

The Role of SBIR in Innovation



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Background

- SBIR created in 1982 by the Small Business Innovation Development Act
- Objective: stimulate technological innovation among small (under 500 employees) private-sector businesses; while providing the government with cost-effective new technical and scientific solutions to challenging mission problems, and to help stimulate the U.S. economy by encouraging small businesses to market innovative technologies in the private sector
- Program reauthorized in 1992, 2000, and 2009
- Each year 11 federal agencies (those with R&D > \$100M) are required to set aside 2.5% of their extramural R&D budget exclusively for SBIR
- Currently \approx \$2.5 Billion/year program

Program Structured in Three Phrases

- Phase I – fund feasibility studies and research to show promise – Grants up to \$150,000 (20% of applicants win awards)
- Phase II – fund more extensive R&D to develop scientific and commercial promise (including for government sales) – Grants up to \$1M (about half applicants from Phase I selected)
- Phase III – focused on moving technology from prototype to the marketplace – funding from government agency, private investors, or the capital market

Government Agencies define their areas of mission needs (e.g. health, security, environment, energy, space); industry proposes solutions (selection based on technological and commercial feasibility)

A Key National Challenge is 'Jobs'
Innovative Start-ups are a Key National Asset

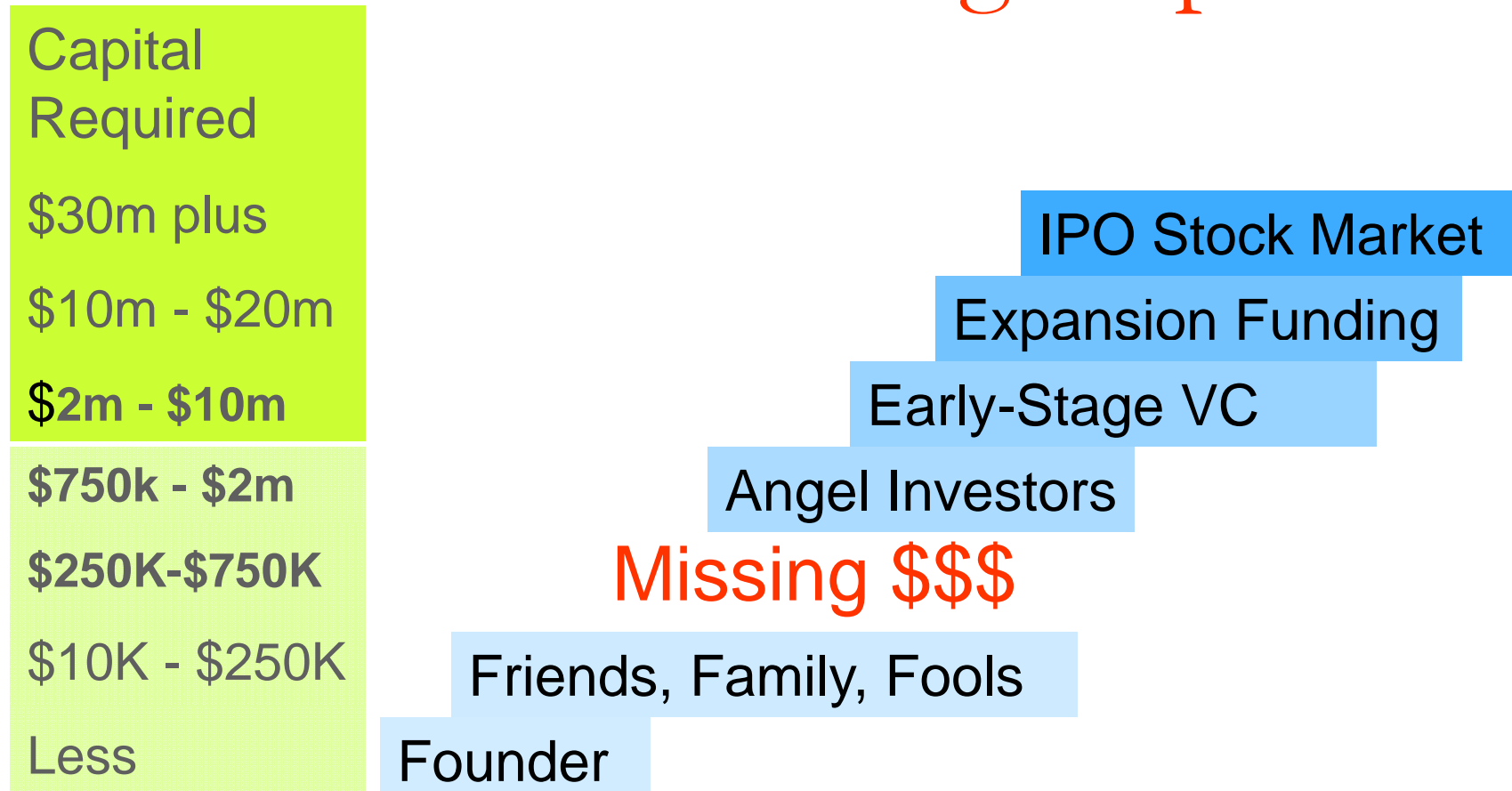
“Between 1980 and 2005, virtually all net new jobs created in the U.S. were created by firms that were 5 years old or less,”

