

Rethinking the Small Business Innovation Research Program



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The “I” in SBIR

- **What is innovation?**
 - Innovation is the Successful Transformation of New Ideas into Products, or Known ideas into New Products
- **Why must we Innovate?**
 - To Address Pressing Global Challenges that affect us all and to Grow our Economies in a Competitive World

Current Global Mega-Challenges

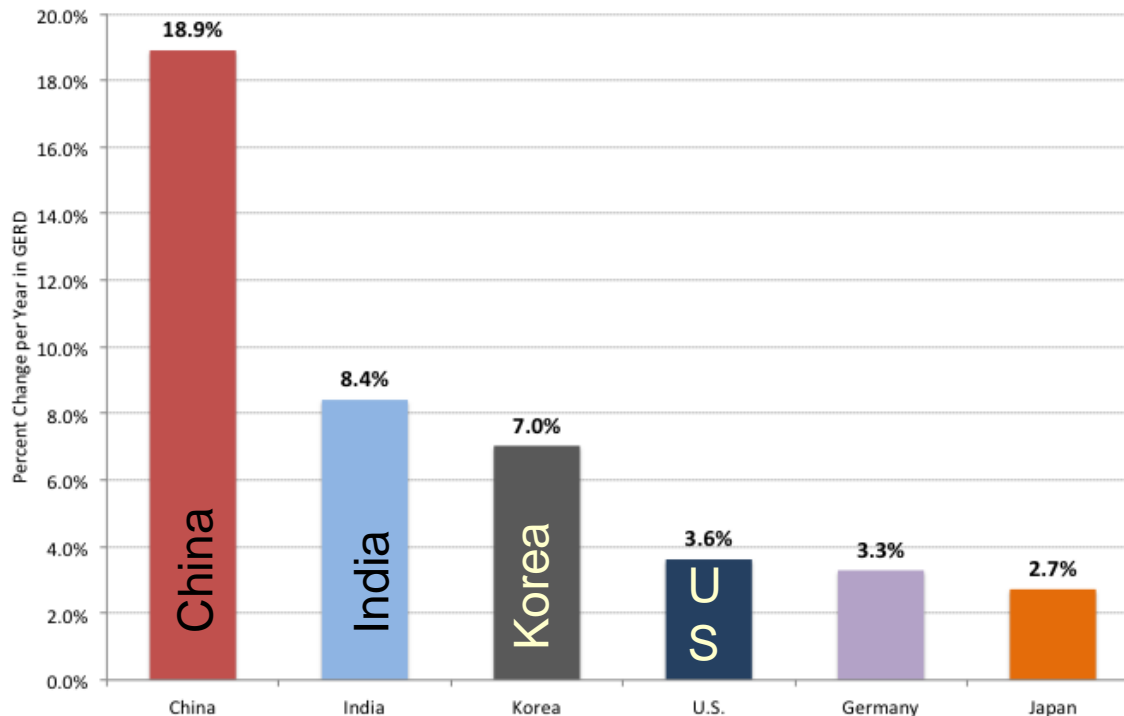
- Fostering Economic Growth through Innovation
 - Driving domestic Growth and Employment
- Developing New Sources of Energy
 - Commercializing renewable alternatives to oil
- Addressing Climate Change
 - Growing a Green Economy; A major Growth opportunity
- Delivering Global Health
 - Transforming large investments in research to affordable and personalized treatment and care
- Improving Security
- Innovation is key to addressing these challenges

Leading Countries and Regions are Responding to the Innovation Challenge

- They are providing five things:
 - High-level **Focus** on Growth and Strength
 - Sustained **Support** for Universities
 - Rapidly Growing **Funding for Research**
 - Support for Innovative **Small Businesses**
 - Government-Industry **Partnerships** to bring new products and services to market
- They are investing very substantial resources to create, attract and retain the industries of today and tomorrow.

Growing Commitments to R&D

Figure 3: R&D Spending Growth by Emerging Economies is Significantly Faster Than in Developed Countries (Average Annual Growth Rate 1996-2008)



Source: UNESCO, UNESCO Institute for Statistics, Science and Technology, Table 25. GERD refers to gross domestic expenditure on R&D. India growth rate for 1996-2007.

China's Goal: To Become an “Innovation-Driven Economy” by 2020

- Boosting R&D Investments
 - Expenditure on basic research doubled between 2004 and 2008
 - Tax incentives for enterprises that invest in R&D
- Building R&D Infrastructure and Facilities
- Focus on building world class universities to create a Skilled Workforce
- Government procurement favors “Indigenous Innovation”
 - **Foreign-owned technologies targeted for “assimilation”**
- Financial Support for “Indigenous Innovation”
 - Financing for large projects
 - Facilitating Credit and investment capital for SMEs

Source: Mu Rongpin, 2010 UNESCO Science Report

Its not just Size but Focus!

Singapore's Innovation Strategy

- Total Focus, Commitment, and Long-Term Spending by the Government
 - Goal is to establish Singapore (**population: 4.5 million**) as Asia's preeminent financial and high-tech hub.
- A*STAR's task, with \$5 Billion in funding, is to:
 - Invest in and attracting a skilled R&D workforce
 - Attract major investments in pharmaceuticals and medical technology production
 - Invest in Public Private Partnerships: Biopolis & Fusionopolis
 - Develop new programs to address the early-stage funding challenge for innovative firms
- Generating local entrepreneurs and firm growth remain challenges

Europe's Best Innovators are Changing

- Finland, Sweden, the Netherlands, & France are among those
 - Making Substantial public R&D investments
 - Reforming university structures and public research institutes
 - Mobilizing private capital for start-ups and growth companies (eg. by providing "tax grants")
 - Introducing new partnership programs
- Many of these Strategies draw from successful U.S. Policies and Programs

