

Kees Neggers, Strategic Advisor SURF e-IRG Workshop, Amsterdam, 3-4 December 2012

Cyberinfrastructure Ecosystem

Expertise

Research and Scholarship Education Learning and Workforce Development Interoperability and operations Cyberscience

Organizations

Universities, schools
Government labs, agencies
Research and Medical Centers
Libraries, Museums
Virtual Organizations
Communities

Scientific Instruments

Large Facilities, MREFCs, telescopes
Colliders, shake Tables
Sensor Arrays
- Ocean, environment, weather,
buildings, climate, etc

Discovery Collaboration Education

Computational Resources

Supercomputers Clouds, Grids, Clusters Visualization Compute services Data Centers

Data

Databases, Data repositories
Collections and Libraries
Data Access; storage, navigation
management, mining tools,
curation

Software

Applications, middleware Software development and support Cybersecurity: access, authorization, authentication

Networking

Campus, national, international networks Research and experimental networks End-to-end throughput Cybersecurity

Maintainability, sustainability, and extensibility

Courtesy Alan Blatecky

Internet history

- No grand design of the Internet
- No central management
- Evolution
 - Backbone → NAPs → IXPs
 - Research → users → commercial → political
- Innovation driven by the advanced requirements of the science community

Lessons learned (1)

- Cooperation between networks requires a shared control plane
- Centralistic models won't work
 - Complex to implement
 - Not scalable
- Create a loose cooperation between domains
 - Each domain creates its own solutions
 - Standardized interfaces between domains

Lessons learned (2)

- Keep it simple
- Architecture based on openness and diversity
- Multi-domain connected via Open standards
- Bottom up development together with users (with opposition from incumbents)
- Voluntary international cooperation

e-infrastructure innovation

Will be driven through competition, co-operation and flexibility

Needs openness, neutrality and diversity as guiding principles

Must take account of the global context

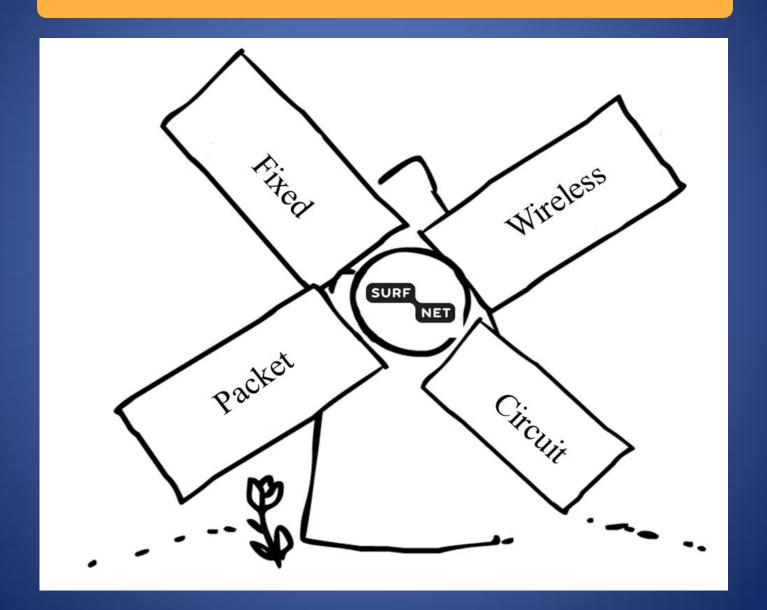
Distinguish three core functions

 Community building, high-level strategy and coordination (with a limited number of organisations and governing bodies)

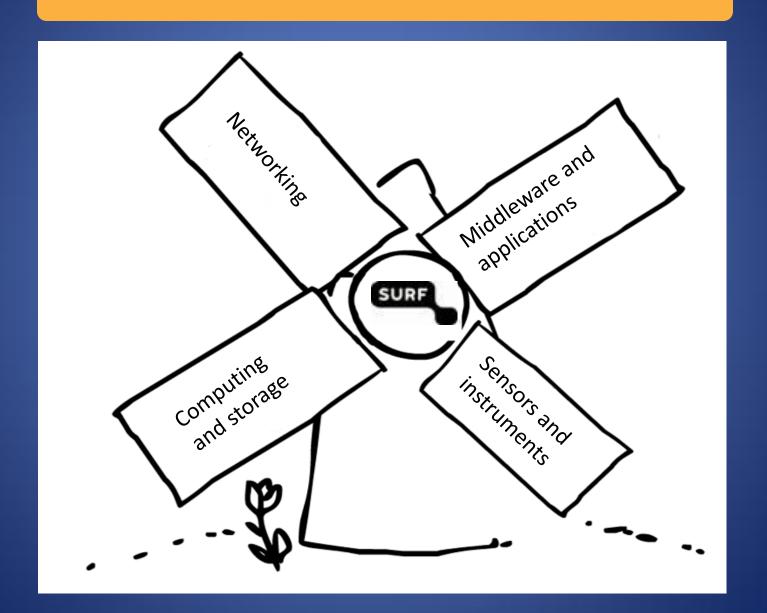
Service provisioning (on a competitive basis)

Innovation (via multiple projects)

The new Internet



e-Infrastructure





Cooperation remains essential

