Discovery
Learning
Research

DLRC Showcase

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Vice President for Research

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TOPICS

- **Trends**
  - Purdue research
  - Partnerships
  - National trends

- **NSF’s Broader Impacts Criterion**
  - Components
  - Examples

- **DLRC Connections**
RESEARCH TRENDS

Awards and Expenditures

- Awards (less ARRA)
- ARRA Awards
- Total Research Support Expenditures
AWARDS BY AGENCY

FY08

- Industrials and Foundations, 24%
- Dept. of Health & Human Services (NIH), 16%
- National Science Foundation, 15%
- State/Local Govt., 13%
- Dept. of Energy, 5%
- Dept. of Defense, 8%
- Other Fed. <$10M & Foreign Govts, 9%
- PRF/PU, 5%
- Dept. of Ag, 5%

FY11

- Nationa Science Foundation, 23%
- Industrials and Foundations, 16%
- Dept of Ag, 6%
- Dept of Defense, 9%
- Dept of Energy, 9%
- Other Federal <$10M & Foreign Govts, 12%
- Dept of Health & Human Services (NIH), 14%
- State/Local Govt., 7%
- PRF/PU, 3%
RESEARCH CONNECTIONS

FY11 Awards
West Lafayette campus

$401M

Note: Areas of pie charts are proportional to award amounts
FY11 University Partners

Iowa State University
Louisiana State University
University of Maryland
University of California - Santa Cruz
University of Nevada
The Ohio State University
University of Illinois - Chicago
University of Georgia
University of California - Berkeley
University of California - Los Angeles
Michigan State University
University of Notre Dame
Pennsylvania State University
Massachusetts Institute of Technology
State University of New York
University of California - San Diego
University of California - Davis
University of Louisville
North Carolina State University
City University of New York
Catholic University of America
University of Central Florida
Norfolk State University
University of Iowa

University of Vermont
Texas A&M University
University of Kentucky
University of Arizona
Lehigh University
Cornell University
University of Nebraska
Carnegie-Mellon University
Northwestern University
Stanford University
Georgia Institute of Technology
Rutgers
University of Illinois

Indiana University
University of Minnesota
Mount Sinai School of Medicine
Rochester Institute of Technology
Indiana University School of Medicine
University of California - Santa Barbara
Duke University
Oregon State University
Indiana University Purdue University at Indianapolis
Auburn University
Virginia Polytechnic University
Stevens Institute of Technology
University of Colorado - Boulder
Kansas State University
Dartmouth College
Ivy Tech State College
University of Wisconsin
Florida State University
New York University
University of New Mexico
University of Rhode Island
University of Alabama
University of Pittsburgh
University of Kansas
Clemson University
FY11 Non-University Partners

Optosonics, Inc.  Marine Biological Laboratory  International Foundation of Hope
Ames Laboratory  CACI International Inc.
Family Services & Prevention  Pacific Northwest National Laboratory  MTS Systems Corporation
Science Applications International Corp  The G-H International Services Inc  Fermi National Accelerator Laboratory
State Student Assistance Commission of Indiana  Indiana National Guard  Texas Agricultural Experiment Station
Westinghouse Electric Corporation  Indiana Office of Energy & Defense Dev. Laserlith Corp
Central Indiana Corporate Partnership  M4 Sciences Corporation  Indiana Department of Natural Resources
Technology Service Corporation  Indiana Department of Transportation  Bechtel Bettis, Inc.
World Vision  Indiana Family & Social Services Administration
HudsonAlpha Inst of Biotechnology  IITA - Nigeria  National Institute for Pharmaceutical Technology & Education
Indiana Department of Workforce Development  American Society for Engineering Education  National Institute of Food & Agriculture
Indiana Department of Environmental Management  Virtual EM Inc.  National Institute of Standards & Tech
Consortium Plant Biotechnology Res Inc  BAE Systems Advanced Technologies, Inc.  TPF Enterprises Consulting
Universal Technology Corporation  Woodrow Wilson National Fellowship Foundation  Intelligent Automations Inc.
Mascoma Corporation  Argonne National Laboratory  Raytheon  Indiana Commission for Higher Education
Indiana Family Health Council, Inc.  Cast Inc  North American Die Casting Association  Goodwill Industries
Wabash River Enhancement Corp  CADEC  Cooperative State Research Service  Arthritis Foundation IN Chapter
National Academy of Sciences  Indianapolis Public Schools  Battelle
Mezzetta Construction Services  TEES  DuPont, E.I. Denemours and Company  Hummingbird Precision Machine
Idaho National Laboratory  IllinoisRocstar LLC  Zero to Three  Cummins Inc.  Techshot
• There has been a significant growth in team publications.
• Also, 99.4% of the 171 subfields have seen increased teamwork.
• The size of those teams has markedly increased.
National Science Foundation
Single PI vs. Multiple PI Awards

INTERDISCIPLINARY APPROACH
$3 billion across Federal government
2.6% increase over 2012 enacted funding level in STEM education

