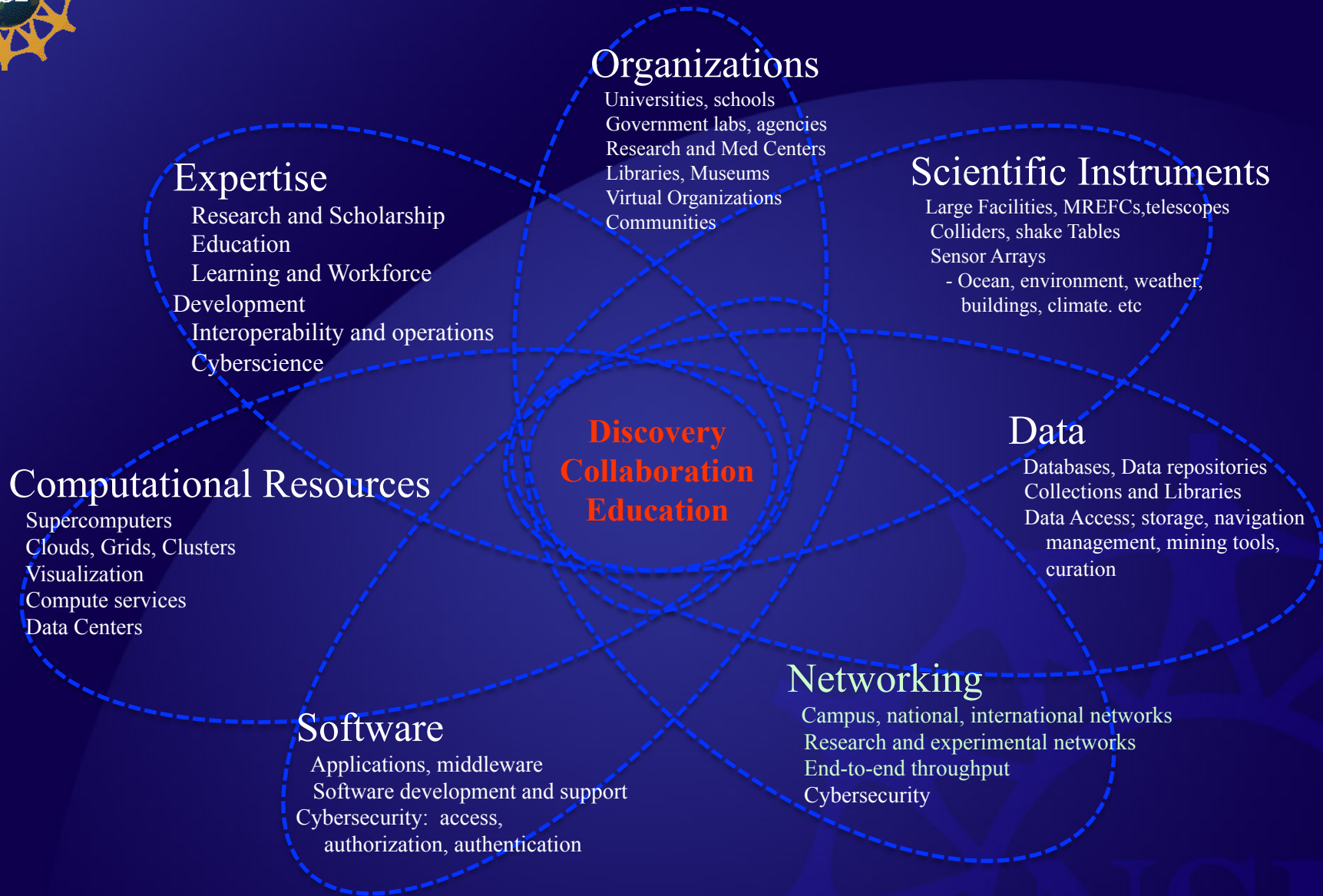


NSF's Office of Cyberinfrastructure and Networking

Kevin Thompson
NSF Office of CyberInfrastructure
January 24, 2012



Cyberinfrastructure Ecosystem



Maintainability, sustainability, and extensibility

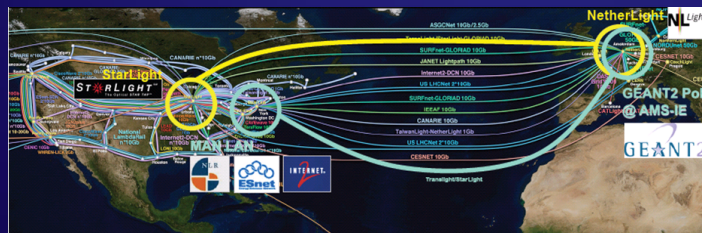


International Research Network Connections (IRNC)



