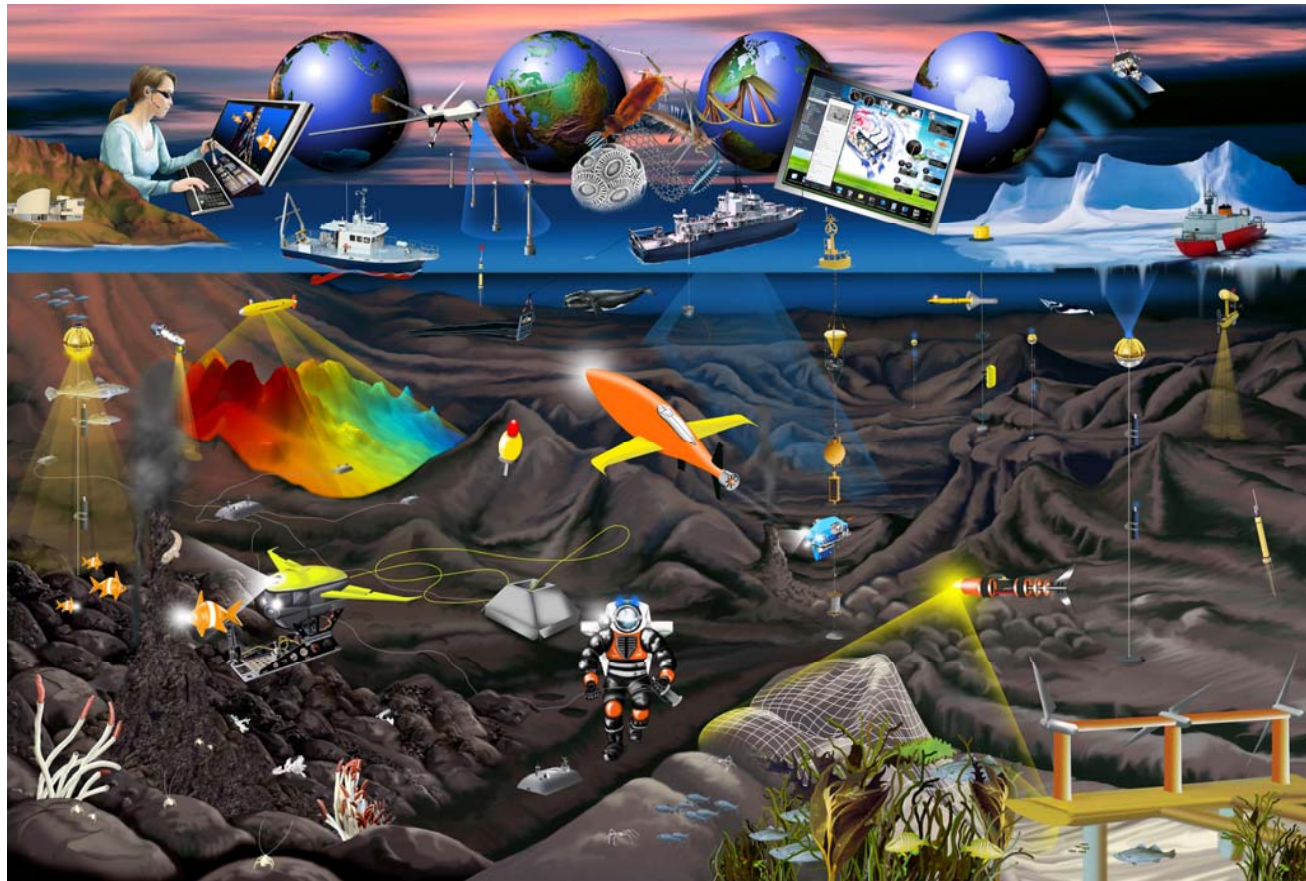


Water Quality Sensors

Where are we, where are we going, and why aren't we there yet?



Mario Tamburri
University of Maryland
Center for Environmental Science



Alliance for Coastal Technologies

ACT Priorities

- ⊕ **Transition emerging technologies to operational use rapidly and effectively**
- ⊕ **Maintain a dialogue among technology users, developers, and providers**
- ⊕ **Identify technology needs and novel technologies**
- ⊕ **Document technology performance and potential**
- ⊕ **Provide information required by IOOS for the deployment of accurate, reliable and cost-effective observing networks**

ACT Services

- ⊕ **A third-party testbed for evaluating technologies**
- ⊕ **A forum for capacity and consensus building**
- ⊕ **An information clearinghouse for environmental technologies**

Generic Testing Approach

⊕ Types of Evaluations:

- Performance Verification
- Performance Demonstration

⊕ Purpose:

- Document performance under third party tests
- NO certifications, recommendations, or comparisons

⊕ Benefits:

- Community engagement
- Enhanced ability to identify appropriate technologies
- Level playing field among manufacturers
- Accelerated adoption of innovative technologies

