SURA Coastal Ocean Observing and Prediction (SCOOP) Program

Philip Bogden
CEO, GoMOOS
Director, SCOOP Program at SURA

Southeastern Universities Research Association

Prototyping a Distributed Facility to Advance the Science of Inundation Planning and Disaster Mitigation

North Carolina
The SCOOP Implementation Team

University of Alabama at Huntsville, University of Florida, GoMOOS, Louisiana State University, University of Miami, University of Maryland, University of North Carolina, Texas A&M, Virginia Inst of Marine Sciences
The True Costs of Hurricane Katrina

~ 1836 Lives Lost…

$120 B in Personal and Public Property Damage…..

Katrina & Rita together caused ~ 217 square miles of land loss in an already fragile ecosystem…

50% of New Orleans population displaced…
The Scientific Issue
Katrina Storm-Surge Simulation

Movie credits: Louisiana State University CCT SciViz Team…
Werner Benger, Amanda Long, Shalini Venkataraman, Stephen Beck
Ensemble of Numerical Grids

SCOOP supports a variety of coastal wave, surge, and water-level models along the Atlantic and Gulf Coasts.
Infrastructure Design Principles

The 3-Legged Stool

The 3 Legs:
1. Government
2. Private Sector
3. Research Community
Infrastructure Design Principles

90/10 Rule

Development & Production “Environments”

Standards Enable Innovation

Case Studies:

- Google
- Wal-Mart
- Raytheon & Lockheed
- NSF (Cyberinfrastructure)
- Microsoft
Cyber Infrastructure Requirements

I'll need to know your requirements before I start to design the software.

First of all, what are you trying to accomplish?

I'm trying to make you design my software.

I mean what are you trying to accomplish with the software?

I won't know what I can accomplish until you tell me what the software can do.

Try to get this concept through your thick skull: the software can do whatever I design it to do!

Can you design it to tell you my requirements?
“System of (legacy) Systems”
The Problem...
Standardize encapsulation & transport over Internet

Data Providers
- NASA
- NOAA
- USGS
- SEACOOS
- GoMOOS
- Etc…

Prediction Systems
- Meteorology Prediction Systems
- Wave, Tide & Surge Prediction Systems
- Hydrological & Water-Quality Prediction Systems

System Management
- Discovery
- Monitoring & Resource Usage

Applications
- Analysis Tools
- Decision-Support Tools

Standardize component interfaces (servers & clients)
Design Requirements
One Infrastructure -- Three Scenarios

Three User Scenarios:
1. Event-driven ensemble prediction
2. Retrospective Analysis
3. 24/7

Infrastructure Components:
- Distributed Archives & Databases, Catalogs,
- Models, Workflow & Analysis Tools, Computers, etc.

Service Interfaces:
- Web services, Open (community) standards
- GIS-compatibility, Web mapping
Ensemble winds from varied and distributed sources

NCEP
MM5
NCAR
Regional Archives
Synthetic Wind Ensembles

Select region and time range

Transform and transport data

Wind Forcing

Wave and/or Surge Models
ADCIRC
EICirc
CH3D
SWAN
WW3
Etc…

Result Dissemination

Archival
Verification
Visualization
Catalog
Decision Support

Analysis, storage, cataloging, visualization

Transport

Quality Control
SURAggrid
Maximum of Ensemble (2-Day Prediction)
(OGC-compliant service interface on Texas A&M Archives)
High Resolution Web Mapping of Katrina
CH3D & GIS-compatible services
Charlotte, FL & Charley
With CH3D & Google Earth
Alexandria, VA & Isabel
With ELCIRC & Google Earth
Present Status & Next Steps

Priority Products (*Prototypes*):

1. Flood maps (storm-specific & ensemble “types”)
2. Verification (model-data & model-model)
3. Event-driven system “Demo” (for testing)

Product Development (*Requirements-driven*):

- Iterative process that must involve users
- QA process that must engage scientists

Regional Requirements & “True” Inundation:

- Implications of precipitation, hydrology, waves
- Regional refinements (extensions to water quality)
For More Information…

http://scoop.sura.org/

http://www.sura.org/SURAgrid