

One Stop Shopping: The ARM Data Ordering Integration Project

Presented by
Rolanda Jundt (PNNL)
Cameron Bates (PNNL)

What is “ARM”?

- ▶ Atmospheric Radiation Measurement Program is the largest global change research program supported by the U.S. Department of Energy
- ▶ Sites around the world collect atmospheric data
- ▶ Web presence for 10+ years
- ▶ Provide data to the scientific community, free of charge

The screenshot shows the ARM website homepage with the following content:

- Navigation:** VIEW CART, PEOPLE, SITE INDEX, HOME, SEARCH.
- Menu:** ABOUT ARM, ABOUT ACRF, SCIENCE, SITES, INSTRUMENTS, MEASUREMENTS, DATA, PUBLICATIONS, EDUCATION, FORMS.
- Header:** A Science Research Program for Global Climate Change
- Main Content:**
 - A New Way to Order ARM Data:** A screenshot of a data selection interface with a 'Shopping Cart' button. Text: "The ARM website now provides a new way to browse and order ARM data. Our developers and webmasters teamed with the ARM Archive to create this new interface and the ability to order data while learning about it. To begin, browse the ARM website instruments, measurements, and data, and simply add datastreams to your 'shopping cart.' Once all of the datastreams are saved to your cart, you can place your order with the Archive. We believe this new capability to our site will make ordering data from the ARM Archive easier and more seamless. As always, we like to hear feedback from our users. Please send us your comments or questions."
 - Atmospheric Radiation Measurement Program:** "The Atmospheric Radiation Measurement (ARM) Program is the largest global change research program supported by the U.S. Department of Energy (DOE). It was created to help resolve scientific uncertainties related to global climate change, with a specific focus on the crucial role of clouds and their influence on radiative feedback processes in the atmosphere. The primary goal of the ARM Program is to improve the treatment of cloud and radiation physics in global climate models in order to improve the climate simulation capabilities of these models. ARM's scientists research a broad range of issues that span remote sensing, physical process investigation and modeling on all scales. ARM's site operators focus on obtaining continuous field measurements and providing data products to promote the advancement of climate models."
 - ARM Climate Research Facility:** "ARM's climate research sites serve as a national scientific user facility for collaborative research primarily with university, government agency, and national laboratory researchers. These sites provide significant research capability for the global scientific community. The resulting new ARM Climate Research Facility (ACRF) has been designated a national user facility for the purpose of providing this unique asset for the study of global change to a broader national and international research community. Proposed projects at the ACRF are reviewed by the ACRF Science Board, a highly respected group of scientists who assist with reviewing proposals for use of the facility."
- Right Sidebar:**
 - Field Campaigns:** Submit your field campaign proposal now!
 - Events:** Now accepting poster abstracts for the ARM 8th Meeting
 - Images:** A view from the ARM in Africa
 - News:** Lori Walker joins the Technical Coordination Office
 - Results:** Small processes make a big difference in model outcomes
- Footer:**
 - Send comments for: [www.administrator](#)
 - Last Modified: December 2, 2005
 - [Privacy & Security Notice](#)
 - All rights reserved.

The Problem

- ▶ Data stored in the ARM Data Archive
- ▶ Archive's website was completely separated from the ARM website, had a different look/feel
- ▶ Interfaces were complicated for novice users
- ▶ Information on the main ARM website was not always consistent with the information on the Archive's website

The Challenge

- ▶ Integrate the main ARM website with the Data Archive website to create a seamless, more user-friendly, data-ordering experience
 - Use the Archive's database as a shared back-end
 - Edit the Archive database so the content is “web ready”
 - Redesign the Archive website so that it looks and feels like the ARM website
 - Implement a way for users to “shop” for and order data from the main ARM website
 - Create a team comprised of developers from 3 labs
 - **Do it all in one FY!**

Rising to the Challenge

- ▶ Create a diverse technical team
- ▶ Communicate regularly
- ▶ Conduct regular user testing

Back-End Integration

- ▶ Had already redesigned the ARM website in 2004 with a database back-end, using PHP to display relational information, “smart navigation”
- ▶ Needed to integrate the Data Archive database
 - Sybase
 - 10+ years old
 - Millions of records
- ▶ Set up proxy tables at BNL to use for development

Front-End Redesign

- ▶ Needed a new interface for data ordering
- ▶ Wanted to be able to “Order Data” from many different places
- ▶ Needed to have a set number of variables defined before we could place an order
 - Site
 - Facility
 - Measurements
 - Instruments
 - Datastream
 - Data range

Front-End Redesign (Cont.)

- ▶ Problems with a linear ordering process
 - Lots of forms; hard to go back and make changes to previous selections
 - Not dramatically different from what the Archive currently had

- ▶ Solution: Developed a different kind of ordering interface
 - Used AJAX (Asynchronous JavaScript And XML) approach and J2EE (Java 2 Platform, Enterprise Edition) technologies
 - Created a “less linear”, faster, easier to use interface
 - [Demonstration](#)



Challenges of a Multi-Lab Team

► Communication

- Not face to face
- Face time is expensive, time consuming
- Hard to discuss highly-technical concepts

► Solution: Compromise

- Bi-weekly teleconferences
- One team meeting at PNNL in February; follow up in March at Science Team Meeting
- Project management tools; ARM Engineering Change Request (ECR) and Engineering Work Order (EWO) software
- Lots of emails!!!

Challenges of Development

- ▶ Legacy Data
 - Creating a data model to account for 10+ years of instruments, datastreams, naming conventions, etc.
- ▶ Servers across the country
- ▶ Primary developers spread across the country
- ▶ Simultaneous development activities
- ▶ User testing sections of website nearly complete

Meeting our Goals and Deadlines

- ▶ On September 27, 2005 (3-days early)
 - Published fully-functional shopping cart on www.arm.gov
 - Pulling information about sites, instruments, measurements, and datastreams from “shared” database
 - Integrated field campaign data and external data into shopping cart
 - Completed 3 rounds of user testing
- ▶ User feedback positive! Customer happy.

The Stats

Since October 2005:

- ▶ Total number of files ordered: **55,039**
- ▶ Total volume of order: **384.03 GB**
- ▶ Number of distinct users ordered through the shopping cart: **32**
- ▶ Number of orders made: **66**

Are We Done Yet?

- ▶ Continuing to refine our ordering system, integrate with our IOP information
- ▶ Exploring ways to make our data model more robust
- ▶ Documenting processes for adding new datastream information to the database
- ▶ Continuing to perform user testing to improve our users' experience; attended a website usability workshop