

PROTEI: Open source, shape shifting, sailing drone to explore and clean the oceans

**Principal investigator:** Cesar Harada, MPhil Candidate in Design & Environment, Goldsmiths University of London, United Kingdom, contact@cesarharada.com

**Co-principal investigators:**

Etienne Gernez, Protei, Academic Coordinator, Norway, etienne@opensailing.net

Gabriella Levine, Open-H2O, Director, USA, gabriella.levine@gmail.com

Peter Keen, Keen Marine, Director, United Kingdom, pwk@keen-marine.com

**Fields of research:** Autonomous surface vessel, multifunctional sensors for in-situ monitoring of marine environment, surface layer sampling, marine litter collection

**What are the proposed technology innovation and its intended impact?**

Technology innovation:

- Open source hardware: every one is invited to contribute, modify and distribute the technology, in order to speed-up the technology development and release
- Shape shifting: resist to natural forces with a soft and adaptable shape
- Sailing drone: autonomous surface vessel performing endurance missions

Intended impact:

- To put an ocean exploring technology in the hands of many
- To use the power of number to clean the oceans in a collective action

**How will this project enable MSTF to make a unique contribution to the oceanographic technology R&D?**

By contributing to bring an innovative and open technology to the hands of many.

**What research applications will benefit from the proposed technology innovation?**

Robustness and resilience of autonomous surface vessels for oil spill clean up, plastic collection, radioactivity mapping, marine protect areas monitoring.

**What technical approach will be pursued and why?**

Protei is an open source technology developed collaboratively to lower the R&D costs and benefit from a global network of innovation.

**What key existing technologies is this proposal building upon?**

Ten prototypes have been built and tested in 2010-2012. Protei also intends to use and promote existing open source environmental sensors.

### **What is the plan for evaluating the effectiveness of the proposed innovation?**

Each beta version of the technology will be released for crowd testing, as a part of Protei technology qualification plan in order to test the technology in several environments and for different applications.

### **What are the tentative project schedule, milestones, and deliverables?**

- mid 2013 Protei 1 meter long Remotely Controlled released as beta product
- end 2014 Protei 1 meter long Autonomous released as beta product
- beginning 2016 Protei 6 meter long Autonomous released as beta product

### **What is the funding plan and overall funding request? MSTF may permit overhead costs of no greater than 15%.**

Protei is applying for 100 000 USD to cover the following costs for one year of operation:

- Protei R&D integration and testing by Protei team: 40 000 USD
- Manufacture and distribution of Protei beta versions: 30 000 USD
- Open-H2O web platform for global crowd sourcing and testing: 30 000 USD

### **How well are external funding sources leveraged?**

- Sponsoring: a sponsor plan is ready to be distributed to targeted companies
- Donation: the non-profit Open-H2O is being registered in the US
- Research: the call “Long Endurance Marine Unmanned Surface Vehicles” from the Natural Environmental Research Council in the UK is being answered
- Investors: Protei has been selected in the accelerated business incubator program Unreasonable at Sea for a 4 months trip around the world with 20 renowned business advisors from January to April 2013
- Grants: Protei won in September 2012 the Savannah Ocean Exchange with a 100 000 USD prize money

### **Provide the names and e-mail addresses of 4-5 suggested non-conflicted reviewers**

- Professor John A. Orcutt, SCRIPPS, [jorcutt@ucsd.edu](mailto:jorcutt@ucsd.edu)
- Doctor Jonathan Berger, SCRIPPS [jberger@ucsd.edu](mailto:jberger@ucsd.edu)
- Dan Basta, Director of the US National Marine Sanctuaries [dan.basta@noaa.gov](mailto:dan.basta@noaa.gov)
- Jenifer Austin Foulkes, Google Oceans Manager [jaustin@google.com](mailto:jaustin@google.com)