<table>
<thead>
<tr>
<th></th>
<th>FY11 Enacted</th>
<th>FY12 Enacted</th>
<th>FY13 Budget</th>
<th>% Chg FY12-13</th>
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</thead>
<tbody>
<tr>
<td>NSF</td>
<td>1148</td>
<td>1154</td>
<td>1193</td>
<td>3.4%</td>
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<tr>
<td>Education</td>
<td>561</td>
<td>517</td>
<td>628</td>
<td>21.5%</td>
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<tr>
<td>HHS</td>
<td>560</td>
<td>560</td>
<td>554</td>
<td>-1.2%</td>
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<tr>
<td>Others*</td>
<td>641</td>
<td>646</td>
<td>576</td>
<td>-11.1%</td>
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<tr>
<td>Total</td>
<td>2910</td>
<td>2877</td>
<td>2951</td>
<td>2.6%</td>
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</table>

Undergraduate

- **Transforming Undergraduate Education in STEM (TUES)**
  National Science Foundation
  - $61 million to design, test, and implement effective curriculum and methods to improve learning and completion rates

- **Mathematics-Education Initiative**
  National Science Foundation and Department of Education
  - $60 million to build and scale effective K-16 math-education strategies
Undergraduate (cont.)

- **Widening Implementation and Demonstration of Evidence-based Reforms (WIDER)**

  National Science Foundation
  
  - $20 million for second year of program; to support research on how to achieve sustainable implementation of improved STEM undergraduate teaching practices and student outcomes
Graduate

- **Effective Teachers and Leaders State Grants**
  Department of Education
  - $80 million to expand promising and effective models of STEM teacher preparation

- **Graduate Fellowships**
  National Science Foundation
  - ~2000 new awards
  National Institutes of Health
  - 2% increase in average stipend level
• **Effective Teaching and Learning: STEM**
  Department of Education
  
  **Math and Science Partnership**
  National Science Foundation
  — Align programmatic goals to support research on and scaling of evidence-based models of professional development for STEM teacher

• **Advancing Informal Science Learning**
  National Science Foundation
  — $48 million for research and model-building of effective means and innovative models to engage students outside of school settings
Broader impacts

- Promoting teaching, training, and learning
- Participation of under-represented groups
- Enhancing infrastructure for research and education
- Dissemination to enhance scientific and technological understanding
- Benefits to society
Examples

- Establish special mentoring programs for high school students, undergraduates, graduate students, and technicians conducting research.
- Establish research and education collaborations with students and faculty from non-Ph.D.-granting institutions and those serving underrepresented groups.
- Maintain, operate and modernize shared research and education infrastructure, including facilities and science and technology centers and engineering research centers.
- Partner with museums, nature centers, science centers, and similar institutions to develop exhibits in science, math, and engineering.
- Partner with academic scientists, staff at federal agencies and with the private sector on both technological and scientific projects to integrate research into broader programs and activities of national interest.
INTERNAL COLLABORATIVE AWARDS

Discovery Learning Research Center

- FY08: 6 awards
- FY09: 16 awards
- FY10: 24 awards
- FY11: 27 awards

- Millions
- $30
- $25
- $20
- $15
- $10
- $5
- $-

- Other
- PHARM
- LA
- AG
- CFS/HHS
- SCI
- SVM
- EDUC
- TECH
- ENG
Questions?
## R&D IN FY13 BUDGET

<table>
<thead>
<tr>
<th>Agency</th>
<th>R&amp;D Budget</th>
<th>% Increase FY12-FY13</th>
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<tbody>
<tr>
<td>DOE</td>
<td>$11.9 billion</td>
<td>8%</td>
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<tr>
<td>NASA</td>
<td>$9.6 billion</td>
<td>2.2%</td>
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<tr>
<td>NSF</td>
<td>$7.4 billion</td>
<td>4.8%</td>
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<tr>
<td>U.S. Global Change Research Program</td>
<td>$2.6 billion</td>
<td>5.6%</td>
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<tr>
<td>NIH</td>
<td>$30.7 billion</td>
<td>0%</td>
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<tr>
<td>National Nanotechnology Initiative</td>
<td>$1.8 billion</td>
<td>4.1%</td>
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<tr>
<td>Department of Homeland Security</td>
<td>$729 million</td>
<td>26.3%</td>
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<td>U.S. Geological Survey</td>
<td>$718 million</td>
<td>6.4%</td>
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<tr>
<td>NIST’s Intramural Laboratories</td>
<td>$708 million</td>
<td>13.8%</td>
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<tr>
<td>Environmental Protection Agency</td>
<td>$580 million</td>
<td>2.1%</td>
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DLRC GOALS

- DLRC fundamental learning research mission is guided by three goals:
  - Catalyze large-scale, interdisciplinary research programs in teaching and learning, especially in STEM and STEM-related fields.
  - Promote articulation between the scholarship of teaching and learning and actual classroom practice at all levels.
  - Provide leadership in influencing STEM public literacy and educational policy.