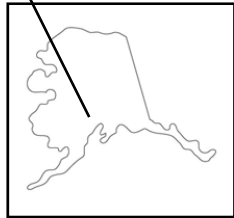
⊕ Credibility:

- Objective testing
- Skilled, trained personnel
- Sound methodologies with statistical rigor
- Transparency and comprehensive documentation
- Rigorous QA/QC



ACT Partner Institutions

Arctic



Great Lakes



University of Michigan
Cooperative Institute for
Limnology & Ecosystems Research



Pacific

Moss Landing
Marine Laboratories

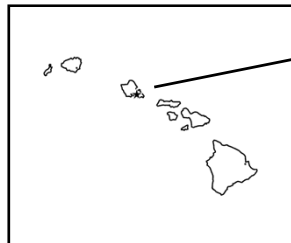


Atlantic



University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE
Chesapeake Biological Laboratory

Tropical

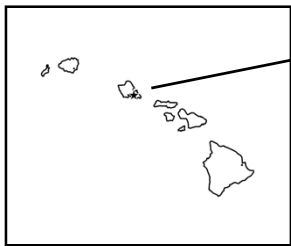
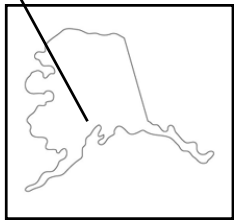
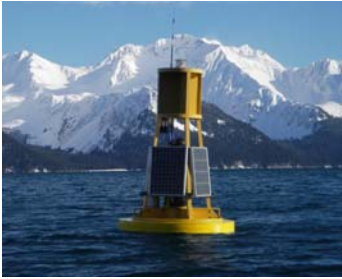


