

Beaufort Award in Sensors and Communications Systems for the Marine Environment

Terms of Reference

OVERALL OBJECTIVE

To develop research capacity in the priority area of Sensors and Communications Systems for the Marine Environment through the funding of a research team focused on the field of Sensors, Sensor Systems and related Telemetry, Communications and Data Management, in the area of monitoring water quality and the marine environment.

STRATEGIC CONTEXT

The Beaufort Award in sensors and communications systems for the marine environment addresses the vision and challenge in the Government's *Strategy for Science Technology and Innovation 2006-2013* (SSTI). In addition, this award directly addresses a number of key objectives of *Sea Change: A Marine Knowledge, Research & Innovation Strategy for Ireland 2007-2013* (www.marine.ie). Specifically, it addresses objectives within the Marine Technology Research Programme, as follows:

- *Create a critical mass, multi-disciplinary and industry-oriented research grouping in the field of sensors, intelligent systems and sensor platforms;*
- *Create a focused capability in the application of information and communication technologies to the marine sector; and*
- *Harness the synergies between the above to deliver innovative technology solutions to targeted sectors (aquaculture, seafood processing, environmental monitoring, and ocean energy).*

The Award will build on emerging concepts and principles to support pragmatic actions and plans that can be used for the sustainable management of Ireland's aquatic resources.

DELIVERABLES/KEY OUTPUTS

- Strengthening of existing multi-disciplinary, industry-oriented research capability in the field of sensors, intelligent systems and sensor platforms for monitoring water quality and the marine environment;
- Supporting the development and deployment of advanced Sensor and Communications technologies in the marine environment;
- Enhancement of capability to apply information and communication technologies to the marine sector;
- Support the development of Irish knowledge-based economic activity in marine Sensors and Communications Systems;
- Review of current and emerging state-of-the-art developments in the field;
- Establishment of close working relationships with other relevant institutions on the island of Ireland;
- Development of an internationally recognised Sensor and Communications research capacity in Ireland;
- Active participation in internationally funded programmes and bilateral international collaborations.

ACCESS TO MARINE INSTITUTE DATA/FACILITIES

The Marine Institute has facilities and data which may be applicable to this research programme. This national infrastructure will be made available to anyone who wishes to compete for this award. Candidates should contact Aengus Parsons (aengus.parsons@marine.ie) to discuss further details on access.

KEY ADDITIONAL INFORMATION

The Marine Institute, in partnership with the EPA and others, has been working to develop national RTDI capacity in the field of sensors, sensor systems and related ICT in the area of freshwater and marine environmental monitoring, in order to:

- a. provide technological support for the sustainable development of aquatic/marine resources; and
- b. support the creation of new industrial capabilities in these areas.

Projects and studies supported to date include:

- SMART Water Quality Monitoring System (SmartCoast)
- Demonstration of a Miniaturised Multi-Channel Cytometry System & its suitability for Autonomous Deployment (Cytometry)
- Marine Monitoring System Based on Optical Oxygen Sensing and Respirometry (Oxygen Sensing)
- Instrumentation Interface, Communication & Data Management Architecture Issues for Marine Sensor Systems, including Sea-floor Observatories
- Platforms for Marine Monitoring

Other related developments include:

- *SmartBay* - a planned initiative to develop a national test and demonstration site for a wide range of new and emerging marine technologies, and
- *CeltNet* - a developing concept for a large, long-term cabled observatory in the Porcupine area, west/south-west of Ireland

The overall goal of the Advanced Technologies programme, initiated by the Marine Institute in 2005, is to increase the contribution of the marine sector to the Irish economy by developing a new technology-driven dimension in areas with emerging industrial potential.

The medium-term objectives that underlay the suite of projects, listed above, are:

- To create strong national partnerships around agreed objectives and strategies for the development of new marine technology capabilities in Ireland, in the area of Advanced Technologies; and
- Develop strongly networked centres of research expertise in these areas, with sufficient critical mass to support existing and new industrial capabilities in these market sectors.

Among the new research and technological challenges in these areas and in which proposals should demonstrate current or potential capabilities are:

Sensors and Sensor Systems

- Sensitivity for low levels of trace chemical concentrations;
- Fouling of sensors;
- Selectivity limitations;
- Limited stability of sensor chemistry and material;
- Correlation of pressure and depth sensors data to allow *in-situ* instruments to match satellite altimeter data;
- Interfacing of sensor systems with networks and communication and data infrastructure mechanisms;
- Instrument capabilities and functions in respect to data acquisition and analysis;
- Design and operation of sensor platforms; and
- Integration of fibre-optic technology with sensors, communication and power sources.

Information and Communications

- Automatic identification and tagging of events in sensor data streams;
- Wireless technologies for use offshore and their integration with inshore communications networks;
- Underwater communications inc. acoustics, distance, reliability, speed, power and their integration with onshore communications networks;
- Web service workflow tools allowing users to bind processes together for particular applications;
- Integration of instruments and sensors into a grid computing environment with web services interfaces;
- Techniques for simulation and visualization of complex data sets;
- Automatic linking of instruments and metadata production; and
- Development of methodology for grid enabling instruments.