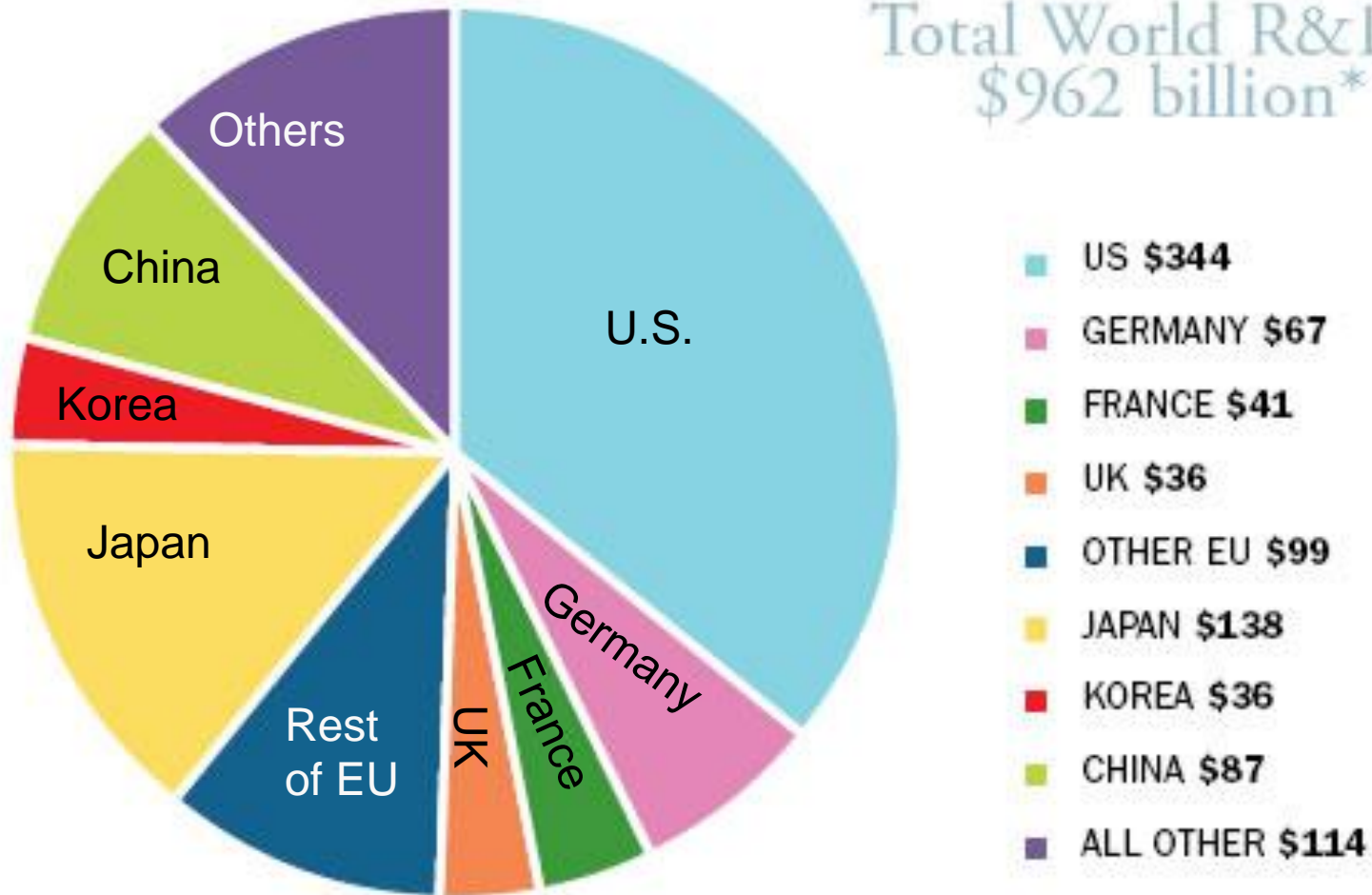


How is the United States Addressing the Innovation Imperative?