Gulf

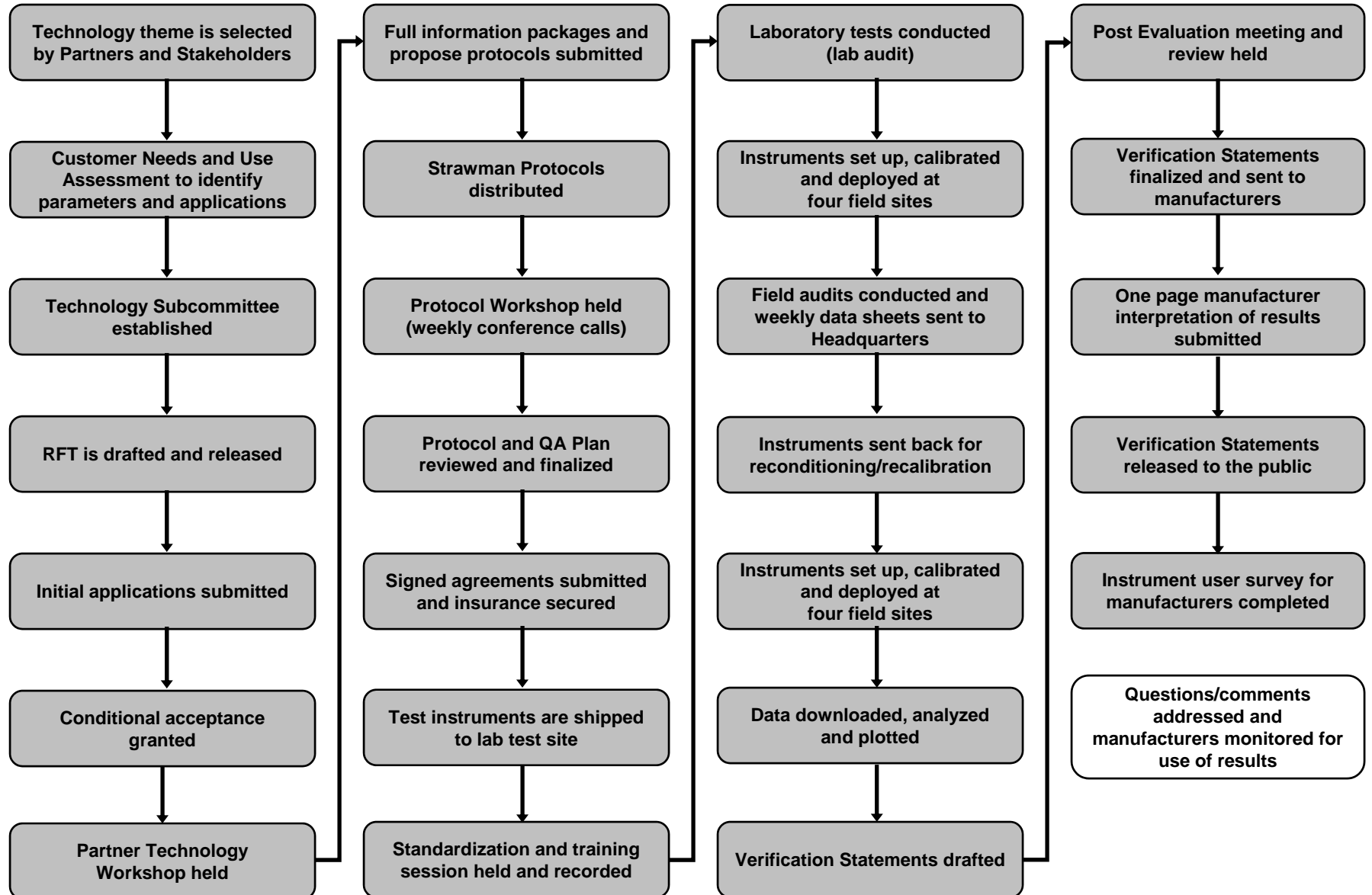


UNIVERSITY OF
SOUTH FLORIDA
COLLEGE OF MARINE SCIENCE

Diverse Environments & Applications



Generic Testing Process



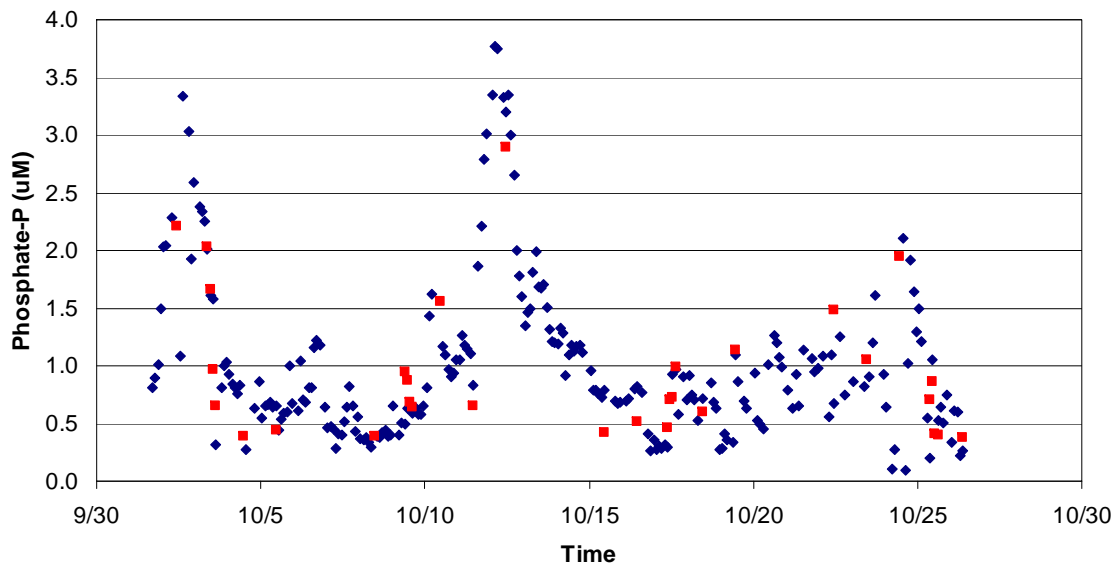
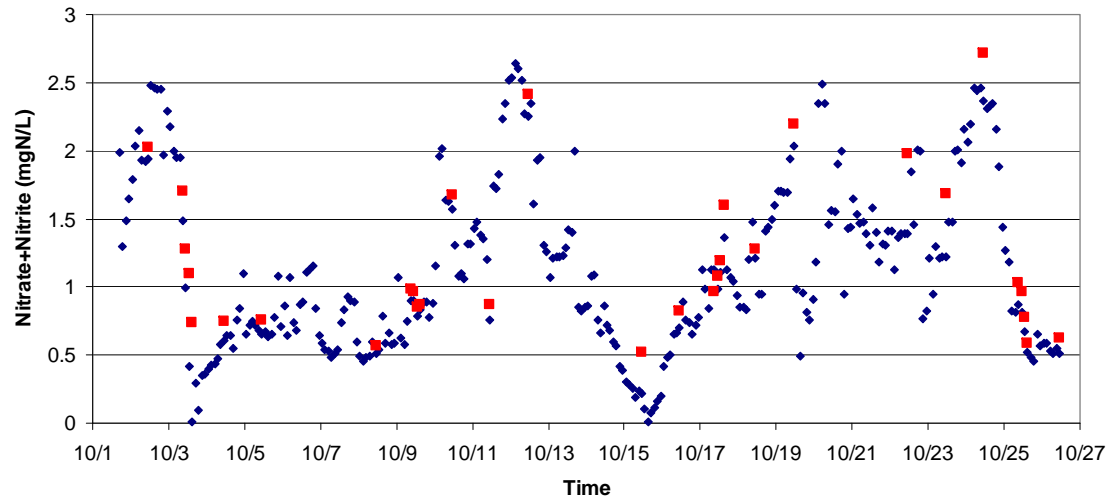
Sensors – Where are we?

