The EU BRIDGES glider project

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BACKGROUND

In 2015 the EU funded a 4-year programme to build a deep diving glider under the h2020 initiative. The programme was christened BRIDGES (Bringing together Research and Industry for the Development of Glider Environmental Services). The project comprises a total of 19 partners from across the EU, and is split into 9 individual work packages. The project is funded, not just to build a vehicle, but to specify the data from sensor to archive, and to target the vehicle as a product that both scientific and commercial users will want to use.

The work packages are being undertaken by a consortium of companies and research institutes from across the EU, led on the commercial side by glider manufacturer Alseamar (formerly ACSA), who build the Sea Explorer glider. Overall management is from UPMC and Armines in Paris. The work packages range from management and planning, vehicle and sensor design and testing, reliability analysis, data and sensor standardisation, to at-sea demonstration and outreach. In the UK NOC leads the sensor development package, and is the major partner within the mechanical design work package led by Alseamar. University of Porto, Portugal have built the simulator and are also integrating sensors and integrating them into the glider design. NOC will also undertake the deep water demonstration deployments at the project's end in 2018/19.

PROGRESS

The initial design phase of the vehicle pretty much complete, although obviously testing will provide feedback to tune many of the designs. Sensor design is well advanced. The new individual sensors have been sourced, built or prototyped, and full system testing with the vehicle simulator will be carried out this summer. The pressure hull design will be finalised shortly, and the hulls built and tested this year. The glider control system is more complete and the complete glider is on track to be built by 2018.

THE VEHICLES

The vehicle design is based upon the Sea Explorer with interchangeable payloads. Battery power is initially expected to be rechargeable lithium ion with primary batteries as an option. Endurance will be of the order of several weeks, dependent on payload. Two vehicles are being designed, the Deep Explorer rated to 2400m and the Ultradeep Explorer rated to 5000m.

The design is superficially similar to the 700m rated Sea Explorer with wings mounted aft. Internally, it will use the same operating system and architecture. The outer is to be a composite fairing, the main pressure hulls are of aluminium and titanium respectively. It will be fitted with a thruster based on the Autosub long-range design from NOC to enable it to carry out horizontal flight for seabed surveys, for example. It is envisaged that a vehicle will have interchangeable sensor packages, although not necessarily field-changeable. The sensor packages have been specified, not to limit the sensors carried but to ensure that the design can carry all the sensors required for each set of tasks.

THE SENSORS

Starting with the concept that the vehicle should address specific market and mission requirements, four main payload types were identified. These were defined as marine science research, Marine Strategy Framework Directive (MSFD) implementation actions, living resources, offshore Oil & Gas, and Deep-Sea Mining. The consortium has good contacts within the scientific community already, and has a brief to consult with commercial companies engaged in the vehicle's other target areas. There is a certain amount of overlap between some of these already and in reality they will evolve in response to input from industry and other stakeholders.

For science, the Copernicus package is designed to measure natural and anthropogenic dissolved and particulate matter in the water column. This will use well established optical measurements and proxies using mostly off the shelf sensors on both the Deep and Ultradeep vehicles.

For mining and the MSFD target, the package will include a camera for optical imaging of micro litter, passive acoustics for noise monitoring and titration of nitrate, ammonia, silicate and phosphate. NOC has been developing the latter devices, for some time and they are of great interest for science applications as well.

For O&G, the emphasis is on detection of hydrocarbons, turbidity measurements and measurement of noise levels, and so on.

THE FUTURE

The EU funding will carry on until March 2019 by which time Alseamar will have a pair of vehicles that have been fitted with sensors and tested to 5000m. The company plan further product proving prior to a full commercial launch, and will be working with the rest of the partners to take the gliders to that point.

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BRIDGES
BRINGING TOGETHER RESEARCH AND INDUSTRY FOR THE DEVELOPMENT OF GLIDER ENVIRONMENTAL SERVICES

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