The Good News and the Bad News

National Shares of Global R&D

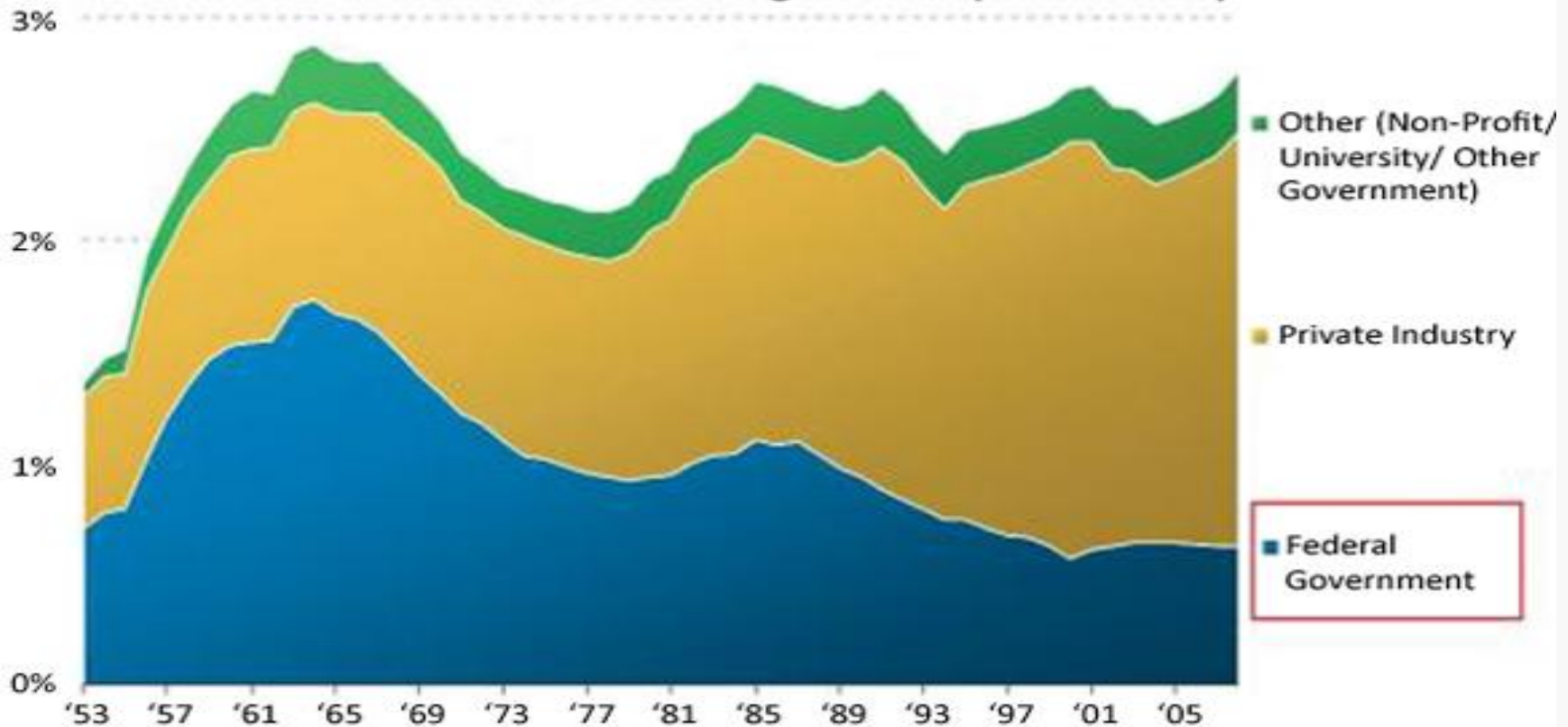
Total World R&D =
\$962 billion*



Source: OECD, Main Science and Technology Indicators, 2008.

Federal R&D investment as a percentage of GDP has been declining

**Total U.S. Technology Research & Development Spending
As % Of GDP BY Funding Source (1953-2008)**



Source: KPCB; National Science Foundation, Science and Engineering Indicators (2008)

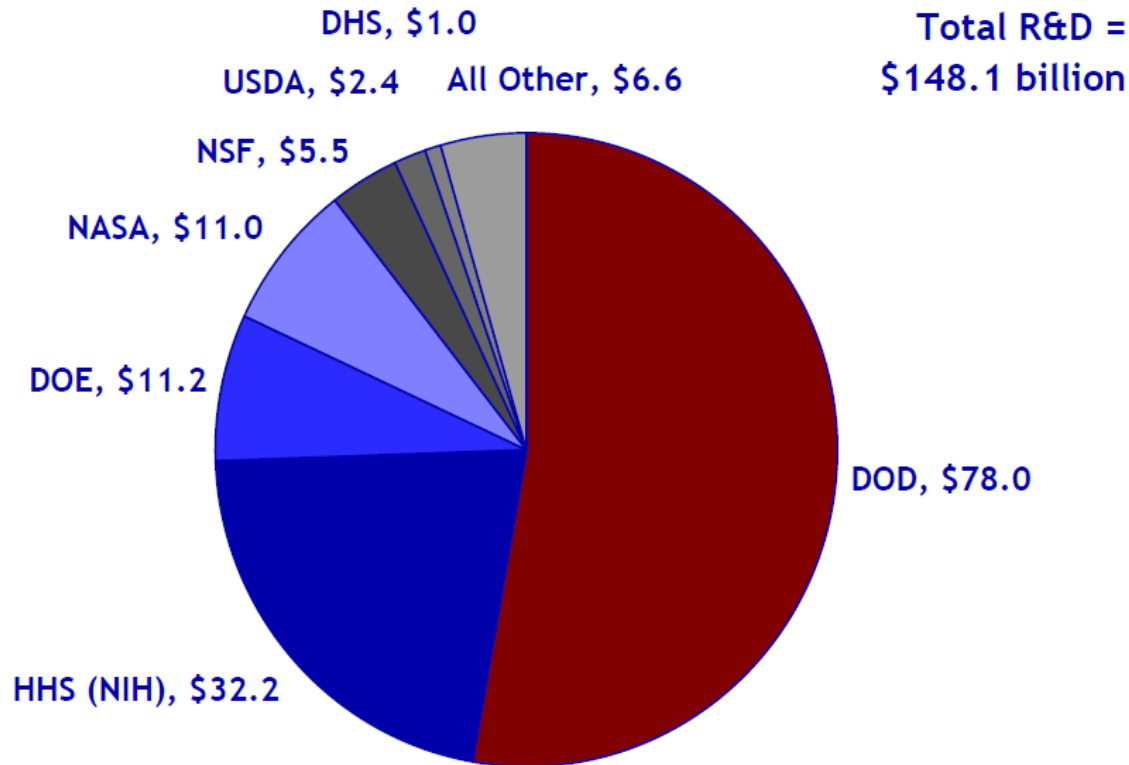
Share of Government R&D
spending targeted to basic research
has also been declining

Why is this a concern? Because
fundamental research is
ultimately the source of most
innovation