Robert Litan, Kauffman Foundation

But Small Firms Face Major Challenges

- **SME's Face High Regulatory Burdens**
 - “In the distribution of federal regulatory costs, a disproportionately large share falls on small businesses”
 - Very small firms (less than 20 employees) spend 45% more per employee than large firms to comply with federal regulations
 - Mark Crain, “The Impact of Regulatory Costs on Small Firms,” SBA: SBHQ-03-M-0522, 2005
- **New Firms Struggle for Adequate Financing**
 - Start-Up funds from “Friends, Family, and Fools”
 - Banks hesitate to lend to Small Businesses
 - WSJ (March 15, 2010) “Loan Squeeze Thwarts Small-Business Revival”

The Missing Step

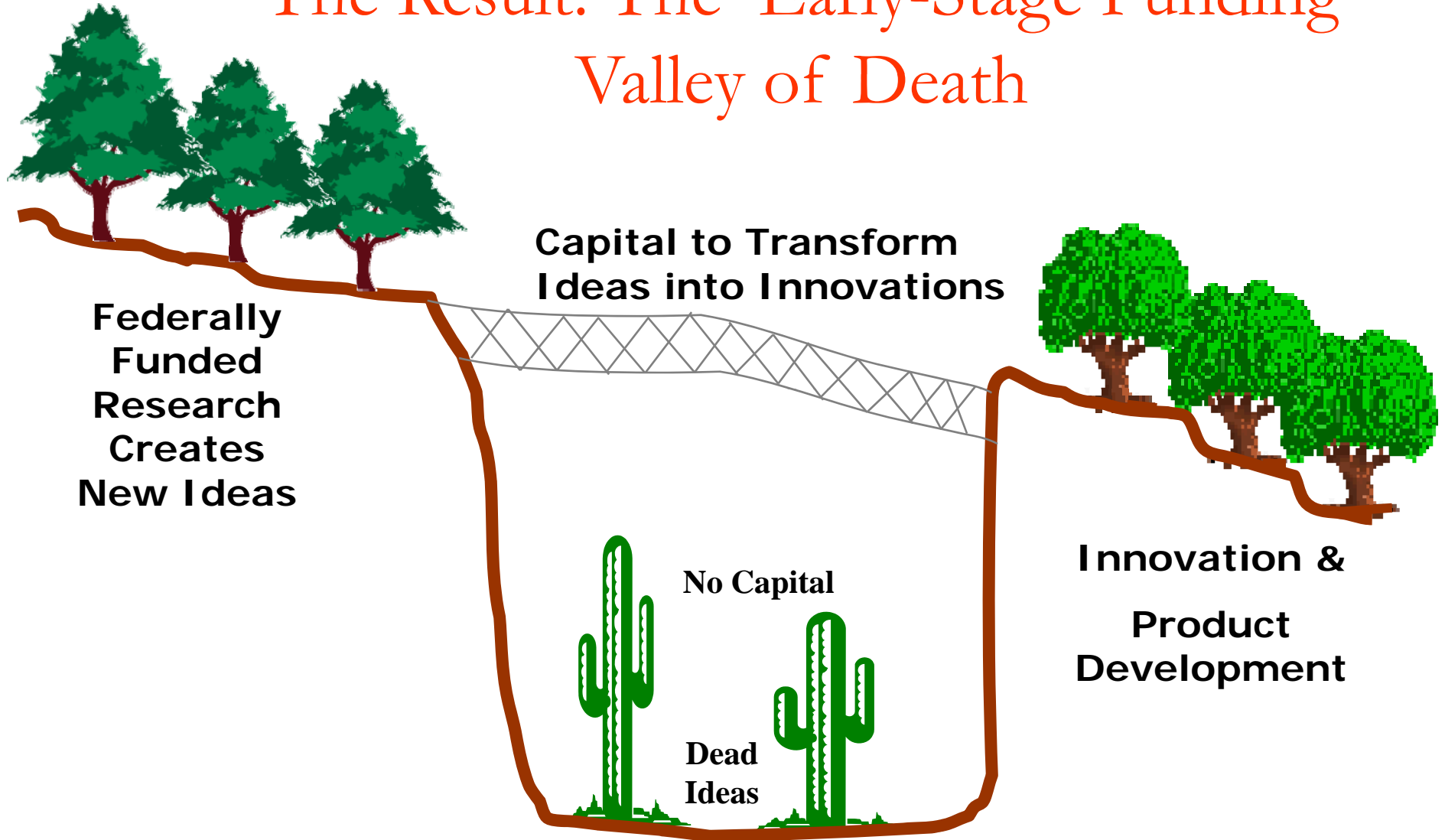


Concept → Development → Commercialization

What about the Capital Markets?

- Amount of Venture Capital available is limited
 - Two-thirds focused on Later and Expansion Stages of Investment
- Venture Capitalists have
 - Limited information on new firms
 - Prone to herding tendencies
 - Focus on lower-risk, later stages of technology development
 - Most VC investors seek early exit
- Funds available has dropped sharply in the current economic downturn

The Result: The Early-Stage Funding Valley of Death



SBIR's Advantages for Government

- **A low-cost technological probe**
 - Enables government to explore more cheaply ideas that may hold promise
 - Identifies dead-ends before substantial investments are made
- **Quick reaction capability**
 - Solicitation topics can respond rapidly to urgent national needs
 - Anthrax attacks led NIH to seek and get innovative bio-defense technologies
- **Diversifies the Government Supplier-base**
 - Brings in competition, low-cost solutions, new approaches to address government needs

Why do Entrepreneurs like SBIR?

- Provides ‘first money’—i.e., the “hardest money”
 - Helps get new projects started
 - Academics can apply even without a company
- No dilution of ownership; owners retain control
- No repayment is required
 - Government recoupment is through the tax system