❖ Goals:

- Provide network connections linking U.S. research with peer networks in other parts of the world
- Stimulate the deployment and operational understanding of emerging network technology and standards in an international context
- Support science and engineering research and education applications



http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503382



IRNC

- ❖ Increase capacity and reach into new and existing regions
- ❖ Strive to support to the scientist/engineer/educator/student by targeting an end-to-end approach in appropriate activities
- ❖ Maintain and build strong international relationships with colleagues and partners
- ❖ Leverage resources (capacity, tools, ideas) where feasible
- ❖ Collaborate closely with U.S. domestic R&E network providers and leaders
- ❖ Technical emphasis areas include measurement/monitoring
- ❖ **www.irnclinks.net**



OCI' s SDCI and STCI Programs 2011

- ❖ Software Development for CI (SDCI) Program
- ❖ 1 of 2 areas focused on end-to-end high performance networking
 - Network measurement and monitoring tools
 - Network protocol development/deployment
 - Sensor and wireless networking
 - 8 awards total, not including awards from previous years
- ❖ Strategic Technologies for CI (STCI) had 1 networking award in 2011
 - #1137045/#1136941 – “100G Connectivity for Data-Intensive Computing at JHU”
 - Lead PI Alex Szalay JHU, Abdella Battou, UMd



ACCI Task Force on Campus Bridging

- ❖ *Strategic Recommendation to the NSF #3: The National Science Foundation should create a new program funding high-speed (currently 10 Gbps) connections from campuses to the nearest landing point for a national network backbone. The design of these connections must include support for dynamic network provisioning services and must be engineered to support rapid movement of large scientific data sets."* - pg. 6, National Science Foundation Advisory Committee for Cyberinfrastructure Task Force on Campus Bridging, Final Report, March 2011
- ❖ www.nsf.gov/od/oci/taskforces/TaskForceReport_CampusBridging.pdf
- ❖ Also see Campus Bridging Technologies Workshop: Data and Networking Issues Workshop Report. G.T. Almes, D. Jent and C.A. Stewart, eds., 2011, <http://hdl.handle.net/2022/13200>



Addressing Campus CI Needs?

- ❖ Potential for an OCI program supporting campus networking
- ❖ 2 areas?:
 - Network Infrastructure improvements
 - Network Integration and applied innovation: supporting end-to-end network CI through integration of existing and new technologies
 - All funded activities tied to data intensive science



Campus Networking

- ❖ Possible Program area #1 – campus infrastructure improvements:
 - Network upgrades within a campus network supporting wide range of science data flows
 - Re-architect a campus network for scientific data flows – “Science DMZ”
 - Campus network upgrades addressing energy efficiency
 - Connection upgrades
 - Emphasis on leveraging dynamic network services
 - Require proposals to include a campus CI plan?



Campus Networking

❖ Possible Program Area#2 - Integration

- Experimental deployment of new networking protocols and technologies
- Integration of networking protocols and technologies with application layer code and processes
- Tool development supporting native IPv6 campus environments
- Transitioning and leveraging successful r&d in SDN, Named Data Networking, and others, to distributed scientific environments and campus infrastructure
- Development and deployment of mobile communication protocols and capabilities to support remote sensor and instrument access, real-time and adaptive steering, and energy efficiency.
- Applying new energy efficient algorithms and techniques to production networking environments
- Network engineering support through the creation and application of a “tiger team” for solving end-to-end network performance issues.
- Applying network monitoring/measurement or security tools and capabilities, including PerfSonar, Bro, and Web10G, to scientific domains, project end systems, and distributed environments.