Defense R&D Budget is over 50 Percent

Total R&D by Agency, FY 2011

budget authority in billions of dollars



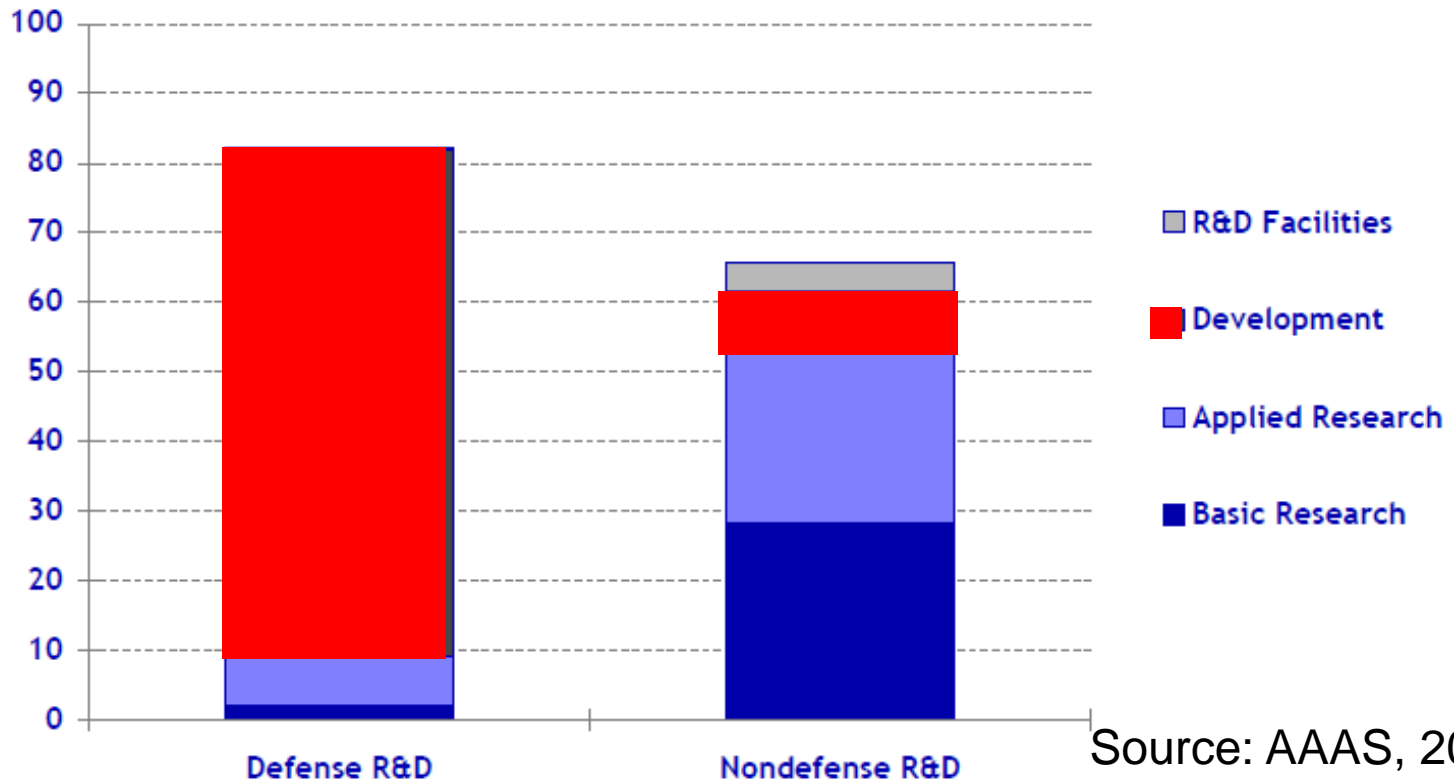
Source: OMB R&D budget data, agency budget justifications, and other agency documents.
R&D includes conduct of R&D and R&D facilities.

Source: AAAS, 2010

~90% of Defense R&D Spending is for Weapons Systems Development

Character of R&D, FY 2011

budget authority in billions of dollars



Source: AAAS, 2010

Major Risks to the U.S.

- **Complacency** about our competitive position in the world—little understanding of how we got here...primacy of market ideology.
- Limited attention to the **composition of the economy**, including trade and investment policy.
- Focus on **current consumption** rather than investment for the future.
 - A lack of investment in universities, in R&D, and on infrastructure on the scale of our fathers and our competitors
- Failure to focus on the **commercialization** of research and on manufacturing

How can the United States stay
ahead in this global competition?

Support our Innovative Small Businesses
They are a Key Strategic Asset for the U.S.

Small Businesses Drive High-Technology Innovation

- Small Companies are Key Players in Bringing New Technologies to Market
 - Audretsch & Acs
- Innovative American Small Businesses
 - Increase Market Competition
 - Generate Taxable Wealth
 - Create Welfare-Enhancing Technologies
 - Over time, innovative small businesses (like Microsoft, Intel and Google) transform the composition of the economy

Small Businesses Create Jobs

- “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 (2010)



