



Networked Ocean

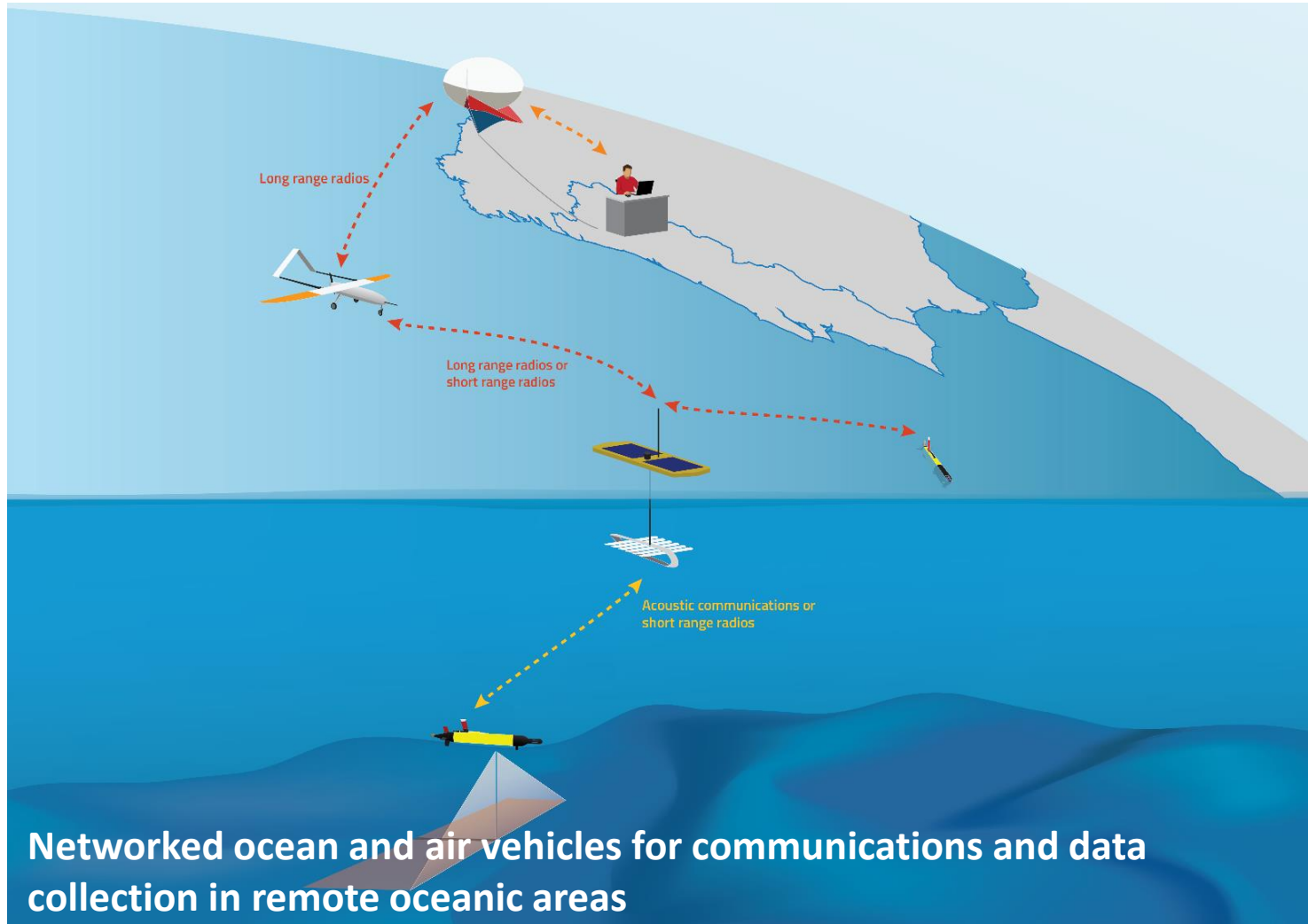
Networked ocean/air vehicles for communications and data collection in remote oceanic areas