- ⊕ **DO Sensors (2004)** - Aanderaa (optode), Greenspan (galvanic cell), In-Situ (optode), YSI (Clark cell)
- ⊕ **Chl-a Fluorometers (2005)** - bbe Moldaenke, Chelsea (2), Hydrolab, Turner (2), WET Labs, YSI
- ⊕ **Turbidity Sensors (2006)** - Aquatec, In-Situ, McVan, WET Labs, YSI
- ⊕ **Nutrient Analyzers (2007)** - American EcoTech, Satlantic, WET Labs, YSI
- ⊕ **C-T Sensors for In Situ Salinity (2008)** - Aanderaa, Campbell, Falmouth, Greenspan, In-Situ, RBR, Rockland, YSI
- ⊕ **pCO₂ Analyzers (2009/2010)** - Contros, NOAA/PMEL (Battelle), Pro-Oceanus, Sunburst, YSI
- ⊕ **Hydrocarbon Sensors (2011)** - Aquatec, Chelsea (3), Hach, S:can, Turner Designs, and WET Labs
- ⊕ **pH Sensors (2012)** - Aanderaa, Campbell, Idronaut, In-Situ, Satlantic, Sunburst, YSI



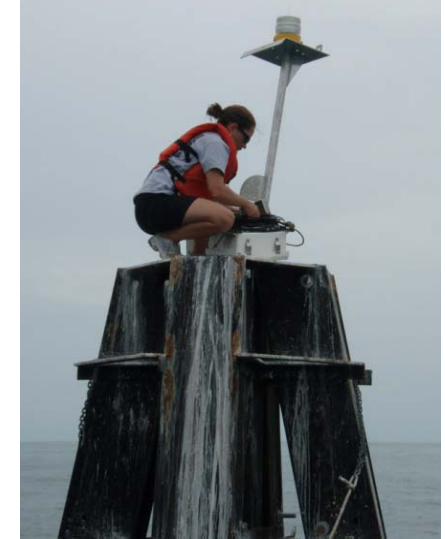
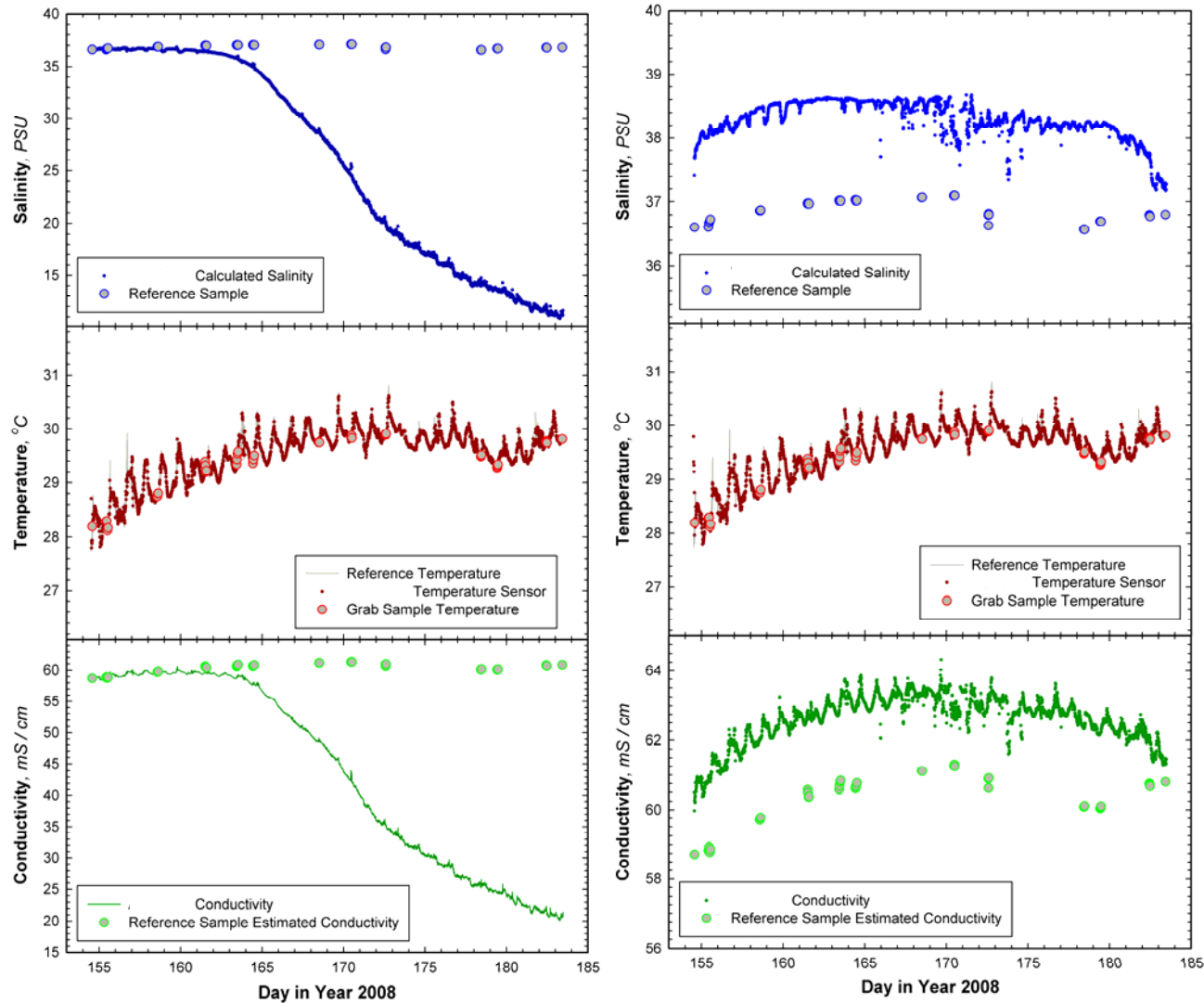
Nutrients Performance Demonstrations