Small Innovative Businesses Face Major Hurdles

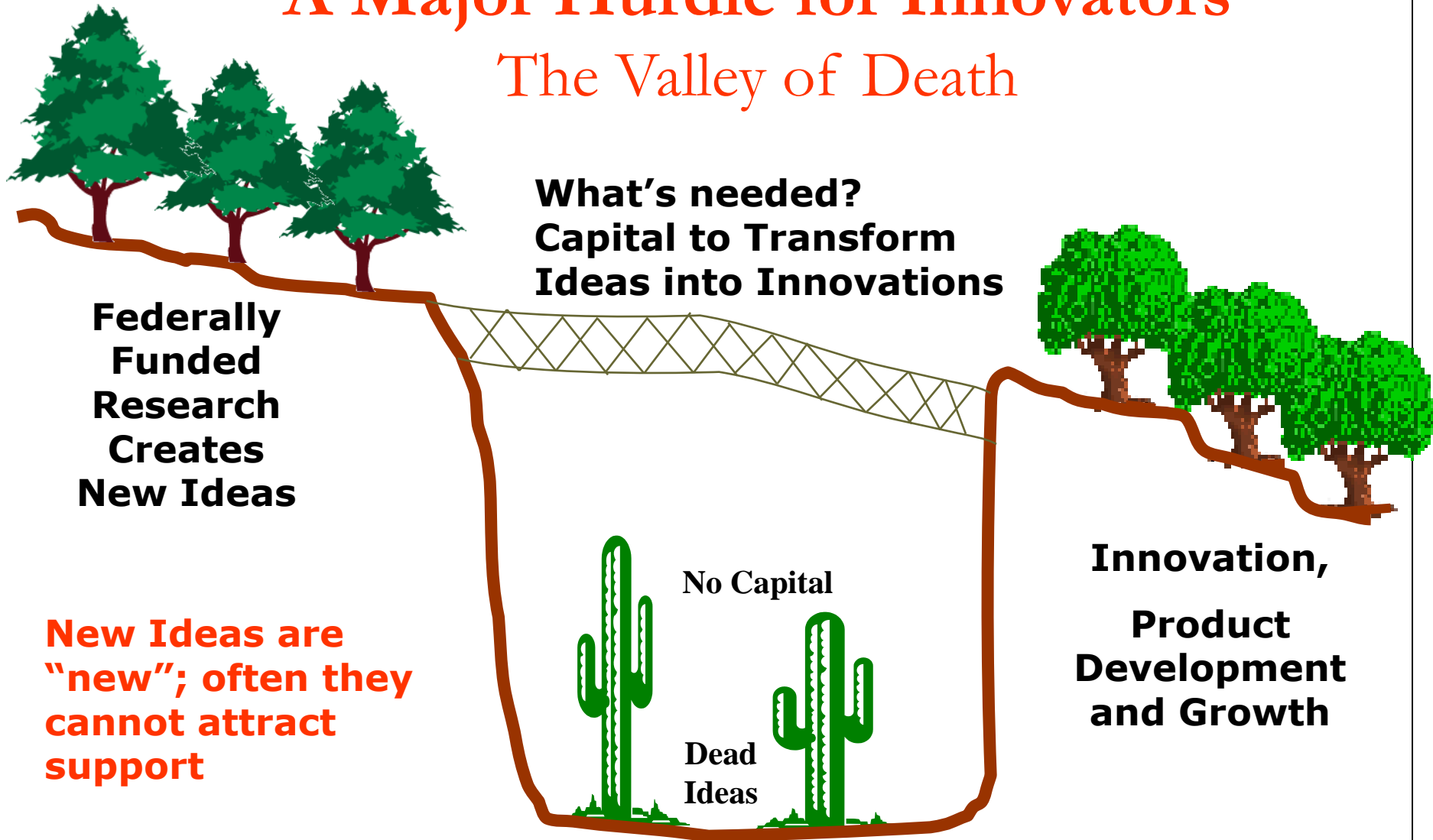
Policy Myths and
The Valley of Death

The U.S. Myth of Perfect Markets

- Strong U.S. Myth: “If it is a good idea, the market will fund it.”
- Reality:
 - Potential Investors have less than perfect knowledge, especially about innovative new ideas
 - “Asymmetric Information” leads to suboptimal investments
 - George Akerlof, Michael Spence and Joseph Stiglitz received the Nobel Prize in 2001, “for their analyses of markets with asymmetric information”

A Major Hurdle for Innovators

The Valley of Death



What about Venture Capital?