- SBIR recipients retain intellectual property developed using the SBIR award
 - No royalties owed to the government, though government retains royalty-free use for a limited period
- Certification effect draws in additional investment
 - Signal to private investors of technological validity and commercial promise of the innovation

Why do Universities Increasingly like SBIR?

- SBIR Innovation Awards Directly Cause Researchers to create New Firms
 - **Lowers Risk:** Faculty does not have to give up University post
 - **Lowers Overhead:** Don't need to have a company to apply
 - 15 to 20% success rates—comparable to other grants
- New firms help grow the region and provide returns on R&D investments



*After nearly 20 years of operation,
The Congress asked the NRC:*

How well is SBIR Working Overall?

What do we mean by “work”?

The Focus of the NRC Assessment

- Do the agency SBIR programs meet program objectives?
 - to stimulate technological innovation
 - to increase private sector commercialization of innovations
 - to use small business to meet federal research and development needs
 - to foster and encourage participation by minority and disadvantaged persons in technological innovation
- How effective is the management of agency SBIR programs?
 - Are there best practices in agency SBIR programs that may be extended to other agencies’ SBIR programs?

NRC Study of SBIR

Unprecedented Large Scale Original Field Research

- **Surveys: Over 7000 Projects Surveyed**
 - Phase I Award Survey targeted 3000 firms
 - Survey on Phase II Awards (1992-2002) involved over 4000 firms
 - Program Manager Survey
 - Technical Manager Surveys (TPOCs and COTRs)
- **Case Studies**
 - Approximately 100 case studies conducted
 - Case Study selection reflects program diversity
- **Surveys & Case Studies Developed in Consultation with Agencies & SBIR users**

What was the Key Finding?

“The SBIR program is sound in concept and effective in practice.”

Why is SBIR an Effective Program?

