Disclaimer

These slides were presented at the President's Information Technology Advisory Committee's (PITAC) November 4, 1998 meeting by the chairs of its six panels. The panels were asked to suggest revisions to the PITAC's Interim Report. The information in these slides will be taken into consideration as the PITAC drafts its final report.

PITAC Management Panel

Raj Reddy, Chair

PITAC Public Meeting

November 4, 1998

Management Panel Members

Raj Reddy, Chair

Vint Cerf

Ken Kennedy

Ed Lazowska

Ted Shortliffe

Objectives

- Solicit and consider feedback from the community to the PITAC's Interim Report's management recommendations
- Prepare proposed revisions to the Interim Report's Management section
- Work with the Modes of Funding Panel

Questions to be addressed

- What funding/management structures are appropriate?
  - Particularly given recommendations for funding increases?
- Review recommendations of the Interim Report.
  - Review coordination and responsibility mechanisms with regard to NSF, DARPA, ASCI, etc.
  - Can NSF handle the coordinating role?
  - Are there alternatives we should recommend ?
  - What is the responsibility of DARPA, DoE, ASCI?

Activities

- Meet with CIC Agency Directors and/or their Principals
- Meet with Agency heads of CIC R&D to get their comments
- Meet with others in the community, to discuss response to the recommendations

Management Panel Meetings and Telcons to Solicit Agency Feedback

NSF:	Rita Colwell, Joe Bordogna (Oct. 16)
	Juris Hartmanis (Oct. 29)
	Rujena Bajcsy (Incoming CISE Director, Oct. 16)
DDR&E:	Delores Etter, Charles Holland, David Tennenhouse (Oct.16)
DARPA:	Frank Fernandez, David Tennenhouse (Oct. 29)
NIST:	Ray Kammer, Shikri Wakid (Oct. 29)
	Jerry Linn (Oct. 29)
EPA:	Joan Novak, Gary Foley, Frank Schieremeier (Oct. 30 telcon)
NASA:	Lee Holcomb (Oct. 23 telcon)
DoE:	Ernie Moniz (Nov. 3)
	Dan Hitchcock (Oct. 23 telcon)
NIH:	Bob Martino (Nov.3)
NOAA:	Bill Turnbull (Nov. 3)
NCO:	Sally Howe (Nov. 3)
Others:	John Toole (Nov. 3)

Summary of Meeting with Rita Colwell

- Agreed with statements by Management Panel regarding the importance of funding CS&E, not simply as an enabling technology for computational science, but to produce new capabilities
- An initiative in IT R&D is the most important initiative for NSF this year
- There are many areas of science ready to "explode" in regards to their use of IT – biological sciences is a good example
- A managed infrastructure capability is needed for scientists
  - Need for joint funding – we seem to have stopped doing this
- Important to find ways to team with industry
- Need to find a way to fund young investigators not on tenure track because of lack of faculty positions

Summary of Meeting with Delores Etter/DDDR&E

- Funding IT research is important
- Expressed concern about omissions of the PITAC report
  - in particular the important contributions of DARPA
  - IT work is done in DoD, in addition to that in DARPA
- Understand the need for flexibility to have different models of R&D funding
- Different models for accomplishing R&D are important for diversity
- Consider a “board of directors” to deal with policy issues
- DoD has a large 6.1 research program
  - includes funding to universities for IT R&D
  - these programs are not part of CIC
- Will provide a statement similar to that from DARPA for rest of DoD IT R&D
- DoD has strong history of successful IT R&D funding
  - capable program managers trying to affect a paradigm shift
  - history of funding R&D that might not be attractive to university researchers, but important to DoD, such as INFOSEC

Summary of Meeting with Frank Fernandez/DARPA

- DARPA has played a critical role in the evolution of information technology through key long-term investments
  - these investments were targeted at anticipated defense needs
  - but they contributed effectively to meeting both defense and non-defense needs.
- In recent years, DARPA chose to broaden its IT investments to reach beyond High Performance Computing
  - into areas such as information management, visualization, networking, information infrastructure, software engineering and information survivability
- A substantial portion of DARPA's current IT portfolio is aligned with the recommendations of the PITAC
  - especially in areas of Software, HCI, and Scalable Infrastructure.
- Recently there have been cases in which DARPA chose to emphasize somewhat shorter-term goals and demonstrations

Summary of Meeting with Frank Fernandez/DARPA

- Shorter-term focus was due, in part, to the desire to demonstrate to the Warfighter the positive impact of IT
  - This awareness is now firmly in place and that the military is now actively pursuing near-term developments on its own
- DARPA plans to reemphasize investments that have the following attributes:
  - high potential impact for defense (and likely for other sectors as well)
  - significant innovation, high risk/high payoff
- Of particular interest will be the creation of experimental testbeds that demonstrate particular capabilities in domains of interest to defense
- DARPA intends to concentrate on focused critical mass efforts
- DARPA fully expects other agencies to complement these efforts
  - provide as strong a combined investment program as is possible given the available resources

Feedback from the community – concerns regarding a "lead" agency

- Agencies must meet agency mission needs; can't/won't accept another agency telling them what to do
- Congressional committees won't accept another agency determining an agency's priorities
- NSF considers its mission as all of science and engineering - treats CS&E as enabling technology for the other sciences and engineering
- NSF too dependent on peer review
- Non-popular R&D is not funded
- Need visionary PMs empowered to fund high-risk/high-payoff R&D
- NSF doesn't have a track record of defining long-term objectives
- NSF highly subject to NSB decisions
- In most successful fields there is major funding by at least 2 agencies
- Diversity of funding models is important