Another (Partial) Myth

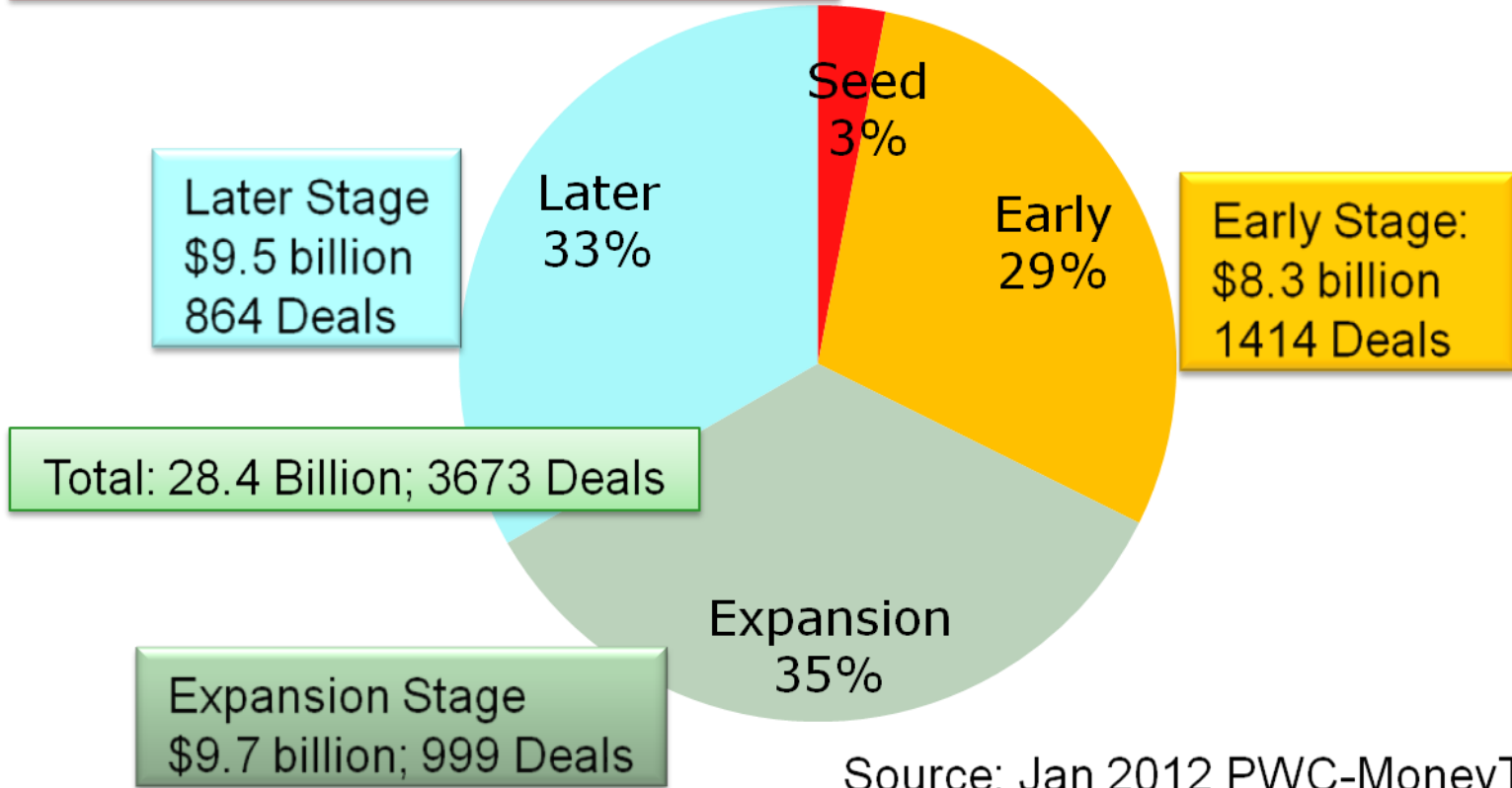


The Myth of Perfect Venture Capital Markets

- Myth: “U.S. VC Markets are broad & deep, thus there is no role for government awards”
- Reality: Venture Capitalists have
 - Limited information on new firms
 - Prone to herding tendencies
 - VC investments have moved towards later, less risky stages of technology development
 - Limited investments in the seed stage of investment—\$1.7 billion (363 deals) in 2010:

Seed Stage Investments Dropped by 48% in 2011

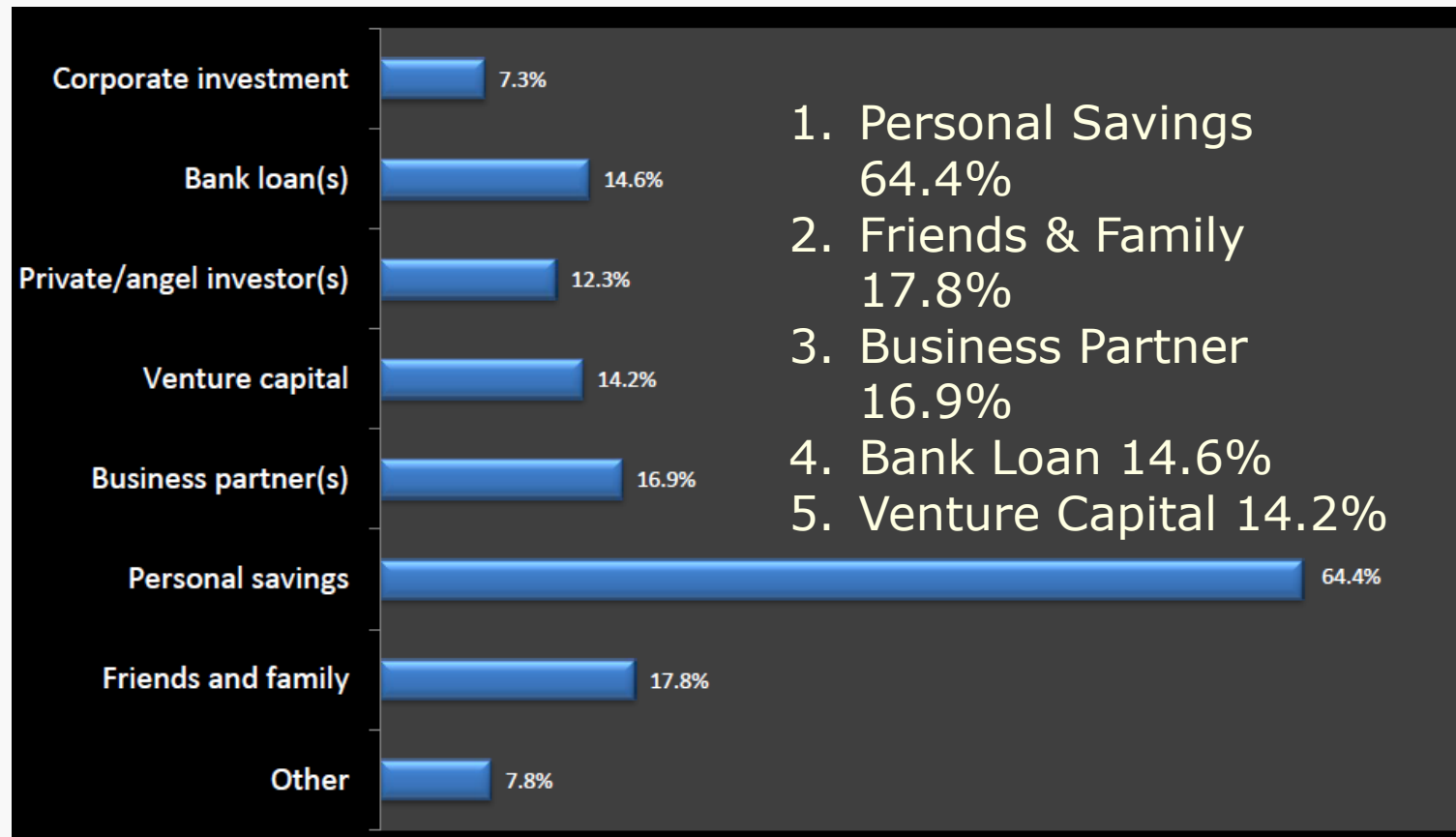
Seed Stage: \$919 million; 396 Deals



Source: Jan 2012 PWC-MoneyTree

Sources of Funding for Startups

Personal Funds are the Norm



Source: Vivek Wadhwa, 2010

Limits of Venture Capital

- Venture Capital is great for scaling of production and new products
- Bringing Companies forward to the Market
- Gaining Market Access and other Sources of Capital
- But it is only one Path
- The First Money often is not VC

