Research Innovation

Science Information Technology

Eugene F. Burger
Who are we?

Software developers

• Most with science background
• Embedded with science projects
• Develop IT solutions that help scientists
How we align in the lab?

Work closely with
PMEL science projects

Answer to
The science project PIs

Depend highly on
The PMEL Computer & Network Services Division

We do not
Provide or maintain core IT & network services
Involvement

Observations
- Instrument management
- Data retrieval
- Data processing

Understanding
- Analysis
- Data visualizations
- Modeling tools

Results
- Data access
- Publications
- Technology transfer
- Outreach

2014 PMEL Lab Review
Examples
PMEL Science-Focused Software Development
Instrumentation development

Daniel Dougherty, Mick Spillane

Requirement

• Developmental instrumentation
  • Acquire telemetered data
  • On demand visualization

Solution

• Modular data acquisition
• Data visualization component
• Data viewer

Results

• Platform for future instrumentation development
• Modular design allows for adaption to new telemetry methods
Engineering Group

DART 4G Deployment

Engineering instrument test-data access
Engineering Group

4th Generation DART data viewer

Autonomous profiler data viewer
**Requirement**
- Extensive inventory of instruments
- Difficult to manage

**Solution**
- Develop Instrument Database

**Results**
- Updated FOCI’s instrument pool usage
- Scientist guidance in mooring design
Ecosystems & Fisheries-Oceanography Coordinated Investigations

Movie
Existing Cruise and Instrument Records
ARGO

Donald Denbo

Requirement

- More than 600 floats deployed
- Float calibration history management

Solution

- Automate float testing
- Automatically archive information

Results

- Significant time savings
- On-line access to instrument history
- Correlations between test/calibration and failures
Atmospheric Chemistry
Derek Coffman

**Requirement**
- Log/monitor data at experiment sites
- Wide range of loggers/formats/OSs

**Solution**
- Data logging portal (DataGate)
- On-site data visualization tool (Dchart)

**Results**
- Logs ~65 instruments @ 1s frequency
- Integral component of underway data collection strategy
Carbon Program
Willa Zhu, John Osborne

Requirement
• Manage increasing data volume from MapCO\textsubscript{2} moorings

Solution
• Data ingest software
• Database archive
• Compute xCO\textsubscript{2} parameters

Results
• Millions of data records
• Easy access and diagnostic tools (Graphite)

Change Since 2008

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Tropical Moored Buoy Array
Dai McClurg, Dan Dougherty, Curran Fey

Requirement
• Centralize and update management of mooring and instrumentation meta data

Solution
• Adapt web application and database to accommodate new instruments, mooring systems
• Extract calibration information from PDF documents

Results
• Easy access to this information to anyone at the lab
• Full instrument traceability > 40 years of data
Science Data Integration Group
Kevin O’Brien, Steven Hankin, Roland Schweitzer, Karl Smith, Ansley Manke, Eugene Burger

Requirement

• General purpose tool for science data access
• Not a custom solution for each dataset

Solution

• Live Access Server
• Adapts to data through configuration settings

Results

• Web-application framework applicable to large variety of datasets
Acoustics
Andy Lau (PMEL/Newport, OR)

Requirement

- Analyze data from hydrophones
- No off-the-shelf solution available

Solution

- SEAS Analysis tool developed

Results

- Eased and improved sound files analysis
- Better event timestamp & location
- Used internationally
Acoustics
NOAA Center for Tsunami Research

Requirement
- Operationalize MOST and NCTR developed methodologies at TWCs

Solution
- SIFT development
- Full tsunami forecasting suite

Results
- Operationalized at NOAA’s Tsunami Warning Centers
要求
- 易于访问MOST模型
- 研究平台以调查新技术

解决方案
- Tweb
- 利用SIFT开发作为新Web显示层的后台

结果
- 广泛接受用户
- 一些Tweb正在被操作化
NOAA Center for Tsunami Research

Tweb Interface examples
Communicate PMEL science

- PMEL and science topic webpages
- YouTube Channel
  - 54 Videos
  - 2.2 million views
Performance & Quality

- Prominent role in NOAA
  - Tools used widely: LAS
  - Tsunami modeling tools: SIFT, Tweb and ComMIT
  - Visualization tools: Ferret, SGT framework

- Science IT group underpins the PMEL scientific achievement
  - Instrument development and deployment
  - High quality data delivery
  - Data analysis
  - Communication of science results
Future Directions

- Continue to serve scientists
- Apply innovative & appropriate technologies
- New frontiers
  - Cloud computing
  - Crowd sourcing science
- Federal IT environment challenges
Opportunity
Lab-wide Strategy

- Data management
  - Data volume increase
- Data interoperability
  - Easier access to PMEL data
- Instrument management
  - Platform proliferation
To Summarize

Support engineering development
Ensure data quality and high data-return
Innovative data logging solutions
Operation transition
Scientific application access
Outreach

Guided by science requirements
Defined by DOC, NOAA, OAR & PMEL Strategic Goals
Thank you