# Cyberinfrastructure for Environmental Observatories

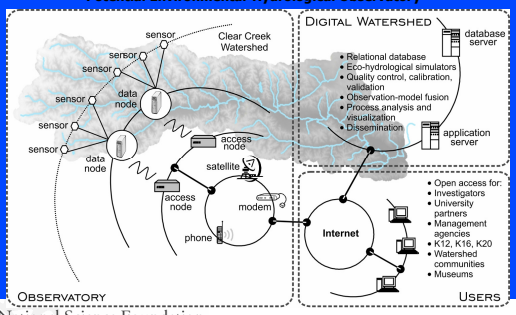
- Observatory Initiatives
  - WATERS, OOI, NEON
- CI Challenges
- CEO:P Program
- Next Steps

Peter McCartney (BIO), Pat Brezonik (ENG), Alexandra Isern (OCE)



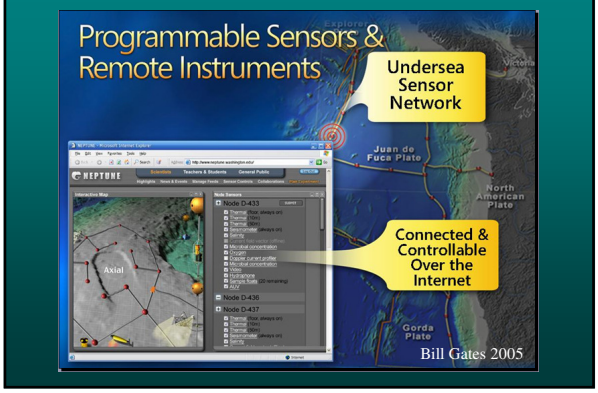
## WATERS Network cyberinfrastructure

**Potential Environmental-Hydrological Observatory**





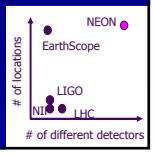

## Ocean Research Interactive Observatory Networks



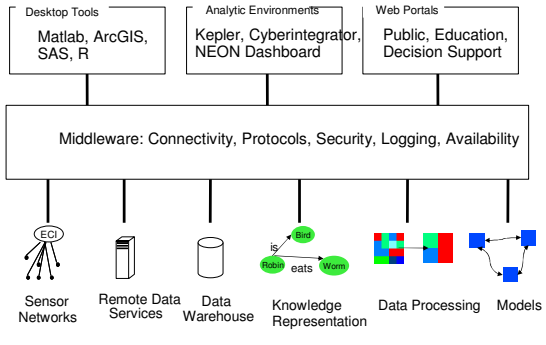

National Ecological Observatory Network (NEON)

## Cyberinfrastructure Issues

- Collaboratory & communication tools
- Hardware (Internet, wireless, computer, etc.)
- Specialized software (interface with technology, project management)
- Middleware (user interface, system integration, data-computation-visualization interface)
- Metadata, standards, protocols
- Computation capacity
- Knowledge discovery
- Interoperability



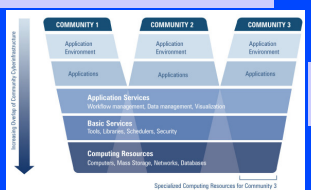

## Layered Cyberinfrastructure




## Cyberenvironments Project Landscape

Jim Myers, Thom Dunning

Community projects (e.g. WATERS, OOI, NEON)



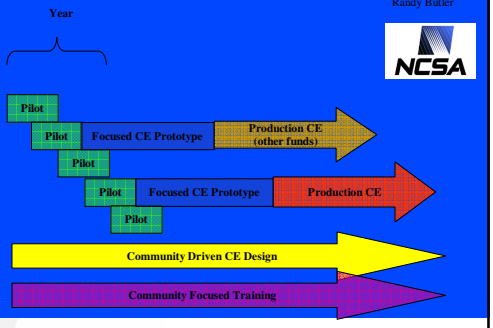

Middleware Development

Community Engagement, Training, Design Cross-Fertilization, Evaluation, …

CI service hosting

## Pilots, Prototypes, & Production Ces

Jim Myers,
Randy Butler






## Challenges

- How to ensure the workforce for CI development and maintenance
- How to keep cycles of development connected and on target
- How to promote interoperability between major observatory communities
- How to enable the research community to use cyber research environments



## CEO:P Program

- OCI, OCE, ENG, BIO
- Meacham, Isern, Brezonik, Blood, Thompson, McCartney
- 34 proposed projects
- Panel Review May 2006
- 8.5 M, 5 Awards



## CEO:P Goals

- ...help insure that the information infrastructure technologies needed to support the widespread use, for cutting-edge research, of large environmental observing systems are available [...\
- ...help environmental research communities and information technologists gain expertise with the technological challenges [...] so that [CI] design can be integrated ... into observatory design and [...] deployment.



- PI: Gagan Agrawal (Ohio State)
- Title: A Data-Intensive Cyberinfrastructure Component for Coastal Forecasting and Change Analysis
- Domain: Oceanography, Atmospheric
- Geographic Area: Great Lakes
- Question: Forecasting coastal conditions and erosion
- CI: Data integration, Image analysis, data mining, workflow



- PI:Thomas Gross (Chesapeake Research Consortium)
- Title: A Prototype System for Multi-Disciplinary Shared Cyberinfrastructure: Chesapeake Bay Environmental Observatory (CBEO)
- Domain: Ecology, Oceanography, Engineering
- Geographic Area: Chesapeake Bay
- Question: Seasonal hypoxia in coastal waters
- CI: Data integration, Sensors

- PI:Bernard Engel (Purdue)
- Title: C4E4: Cyberinfrastructure for end-to-end environmental explorations
- Domain: Atmospheric, Hydrology, Engineering
- Geographic Area: St. Joseph Watershed, IN
- Questions: Impacts of local & realtime information on predicting environmental quality
- CI: Grid computing, Informatin portals



- PI:Matthew Jones (UCSB)
- Title: Management and Analysis of Environmental Observatory Data using theKepler Scientific Workflow System
- Domain: Ecology, Oceanography
- Geographic Area: Western grasslands, Oceans
- Question: Pathogen vectors in exotic plant invasion, Quality assurance in sea surface temp data.
- CI: Workflow processing, system health monitoring



- PI: Michael Gertz (UC Davis)
- Title: COMET: Coast-to-Mountain Environmental Transect
- Domain: Ecology, Atmospheric
- Geographic Area: California Coast-Sierra
- Question: Impacts of novel climate conditions on ecoystems
- CI: Federated data systems, model integration



## Post Award

- PI meetings
- Integration with observatory development activities
- Framework for developing and maintaining cyberinfrastructure for environmental observatories