day I saw the edge of a razor blade and I'm just fascinated by the steel industry’.” The complexity of the oceans means there's a myriad of technological challenges to be weighed up, he insisted, and the opportunities are now emerging for companies with the right strengths to dive in.

The SMARTOCEAN Innovation Cluster Strategy was launched for consultation at a workshop at the Marine Institute this March, entitled ‘Harnessing Ireland's Potential as a European and Global Centre for Ocean Technology’. The Marine Institute will publish the outcome of this consultation process in May/June 2010.

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