⊕ Transitioning into operations



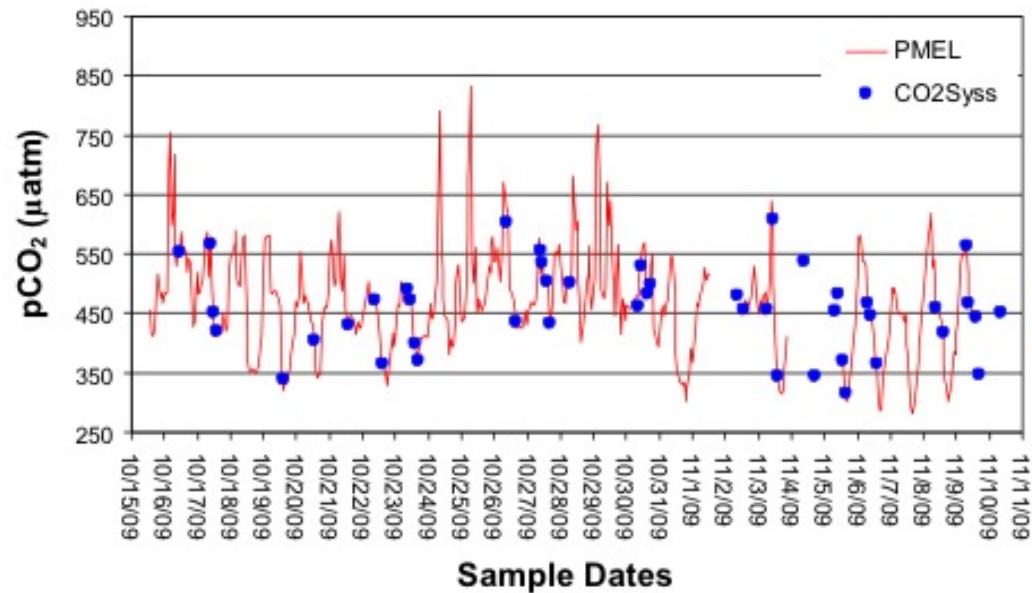
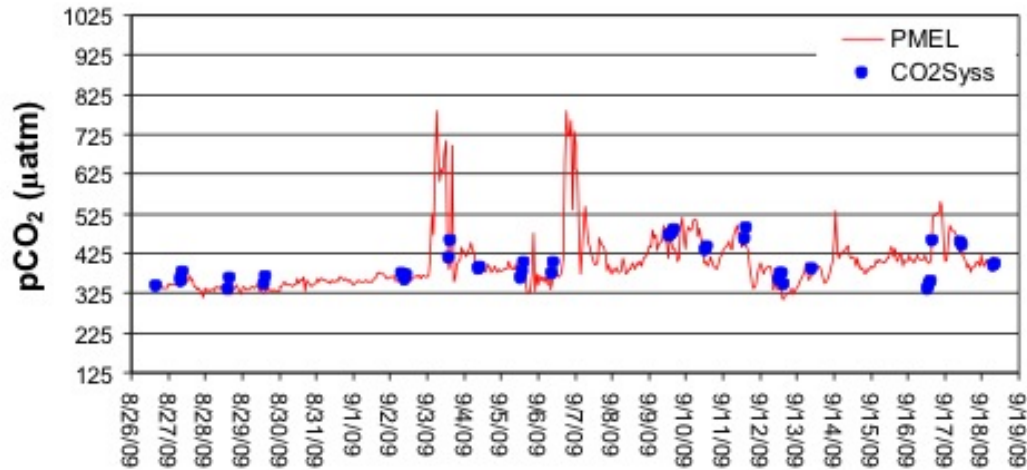
Salinity Performance Verifications

