Unidata’s Future

The future belongs to those who prepare for it today.

Malcolm X (1925 - 1965)
Outline

- Prediction
- Today’s Context
- Tenets shaping Unidata’s future
- Evolution of the modes of support
- Crystal ball gazing
- Conclusions
Prediction

- Prediction is very difficult, especially about the future.
  
  **Niels Bohr (1885 - 1962)**

- The best way to predict the future is to invent it.
  
  **Alan Kay**
Today’s Context

Starting from the known
Appropriations for the National Science Foundation
FY 1998 - 2004

Assertive Growth for the Nation’s Future

Total Growth FY 98 – FY 04: $2 billion (60%)
Today’s Guidance
Tomorrow’s Opportunities and Challenges

Examples
Cyberinfrastructure

- NSF has an opportunity to provide leadership for the Nation in an initiative to revolutionize science and engineering research capitalizing on cyberinfrastructure opportunities.
  - A nascent revolution has begun. Demand is here and growing. The time is now (opportunities & opportunity costs.)
  - Many prior investments (projects, initiatives, centers) are a key resource to build upon.
  - Now need sanction, leadership and empowerment through significant new funding and effective coordination.
  - Need very broad (synergistic) participation by many communities with complementary needs and expertise.
  - Need appropriate leadership and management structure.
  - Need incremental funding of $1B/year.
Advanced Cyberinfrastructure Program (ACP): Need highly coordinated, persistent, major investment in...

- **Research and development (CI as object of R&D))**
  - Base technology (CISE)
  - CI components & systems (CISE & SEB)
  - Science-driven pilots (CISE, SEB, all others)

- **Operational services**
  - Distributed but connected (Grid)
  - Exploit commonality, interoperability
  - Advanced, leading-edge but…
  - Robust, predictable, responsive, persistent

- **Domain science communities (CI in service of R&D)**
  - Specific application of CI to revolutionizing research (pilot -> operational)
  - Required not optional. New things, new ways.

- **Education and broader engagement**
  - Multi-use: education, public science literacy
  - Equity of access
  - Pilots of broader application: ITFRU, industry, workforce & economic development
If this is the future, what roles will Unidata play in facilitating it?
Key Factors Shaping Unidata’s Future
Tenets Shaping Unidata’s Future

1) Customers for services and information in every sphere of education and research will want to be able to influence the form and makeup of some of the information they consume, while continuing to be passive recipients of other, prepackaged information products. They will also use more avenues to send out more kinds of information to others.

1 NRC Report: The Unpredictable Certainty
Tenets Shaping Unidata’s Future (2)

2) Personalization of information and communication services will be a key consequence of the availability of computer intelligence to almost every individual through a variety of devices. An important impetus will be significant changes in available wireless systems. (e.g. Smart Mobs, H. Rheingold)
Tenets Shaping Unidata’s Future (3)

3) The distinctions among the workplace, home and schools will continue to erode as part of a broader blurring of the association between activities and locations and the broader penetration of computing and communications in all manner of research and education activities. Public data networks will provide a key mechanism to

A. Integrate widely separated research and education locations into collaborative institutions

B. Allow the research and education transactions to extend to the home and to many other off-site locations (nomadic computing) and

C. Allow the home to become the base of a wide variety of research and educational activities. When coupled with rapidly expanding wireless capabilities, the end result will be a truly anywhere, anytime research and education environment.
Tenets Shaping Unidata’s Future (4)

4) Research and education activities and services will increasingly be supported and transformed by information networks, merging education and research service delivery, improved efficiency and enhancing the quality of work undertaken by a wide range of non-atmospheric sciences professionals, and increasing the consumer’s ability to obtain desired information directly. Similar phenomena will transform research’s and educator’s participation in a process of democratization of the sciences in ways that are hard to foresee.
To whom, for what purpose, and for how long should NSF provide support?
The Evolution of NSF

- What will be the most effective the modes of support for NSF to “Enabling the Nation’s future through discovery, learning and innovation”? 

- Core culture – single investigator research grants

- Science-driven evolution of NSF?
  - Cross directorate multiply investigator announcements
  - New emphasis on infrastructure
    - MREFC
    - Cyberinfrastructure
    - Mid-size infrastructure
Overview of NSF Strategic Goals and Resource Allocation

To promote the progress of science; to advance the national health, prosperity & welfare; to secure the national defense; and for other purposes

Enabling the Nation's future through discovery, learning and innovation

**MISSION VISION**

**STRATEGIC GOALS**

**PEOPLE ($1,153M)**
- Individuals ($457M)
- Institutions ($169M)
- Collaborations ($527M)

**IDEAS ($2,696 M)**
- Core ($1,931M)
- Priority Areas ($765M)

**TOOLS ($1,341M)**
- Large Facilities ($906M)
- Infrastructure and Instrumentation ($435M)

**ORGANIZATIONAL EXCELLENCE ($291M)**
- Human Capital
- Business Processes
- Technologies and Tools

**RESOURCE-LINKED OUTPUT GOALS**

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June 23, 2003
Division of Atmospheric Sciences
Science and Engineering Infrastructure for the 21st Century
The Role of the National Science Foundation

The Charge to the Task Force

“Undertake and guide an assessment of fundamental science and engineering infrastructure in the United States … with the aim of informing the national dialogue on S&E infrastructure and highlighting the role of NSF as well as the larger resource and management strategies of interest to Federal policymakers in both the executive and legislative branches.”
“The Board recommended that the NSF initiate a process to engage the broader atmospheric sciences community in a strategic review of the mechanisms most appropriate to move the nation's current and future science and educational goals forward. The review should evaluate specific modes of support for facilities, research, and education. This process shall be completed in the next 30 months. Periodic reports on this process shall be made to the CPP “

Committee of Program and Plans of National Science Board, May 2003.
The Possible

Crystal Ball
 ALERT!

- There will be heavy precipitation at your current location in 5 minutes!
- Strong winds and damaging hail in 7 minutes!

TAKE COVER IMMEDIATELY!

Now Casting!

😊 Accurate, location- and time- dependent delivery of environmental information via broadband wireless communication.

😊 Value added products and delivery systems developed as proto-types by the Unidata community.

😊 Transform the university research and education environment through what is possible.
Conclusions

- Unidata will invent the future
- Technology will continue to evolve at a rapid pace and present Unidata with
  - Challenges – right choices at the right time
  - Enormous opportunities
- Unidata will become a strategic partner with federal, state, and local governments in providing science and technology in service to society
Questions or Comments