Key Challenges and Trends

• **Demographics**
  – Aging population in developed world
  – Growing youth population in developing world

• **Globalization**
  – World wide access to knowledge

• **Economics**
  – New wealth in Brazil, Russia, India & China
  – Large debts and deficits in developed nations

• **Energy**
  – High on every nation’s priority list

• **Climate change & natural disasters**

• **Challenges to existing state structures**
  – Radical ideologies
  – Internet communities

A robust S&T program is necessary to address today’s complex and changing defense environment
Outline

• Introduction

• By the numbers

• Science initiatives

• Getting involved

• Summary
Federal Research Spending

Recent R&D Appropriations for Key Federal Departments and Agencies

Source: Battelle/R&D Magazine with data from OSTP, AAAS
Basic Research Portfolios

**Defense Investments**

- BA7: 39%
- BA6: 21%
- BA5: 18%
- BA4: 6%
- BA3: 7%
- BA2: 6%
- BA1: 2%

**Federal Investments**

- HHS: 56%
- NSF: 15%
- DoD: 13%
- DOE: 6%
- Other: 10%

These charts represent the distribution of investments in basic research portfolios.
Basic Research Funding

PBR Funding (FY11 $B)


House
Senate
White House
Component Research Organizations

- Funding Organizations

- DARPA 16%
- ONR 28%
- AFOSR 25%
- ARO 20%
- DTRA 2%
- Chem/Bio 3%
- OSD 6%
Funding Recipient Allocation

• Federal Recipients
- Intramural: 23%
- Universities: 32%
- Industry: 25%

• Defense Recipients
- Universities: 51%
- Defense Recipients: 25%
- Industry: 13%
- Personnel: 6%
- Nonprofits: 5%

§ Battelle/R&D Magazine Dec 2010
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### Basic Research Defined

<table>
<thead>
<tr>
<th>Quest for Fundamental Understanding</th>
<th>Considerations of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Basic Research</strong> (Bohr)</td>
<td><strong>Use-inspired Basic Research</strong> (Pasteur)</td>
</tr>
<tr>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td><strong>Specific Curiosities</strong> (Peterson)</td>
<td><strong>Applied Research</strong> (Edison)</td>
</tr>
</tbody>
</table>

Basic Research should pursue fundamental understanding to provide a foundation for future work.
“Need-Driven”
Basic Research

- Cyber Security
- Decision Sciences
- Complex Systems
- Autonomous Systems
- Software Engineering Tools
- Socio-Cultural Modeling
“Opportunity-Driven”
Basic Research

- Nanotechnology
- Synthetic Biology/Panomics
- Quantum Technology
- Cognitive Neuroscience
- Engineered Materials
- Computational Models of Human Behavior
Outline

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Funding Mechanisms

- Single Investigator Awards
  - NSSEFF¹
- MURI² Awards
- Contracts/Subcontracts
  - STTR's
- DoD Basic Research
- DURIP⁴ Awards
- NDSEG⁵ Fellowships
- SMART⁶ Scholarships
- University Affiliated Research Centers
- Centers of Excellence
- Collaborative Technology Alliances

¹ National Security Science and Engineering Faculty Fellowships
² Multi-disciplinary University Research Initiatives
³ Small Business Technology Transfer
⁴ Defense University Research Instrumentation Program
⁵ National Defense Science and Engineering Graduate
⁶ Science, Mathematics and Research for Transformation
Funding Opportunities

- www.grants.gov
Summary

• Future operations capabilities depend on the basic research achievements of today

• Five goals for DDR&E to strengthen the defense basic research program:
  – Provide scientific leadership for the DoD basic research enterprise
  – Attract the Nation’s best S&Es to contribute to and lead DoD research
  – Ensure the coherence and balance of the DoD basic research portfolio
  – Foster connections between DoD performers and the DoD community
  – Maximize the discovery potential of the defense research business environment

• Achieving these goals results in a coherent, forward-thinking basic research program supported by the Nation’s top researchers and paving the way for tomorrow’s revolutionary breakthroughs