Feedback from the community - what a "lead agency" should do

- Be responsible for fundamental IT R&D; shepherd core CS&E
- Be proactive with OMB on behalf of the agencies
- Gather info regarding long term fundamental research in IT
- Articulate a long-tem plan for fundamental IT R&D
- Assess current programs and recommend changes as needed

Results of Panel Deliberations/Community Feedback

- Term “lead agency” probably not correct
- Important to have an agency with designated responsibility for supporting fundamental IT R&D and core CS&E
- Other agencies should also fund fundamental IT R&D – diversity is important
- Fundamental IT R&D should receive a substantial increase in funding
  - Allow for sustained focus on important areas of fundamental IT R&D
- Need flexibility to identify critical new areas and phase out older ones
- Need metrics of progress

Results of Panel Deliberations/Community Feedback

- Coordination among agencies is important
- Coordination is needed at OSTP level
  - it is not practical to have an agency subject to policy/budget decisions of another agency
- There should be multiple lead agencies – subareas will have natural lead agencies for areas of specific interest to them; example scanning/imaging for NIH; NIST – metrology, infosec
- Need senior level agency management actively involved in the coordination process
  - folks who can make commitments regarding agency spending
- NSF is the right agency to have responsibility for core CS&E by default
  - its mission of basic science R&D and academic funding
  - all other agencies have specific agency missions

Preliminary Report Recommendations

- Designate a lead Federal agency for coordinating information technology research. The most logical choice for this role is the National Science Foundation (NSF)
- Expand the current coordination mechanisms already in place to include the entire Federal IT R&D endeavor
- Establish a comprehensive annual review of research programs by the coordination committee, with advice from the Advisory Committee, to ensure that these programs are achieving the goals set out for them

Suggested Final Report Recommendations

- Designate NSF as the lead Federal agency for ***fundamental research*** in information technology
  - multiple lead agency model: example, NIH - imaging/scanning; NIST - metrology and databases
- Approximately half of the recommended funding increment should go to NSF to support fundamental research in CS&E
  - the vast majority of the funding increment that goes to NSF should go as a designated line item similar to Antarctica program
- NSF is *not* responsible for all fundamental research, but is responsible for ensuring the health of IT R&D
  - NSF should have the funding to do those things that the mission agencies choose not to do

Suggested Final Report Recommendations

- Establish a White House focal point for IT R&D – given importance of IT to the Nation it is critical that it be given appropriate attention
  - Associate Director for IT at OSTP
  - NCO becomes a permanent staff organization to this individual
- Expand cross-agency coordination responsibility to include the entire Federal IT R&D endeavor
- Establish a committee, comprised of senior-level officials with policy-making authority (and who can affect agency funding decisions)
  - with responsibility to advise and assist the Administration to increase the overall effectiveness and productivity of Federal IT R&D

Why a Lead Agency for Fundamental IT R&D?

- Rationale for investment in fundamental research in computing is the same as for any other field: ***to make possible the unexpected***
- ***Computer science is revolutionary and transformational***, not evolutionary and incremental
  - Tomorrow's revolutionary and transformational applications will be things we can't even envision today – things made possible by progress at the core of the field
- Of necessity, the mission agencies focus on applications of importance to their missions
  - In some cases on fundamental research strictly related to those missions
- This leaves fundamental research in many critical areas of the field inadequately supported

Why NSF?

- NSF has the broadest mission, and the mission most in line with the nation's current economic and social objectives
- But NSF *is* a mission agency – its mission is the support of science and engineering
- Those who we interviewed expressed the concern that NSF tends to treat computer science like many other mission agencies do
  - in NSF's case, the agency is felt to focus excessive attention on those aspects of computer science that provide short-term support for the other science and engineering disciplines
- NSF must change this behavior if it is to be an effective lead agency for fundamental research in information technology
  - NSF must place a significantly increased value on the core of the field, in order to enable revolutionary and transformation applications tomorrow

Why an Expanded Coordination Role?

- Nothing stronger is possible
- Those who we interviewed emphasized that the mission agencies are only going to carry out work that supports their missions
- Congressional committees that oversee them are not going to cede responsibility to one another.
- Nothing weaker is adequate for the nation's future
- Need to ensure that the waterfront is covered – broker programs across agencies

Major Issues Remaining

- What are the metrics for a well-managed program?
- Should the coordination process be expanded to programs not currently in the CIC programs? If so, to which programs? How should the research be coordinated?
- How should computational infrastructure be managed – part of the IT R&D program, or separately as NSF manages telescopes?
- Should funding for applications development be considered part of the IT R&D program? If so, how should it be managed?
- Can the agencies efficiently manage the proposed funding increment?
- What is the appropriate rate at which IT R&D funding can be increased?

Management Panel Executive Summary

- PITAC Interim Report management recommendations:
  - increase long-term fundamental research in IT
  - designate a lead Federal agency for coordination IT research
- Panel solicited feedback from Agency Heads and others regarding Interim Report
  - met with Rita Colwell, Delores Etter, Frank Fernandez, Ray Kammer, Lee Holcomb, Ernie Moniz, and others
- Summary of discussions:
  - uniform agreement in support for fundamental research in IT
  - concern regarding lead agency designation
  - diversity of funding sources and modes is important
  - designate NSF as the lead Federal agency for ***fundamental research*** in IT
    - multiple lead agency model, for example: DARPA - scalable networking and revolutionary software; NIH - imaging/scanning; NIST - metrology and infosec
  - Panel recommends, given importance of IT to the Nation in the 21st Century, that there be an OSTP Associate Director of IT and coordination support at OSTP level

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