⊕ Mature ≠ reliable/accurate



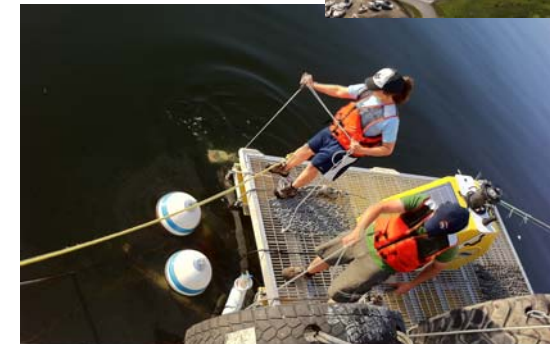
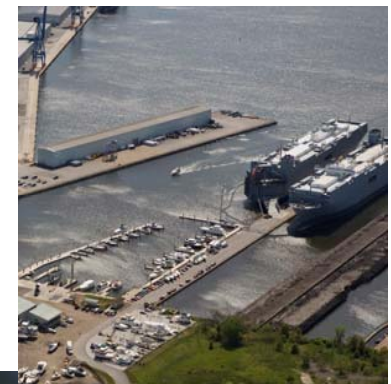
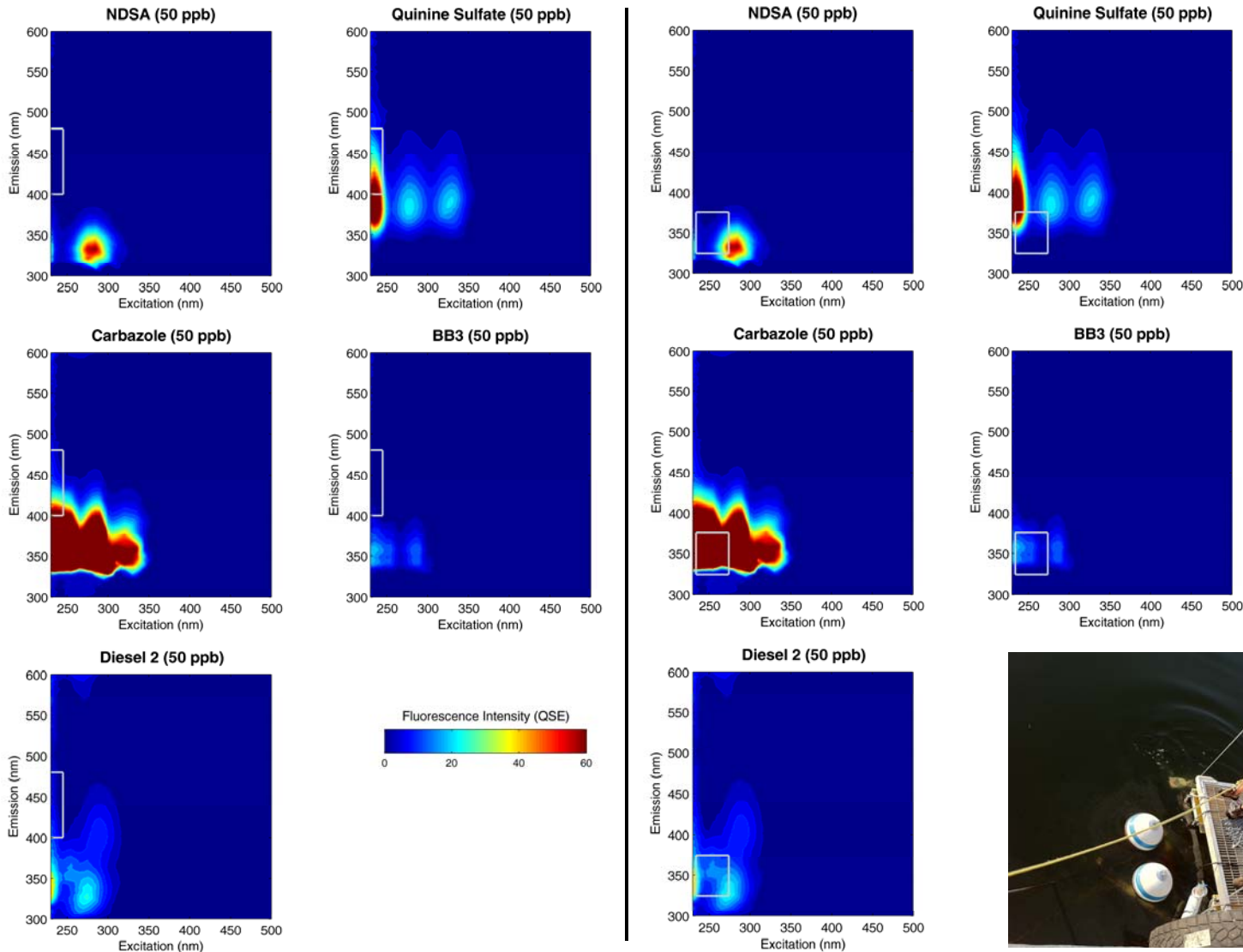
pCO₂ Performance Demonstrations