The “First Money” is Needed to cross the Valley of Death

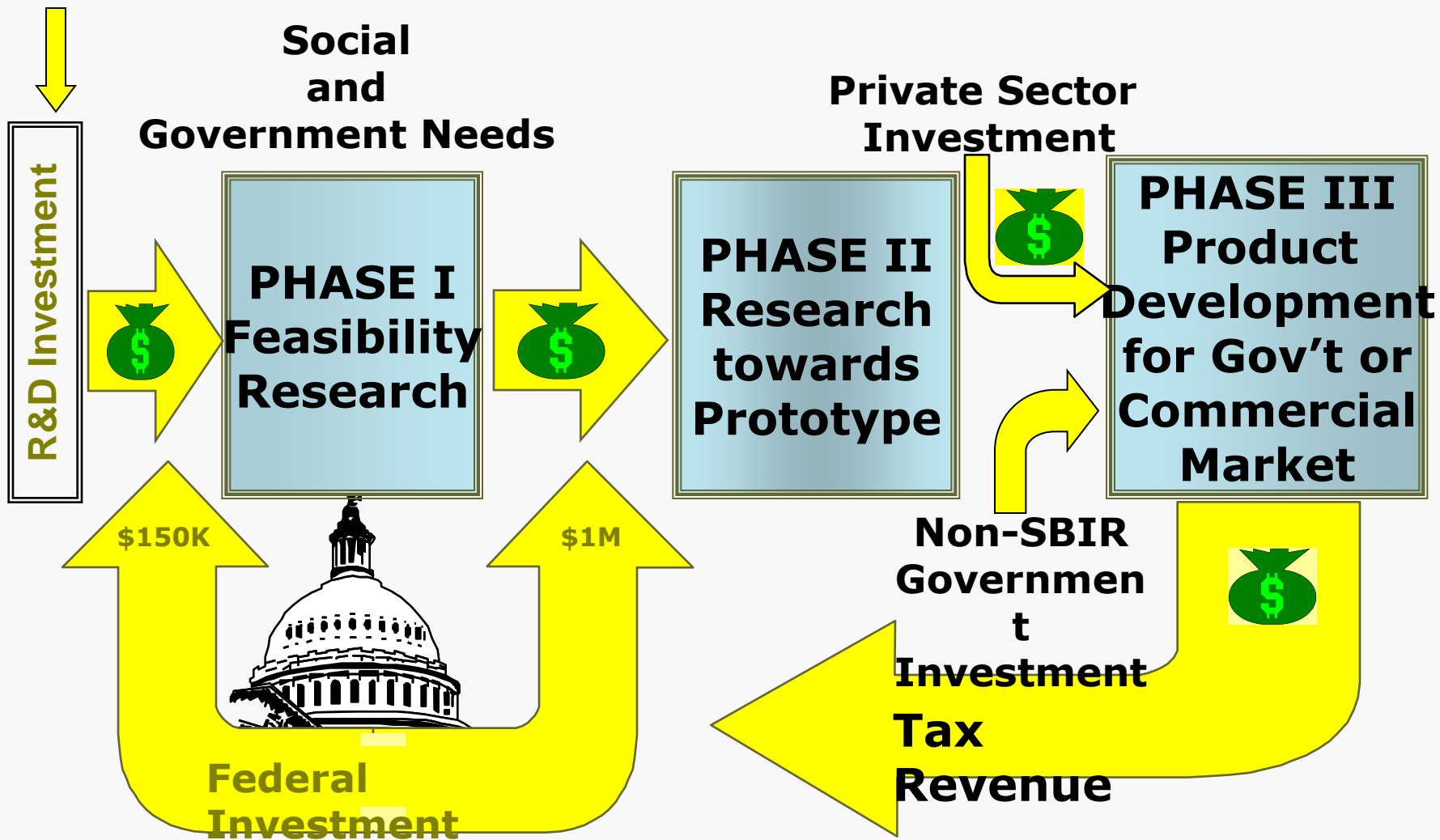
One Proven Path Across the
Valley of Death is the U.S. the
Small Business Innovation
Research Program (SBIR)

What is SBIR? Money to Jumpstart Innovation!

- SBIR is a highly-competitive, double-gated innovation system, providing awards to small companies to
 - Phase I: Provide Proof of Principle
 - Phase II: Develop Prototypes
- Founded in 1982, SBIR provides money to convert Knowledge into Products to meet Government and Societal Needs
- Successful Companies Attract Private Capital and/or win Public Contracts

\$148 billion

The SBIR “Open Innovation” Model



SBIR is a Large, Open Program

- Large Number of Award Winners
 - 4,257 Phase I awards in 2010
 - 1,892 Phase II awards in 2010
- Many New Participants:
 - Every year, 1/3 of awards per year go to new firms
- Large Impact with over 6000 Phase I and Phase II awards in 2010
 - Compare with 363 Seed Stage Venture Deals in 2010



After nearly 20 years of operation,
The Congress asked the National Academies:

How well is SBIR Working Overall?

