Research Innovation Theme

Mark Koehn
Theme Leads:
Engineering: Chris Meinig
Research IT: Eugene Burger
Science Data Integration: Kevin O’Brien
Background: Who we are

- Engineering Development Division
- Research IT project
- Integrated Science Data Management project
- Centralized functions within PMEL
- Science Enablers

Innovation: Implementing new and improved ways of conducting and communicating science
Background: Who we are

Engineering Development Division (EDD)

Engineering innovations at PMEL is multidisciplinary and driven by the formation of teams that integrate research and engineering to solve difficult ocean and atmospheric observing challenges.

The people:

• Engineers
• Instrumentation Technicians
• Mooring Technicians
• Machinists

Unified group that works with scientists and projects across all research themes.
Background: Who we are

Research Information Technology

Supports requirements for observing system data collection and the further development of innovative techniques for data analysis, visualization, presentation, and dissemination.

The people:

• Software and web developers
• Mix of individuals who are dedicated to project and individuals who report to Lab Management but are distributed to projects as needed.

Work as a collective, sharing resources and ideas to benefit all projects.
Background: *Who we are*

**Science Data Integration**

The PMEL Science Data Integration Group (SDIG) is devoted to data management, data integration management and it’s related software development.

**The people:**

- Data Integration specialists

Operate as a unit in the Lab, but individuals are tasked to support different projects

Has more externally-driven projects than Engineering or the Research IT groups.
<table>
<thead>
<tr>
<th>Project</th>
<th>Science Products</th>
<th>Science Planning</th>
<th>Exp. Design</th>
<th>Prototype Dev.</th>
<th>Implement</th>
<th>Transition to ops/app</th>
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</tr>
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Green = Change in last 5 yrs
Relevance

Dept. of Commerce Strategic Plan:

- **Objective 3.1**: Advance the understanding and prediction of changes in the environment through world-class science and observations.
- **Objective 4.1**: Transform the Department’s data capacity to enhance the value, accessibility, and usability of Commerce data for government, business, and the public.
- **Strategic Goal 5**: Operational Excellence: Deliver better services, solutions, and outcomes that benefit the American people.
Relevance

NOAA Next Generation Strategic Plan:

• Objective: A holistic understanding of the earth system through research
  – More effective development and transition of technologies to operational services and stewardship applications.

• Objective: Accurate and reliable data from sustained and integrated earth observing systems
  – Improved data interoperability and usability through application and use of common data standards.
  – Enhanced access and use of environmental data through data storage and access solutions, integration of systems, and long-term stewardship.
  – Reduced life-cycle costs of observations through increased partnerships, integration of systems leveraging available data, and reducing duplicative capabilities.

• Objective: An integrated environmental modeling system
  – Effective and efficient collaboration and coordination with NOAA and partners to enhance the scope and predictive accuracy of integrated Earth system models for global, national, and regional applications, and for specific phenomena.
NOAA 5 Year R&D Plan, 2013-2017:

Objective: Improved accuracy, coverage, resolution, effectiveness, and cost of observation systems.

Objective: Enhance data stewardship.
Relevance

OAR Strategic Plan:

- OAR creates new or significantly improved technology for observation and modeling systems, as well as tools for information delivery and stakeholder engagement.

PMEL Strategic Plan:

“Accomplishments across NOAA’s mission goals are dependent upon the continued innovative development and use of observing platforms, systems, and information technology to improve data quality and delivery, and lower operating costs.”
Science requirements are established by PMEL, OAR and NOAA strategic goals...

...and the Research Innovation group partners with the Science Programs to meet those goals
Performance – Engineering Development Division

- Carbon Wave Gliders
- T-FLEX mooring system
- $\text{pCO}_2$ sensor technology
- DART-ETD
Performance – Research IT

- Effective tools supporting engineering development
- Systems to ensure data quality and high data-return
- Innovative data logging solutions
- Software transitioned to operations
- Access to scientific applications

Tsunami forecast graphics from the SIFT (above) and Tweb applications.
Performance – Integrated Data Management Group

Observing System Monitoring Center

Global Earth Observation
Integrated Data Environment
Unified Access Framework

PMEL: Pacific Marine Environmental Laboratory
SOCAT: Surface Ocean CO2 Atlas
ESGF: Earth System Grid Federation
GFDL: Geophysical Fluid Dynamics Laboratory
Quality: Significant Awards, 2008-13

- **NOAA Technology Transfer Awards:**
  - 2011 - pCO₂ sensor development
  - 2008 - DART tsunami observing technology

- **NOAA Research Employee of the Year Awards:**
  - 2011 - Utilization of YouTube technology to increase understanding of OAR science
  - 2008 - Leadership in the development of NOAA IT Administrative support systems
Quality: Patents, Licenses, CRADAs

- Patents (2)
  - Tsunameter (2007)
  - Oceanographic mooring line
- Cooperative Research and Development Agreements - CRADAs (4)
  - Paroscientific
  - Battelle Memorial Institute
  - Liquid Robotics
  - Saildrone
- Licenses (1)
  - SAIC (tsunameter)
Future Directions

• Wherever the research takes us...
Future Directions

- Autonomous vehicles and sensor packages
- Improved accuracy, data transfer, instrument lifetime
- PMEL-wide integrated Data Management System
What’s Next?

For all: A brief introduction/overview of PMEL Engineering, led by Chris Meinig

Then, For Reviewers: tour of Engineering Facilities in this building and in Buildings 8 and 32 (1 hour and 10 minutes scheduled)
For non-reviewers, unscheduled time (your Engineering tour will be held Thursday morning from 10:05 to 11:15)
For remote viewers, we will be back on screen at 3:20 PM PDT

Two remaining presentations on Research IT and Integrated Data Management will begin at 3:20 in this room.