- SBIR is proving effective in meeting Congressional Objectives by:
 - Increasing innovation
 - Encouraging participation by minorities and women
 - Providing support for small innovative firms
 - Resolving research questions for agencies

Achieves “commercialization” objectives
(for government missions and National economic benefits)

SBIR's Flexibility is a Strength in Meeting Multiple Agency Missions

- **Adapts to Agency Missions, Agency Culture, and Technology needs**
 - Each agency typically has its own manner of choosing awardees and screening applications
 - Different metrics reflecting unique agency missions and needs
 - Different Metrics by industrial sector, e.g., software vs. drug development vs. weapon components

SBIR Awards Have a Substantial Impact on Participating Companies

- **Company Creation:** 20% of responding companies said they were founded as a result of a prospective SBIR award—25% at Defense
- **Research Initiation:** SBIR awards played a key role in the decision to pursue a research project (70% claimed as cause)
- **Company Growth:** Significant part of firm growth resulted from award
- **Partnering:** SBIR funding is often used to bring in Academic Consultants & to partner with other firms

SBIR Helps Attract Additional Investments & Encourages Competition

Award is a Certification of Quality

- **Angel Investors:** 37 percent of NRC survey respondents attracted additional investment from Angels and other sources
- **Venture Funding:** SBIR is a signal of research quality and commercial potential. Over \$1.5 billion in added VC investments between 1992 and 2005
- **Acquisition:** e.g., Philips acquisition of Optiva for \$1 billion
- **Provides Greater Choice:** Provide New Options and Competition for Public Procurement, especially important at DOD

SBIR Strengthens University-Industry Links

- Over a third of the respondents in the NRC Phase II Survey of 4000 firms reported university involvement in their SBIR project. Of these:
 - More than 80% of NIH respondent companies had at least one founder from academia
 - About 1/3rd of founders were most recently employed as academics before founding the company
 - About 1/3rd of projects had university faculty as contractors on the project and 1/4th used universities themselves as subcontractors
 - 15% of SBIR awards involved graduate students.

Key Committee Recommendations:

Designed to improve the operation of the SBIR program

- **Preserve Program Flexibility**
 - SBIR flexibility and adaptability are strengths
 - Draw out and adapt best practices across the federal government
- **Experiment and Evaluate More**
 - Improve program processes
 - Experiment with programs that help firms rapidly transition from Phase I to Phase II and from Phase II to Phase III
 - Evaluate and upgrade the program regularly
- **Improve participation by women and minorities**
- **Provide management funding for all of the above**

Some Perspectives on SBIR

- Small-business entrepreneurs - - “couldn’t have gotten started without SBIR funding”
- Venture Capitalists - - “the SBIR is a great discriminator, since project made the government’s filter”
- Government S&T Manager - - “SBIR helps get funding for the needed long-term effects”
- Government Program Managers - - often view SBIR as a “tax on their R&D program”
- University Perspective - - “more and more of our faculty are directly engaged in research funded by SBIR and STTR”
- Foreign R&D Government Managers - - “SBIR is a major source of U.S. innovation” ... “we need to emulate it”

Phase 2 of the NRC Assessment of SBIR is Underway

It will provide a
valuable second
snapshot of data



Issues for the 2nd Phase of the SBIR Study

- Review institutional initiatives and structural elements contributing to programmatic success including
 - Gap funding mechanisms, e.g., applying Phase II-plus awards more broadly to address agency needs and operations.
 - Streamlining the application process
- Explore methods to encourage minority and woman participation in SBIR.
- Describe University-industry partnering and synergies with the SBIR programs.
- Document the role of complementary state and federal programs.
- Assess the efficacy of post-award commercialization programs

To Conclude...

We need to address Global
Challenges with Innovation

Current Global Challenges Require Innovation of New Products and Processes

- The U.S. Position in the World will Depend on a Strengthened Innovation Capacity
- We need programs like SBIR, and perhaps others, to provide the right incentives to bring the fruits of science to the market



Thank You

The Honorable Jacques S. Gansler
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Back-up Slides

The NRC Assembled a Top Flight Study Committee

- **Jacques S. Gansler**, University of Maryland (Chair)
- **David B. Audretsch**, Indiana University
- **Gene Banucci**, ATMI, Inc.
- **Jon Baron**, Coalition for Evidence-Based Policy
- **Michael Borrus**, X/Seed Capital
- **Gail Cassell**, Eli Lilly and Company
- **Elizabeth Downing**, 3D Technology Laboratories
- **M. Christina Gabriel**, The Heinz Endowments
- **Trevor O. Jones**, Electrosonics Medical, Inc.