Comprehensive 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
- **Case Studies**
 - Approximately 100 case studies conducted
 - Case Study selection reflects program diversity
- **Surveys & Case Studies Developed in Consultation with Agencies & SBIR users**

Key Finding of the National Academies Assessment of SBIR

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

SBIR's Best Practice Features

- **Focus on Valley of Death:** Funds Proof of Concept and Prototype: “The first money & the hardest”
- **Stable Program:** Long reauthorizations
- **Growing Budget:** 2.5% allocation of Agency R&D budgets for small business awards & contracts
- **Large Scale:** Largest U.S. Innovation Partnership Program: Currently a ~\$2.5 billion per year
- **Portfolio Effect:** Substantial sums invested in new companies over a long period increase success
- **Decentralized & Adaptive:** Each Agency uses its funds to support research by small companies to meet its unique mission needs

Academies Research Reveals SBIR Impact on Firm Formation and Growth

- **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 SMEs 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:** SBIR provides New Options and Competition for Public Procurement, especially important at DOD

SBIR links the University with Industry and helps create new Spin-outs

- 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

SBIR Success takes Many Forms

- **Employment Success**
 - SBIR helps new Start-ups grow, creating the high quality jobs of the future
- **Innovation Success**
 - New products, patents, licenses, and publications
- **Government Mission Success**
 - Acquisition and Procurement
 - NASA uses SBIR-funded Lithium-ion batteries to power the Mars Rover
 - DOD uses SBIR developed armor to shield against IEDs
- **NASDAQ Success**
 - SBIR investments contributed to the success of companies like Qualcomm, ATMI, Martek, Luna

SBIR: The Qualcomm Story

- SBIR program was an important source of start up funding for Qualcomm.
 - Qualcomm was awarded 10 SBIR awards (7 Phase I and 3 Phase II) between 1987 to 1990 from the Department of Defense for a total of \$1,317,360.
- “Getting the grants translated into *stamps of approval* that allowed Qualcomm to pursue other sources of private capital.”
 - Irwin Jacobs, Founder of Qualcomm—Congressional Testimony February 2011
- The company now employs 17,500 people and has a market value of \$93.71 Billion.

Key Recommendations of the National Academies Assessment of SBIR

- Keep the program – it works
- Preserve program flexibility
 - Limit regulation
 - Avoid caps and quotas
- Draw from Best Practices and experiment across agencies
 - Focus on Phase II Transition
- Shorten Cycle Time from Application to Award: This is very important
- Adjust award sizes for inflation

Additional Academy Recommendations

- **Assessment:** Report and Evaluate Regularly
- **Outreach:** Improve Participation by Women and Minorities through better outreach and tracking
- **Funds for Management:** Increase the set-aside to provide for program management and evaluation

The SBIR 2012 Reauthorization Adopted Key Academy Recommendations

What's in the legislation?

SBIR Reauthorization Provides for Stability and Growth

- **Stability:** Extends SBIR by 6 years to 2017
- **Program Growth**
 - SBIR Set-aside to rises annually to 3.2% in 2017.
 - Increases are by .1% per year except for a .2% jump from 2016-2017.
- **Larger Standard Award Sizes:**
 - Award sizes are raised to \$150,000 for Phase I and \$1,000,000 for Phase II, with annual adjustments for inflation implemented by the SBA Administrator.
 - Large awards are capped at 150% of the above numbers and require documentation

SBIR Reauthorization Preserves Award Flexibility

- **Sequential Awards:**
 - Firms can win sequential P-I and P-II awards from different agencies.
- **Skipping Phase I:**
 - Agencies are barred from inviting firms to apply for P-II awards.
 - Phase I can be skipped with determination by agency head that qualifications have been met.
- **VC-backed firm participation is permitted**
 - Capped at 25% at NIH, DoE, and NSF and 15% at other agencies.
- **Shorter Cycle Times:**
 - Agencies are instructed to shorten cycle times for application/funding decisions and the release of funds
 - Agencies to report annually on cycle times.

SBIR Reauthorization

Incentivizes Commercialization

- **More Technical Assistance for Small Businesses**
 - Firms authorized to spend up to an additional \$5000/year for technical assistance, reimbursable by the agency
- **Incentives for DOD Commercialization**
 - DoD to establish incentives for Primes to utilize SBIR technologies
 - DoD to increase the transition of Phase II projects into larger programs
 - Annual reporting is required on effectiveness of different incentives.

SBIR Reauthorization

Incentivizes Commercialization

- **New NIH Partnership**
 - NIH may use up to \$5M for a Phase 0 Proof of Concept Partnership pilot program to “accelerate the creation of small businesses and the commercialization of research innovations
- **Pilot Commercialization Programs**
 - Up to 10% of SBIR funds may be used for awards for technology development, testing, evaluation, and commercialization activities if agency declares that additional investment is needed.

SBIR Reauthorization Supports Management and Accountability

- **More Support for Management**
 - Pilot allows agencies to use up to 3% of their SBIR allocation for SBIR administration
 - Calls for faster award processing
- **Metrics and Evaluation**
 - Agencies are required to develop metrics and conduct annual evaluations
 - New SBIR Policy Committee to report to Congress on progress on metrics
 - Continued assessment by the National Academies

The National Academies is Continuing its Evaluation of SBIR

- Conducting follow up surveys—2nd Snapshot
- Assessing the efficacy of post-award commercialization programs
- Exploring strategies to encourage participation by minorities, women, and boomers in SBIR
- Studying university-industry partnering and synergies with the SBIR programs.
- Identifying new approaches to streamlining the application and grant/contract awarding processes
- Reviewing the role of complementary state and federal programs.

We welcome your
Views and Suggestions

And look forward to your
continued cooperation in our
ongoing assessment

Current Global Challenges Require Rapid Innovation of New Products and Processes

- The U.S. Position in the World will Depend on a Strengthened Innovation Capacity
- In the Twenty-first Century, Innovation Policy is no longer a “Hobby”
- Proven programs like SBIR are needed to help the US capitalize on its investments in R&D

Thank You



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