⊕ pCO₂ is important but complex

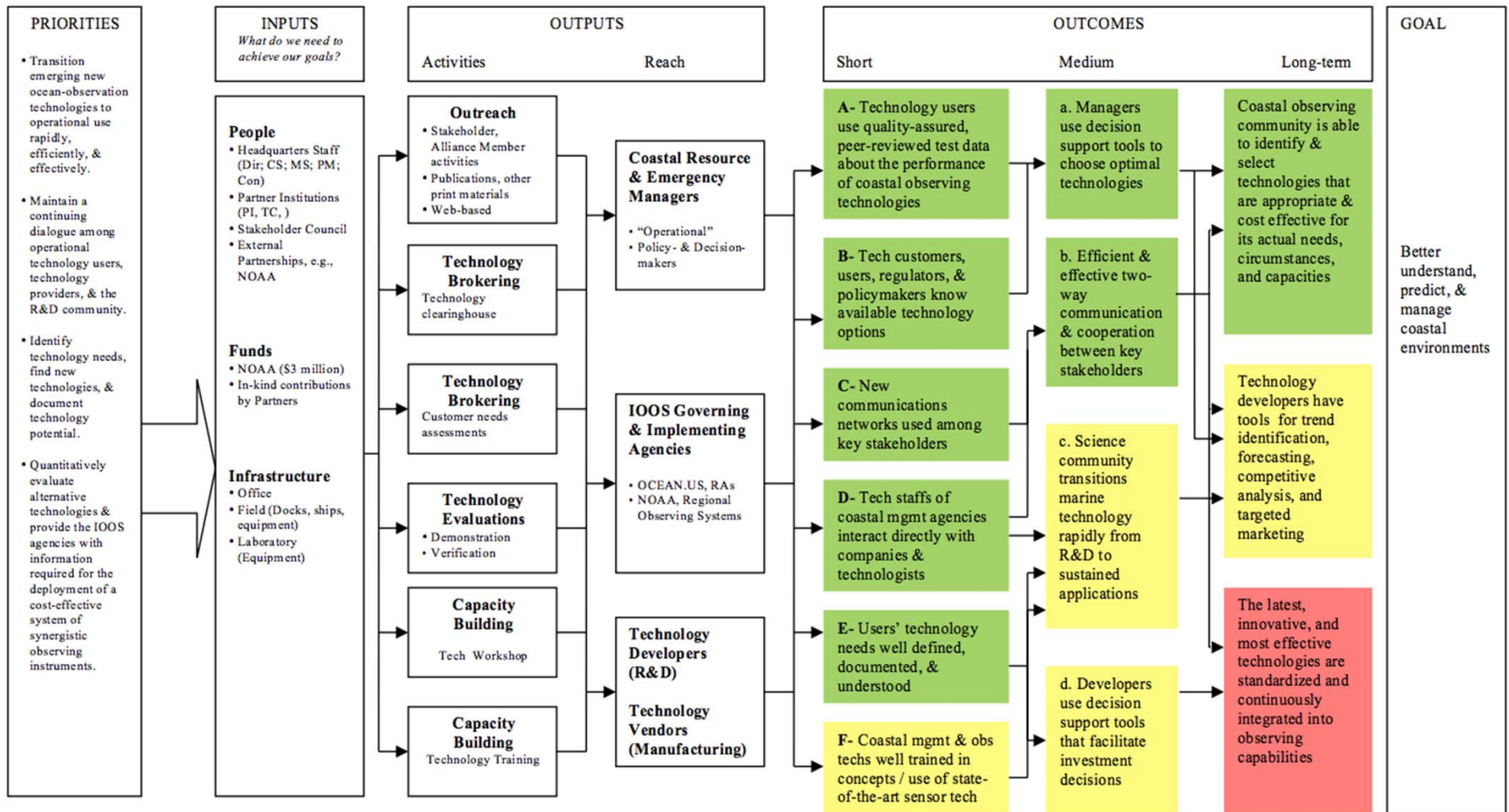


Hydrocarbon Performance Verification

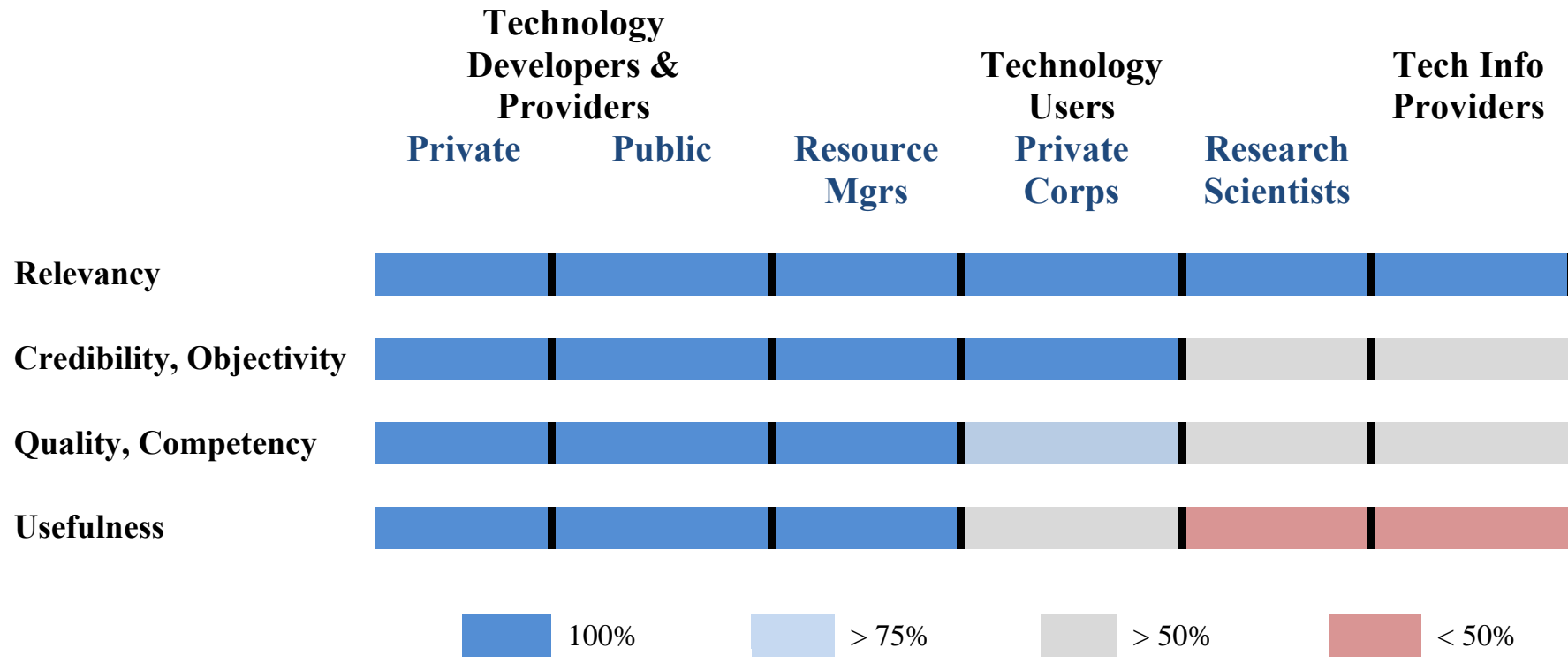
⊕ Are fluorimeters the way to monitor of oil spills?



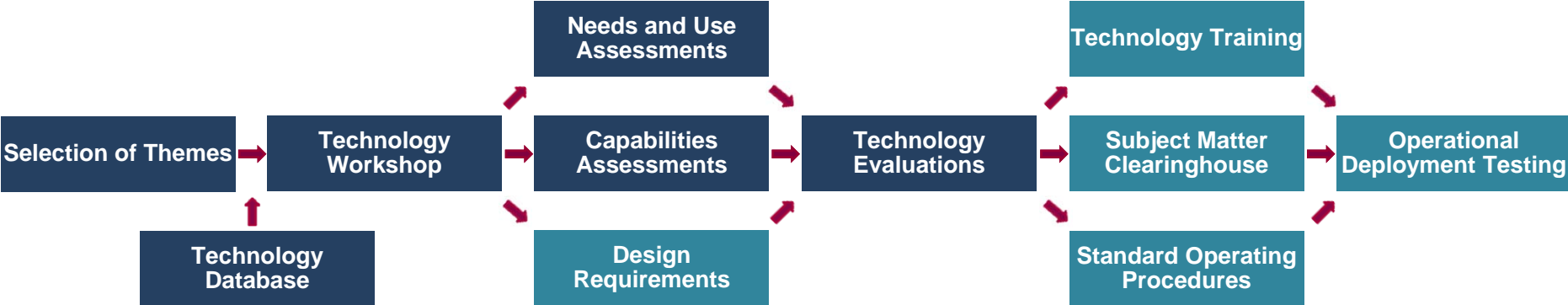
ACT Program Evaluation – Where are we?



ACT Program Evaluation – Where are we?



ACT Program Evaluation – Where are we going?



Current Activities

Potential Activities

Why aren't we there yet?

- ⊕ **Limited resources**
- ⊕ **Different requirements for different users**
- ⊕ **Parameters and technologies are complex**
- ⊕ **Nice to have but not must have**

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