Continued →

The NRC's SBIR Study Committee

- **Charles E. Kolb**, Aerodyne Research, Inc.
- **Henry Linsert, Jr.**, Columbia Biosciences Corporation
- **W. Clark McFadden**, Dewey & LeBoeuf, LLP
- **Duncan T. Moore**, University of Rochester
- **Kent Murphy**, Luna Innovations
- **Linda F. Powers**, Toucan Capital Corporation
- **Tyrone Taylor**, Capitol Advisors on Technology
- **Charles Trimble**, Trimble Navigation
- **Patrick Windham**, Windham Consulting

The Committee Commissioned Greenfield Research to Prepare a Series of Reports on SBIR

- An Assessment of the SBIR Program (2007): The Overview
- An Assessment of SBIR at NASA (2008)
- An Assessment of SBIR at DoE (2008)
- An Assessment of SBIR at NIH (2007)
- An Assessment of SBIR at NSF (2007)
- An Assessment of SBIR at DoD (2007)
- Revisiting the DOD SBIR Fast Track Initiative (2009)
- Venture Funded Firms & the NIH SBIR Program (2009)
- SBIR: The Phase III Challenge of Commercialization (2007)
- SBIR: Assessment Challenges & Program Diversity (2004)
- An Assessment of SBIR—Methodology Report (2004)

Draw from Best Practices

- SBIR is operated very differently at the five major agencies
 - NSF is relatively centralized
 - NIH is decentralized, with central coordination
 - NASA is in between
- The Committee has identified selected agency best practices for further examination and possible adoption by other agencies
 - DOD: Commercialization Tracking
 - Navy Funding of Evaluation
 - NIH: Proposal Resubmission
 - NSF: Phase IIB Enhancements
 - DOE: Commercialization Assistance
 - NASA: Electronic Processing

Improve Program Processes

- Increase flexibility and responsiveness of the program
 - Multiple annual solicitations
 - More transparency in the management of the award process
- Reduce time lags
 - From proposal to awards
 - Between Phase I and Phase II
- Experiment with Funding Beyond Phase II
 - **Provide additional funds** to Phase II grantees that obtain third party funds to accelerate the Phase II project to the commercialization stage

Provide Management Resources

- Effective management and evaluation requires adequate funding
 - Sufficient resources are currently not available for these functions
- The Committee's Menu of Options for Providing Funds to Manage the Program:
 - Allocate additional funds internally, within the existing budgets of the services and agencies, as the Navy has done
 - Reallocate funds from existing 2.5% set aside
 - Not allowed under current law
 - Marginally increase the set aside to provide necessary funding for program management and evaluation
 - The Committee recommends this third option

Report and Evaluate Regularly

- **Generate Data**
 - Data is needed to manage the program
 - What are the means of acquiring needed data?
- **Record Phase III Outcomes**
 - Is a Company Commercialization Report (like DOD's) feasible?
- **Prepare Annual Report**
 - Report should include descriptive statistics on applications, awards, and outcomes
- **Create an Advisory Board**
 - A mechanism to provide regular monitoring and feedback
 - Attract upper management attention

Improve Participation by Women & Minorities

- Agencies do not have a uniformly positive record in funding research by women and minority owned firms
 - Support for women owned firms has been rising
 - Share of minority owned firms in the program have been declining since the mid-1990s
 - Reasons why to be explored in subsequent analysis
 - Efforts to document and monitor their participation have not been adequate in some agencies
- The Committee Recommends:
 - Improving collection of data that tracks women and minority firms within the SBIR program
 - Developing targeted outreach based on analysis of underlying factors
 - Growing the talent pool by encouraging women and minorities to serve as co-investigators

Adjust Award Size for Inflation

- Inflation has eroded the real value of SBIR awards, last increased in 1995
- The Committee Recommends:
 - Making an adjustment, giving agencies latitude to increase the award size to make a new flexible “standard”—that is:
 - Phase I award up to \$150,000
 - Phase II award up to \$1 million
 - Transition increase in award size over 2 to 3 years
 - SBA should continue to provide flexibility for agencies in determining appropriate award sizes on a case by case basis
 - Agencies should continue to experiment with supplementary awards (e.g., the NSF Phase IIB initiative)