Partners



**Networked ocean and air vehicles for communications and data collection
in remote oceanic areas**

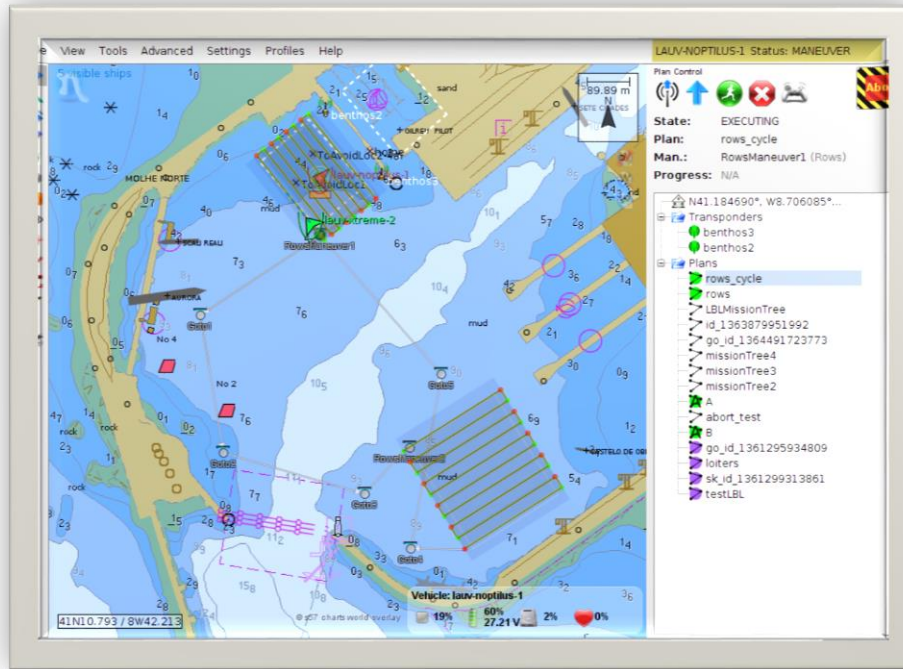
Networked Ocean System



Objectives

- Development & demonstration at sea of a networked vehicle system for persistent communications and data collection in remote oceanic areas.
 - Autonomous surface vehicles support smart routing protocols for direct communications, via persistent unmanned air vehicle (UAV) relays, or delayed data transfer using passing vessels as data mules.
 - Unmanned vehicles have on-board deliverable planning capabilities for unattended operations in remote locations.
 - UAVs use advanced radio technology for long range communications.
 - Land, or ship-based, control stations provide advanced planning and execution control capabilities, as well as dissemination of data to service providers.

Systems and technologies

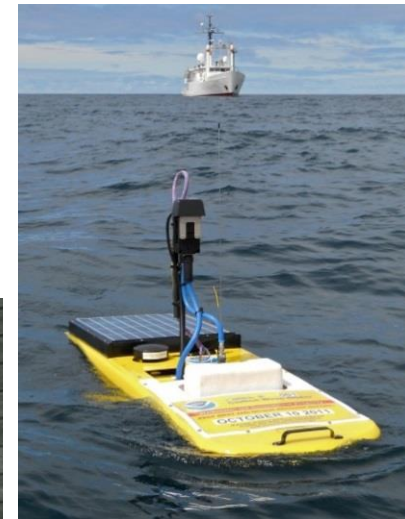


Light autonomous underwater vehicle

Inter-operated communication networks
 Advanced command and control
 Long range flights
 Advanced on-board autonomy
 Persistent presence in the ocean
 Disruptive tolerant networking



Penguin long range unmanned air vehicle



Wave glider

LSTS software tool chain

Field tested every other week with ocean and air vehicles

Off-board command, control and communications



C4I – Command and Control Framework

Neptus

<http://whale.fe.up.pt>

Communication protocols for command and control of heterogeneous systems



iMC

Inter Module Communications

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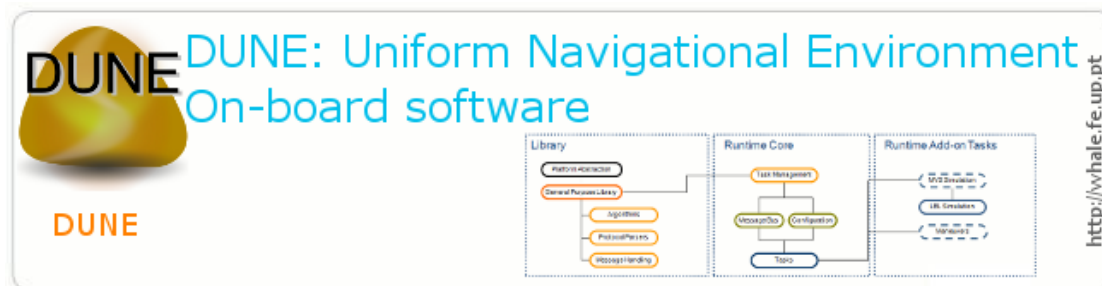
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  sourceVehicle="used-10m-lan"
  <description>Expert of LB_IDetection Addressation
  <file name="Transmission" address="Transmission" <description>True for transmission detection/description
  </file>
  <file name="Laser" address="Laser" <description>True for laser detection/description
  </file>
  <file name="Laser" address="Laser" <description>True for laser detection/description
  </file>
  <file name="Laser" address="Laser" <description>True for laser detection/description
  </file>
  </message>
  
```

Message Protocol

Heartbeat (size=16)
0: 6c c6 00 00 00 00 60 e5 50 c1 ea 39 d2 41 9f 49

<http://whale.fe.up.pt>

Onboard software (vehicles, buoys, data loggers)



DUNE

DUNE: Uniform Navigational Environment
On-board software

<http://whale.fe.up.pt>

Library: PathCollector, ControlProcessLibrary, Algorithms, ProcessManager, MessageHandling

Runtime Core: Task Management, MessageIO, Configuration, Tools

Runtime Add-on Tasks: LB_Creators, LB_Creators