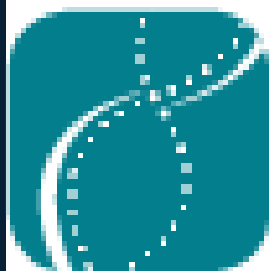Discovery Research K-12 PI Meeting, Washington DC, June 1

The Critical Role of PreK-12 Learning for the Future of Science

Joan Ferrini-Mundy
Assistant Director, National Science Foundation
Education and Human Resources

THANK YOU! 10 Years of DRK-12

Community for **Advancing** **Discovery Research** in **Education**

DR K-12 Principal Investigators, staff, participants, and evaluators

DR K-12 Program Officers and Administrative Staff

Discovery Research K-12, NSF 06-593

- **Grand Challenge 1: Mathematics and Science Assessments**

- **Grand Challenge 2: Elementary Grades Science.**

- **Grand Challenge 3: Cutting-Edge STEM Content in K-12 Classrooms**
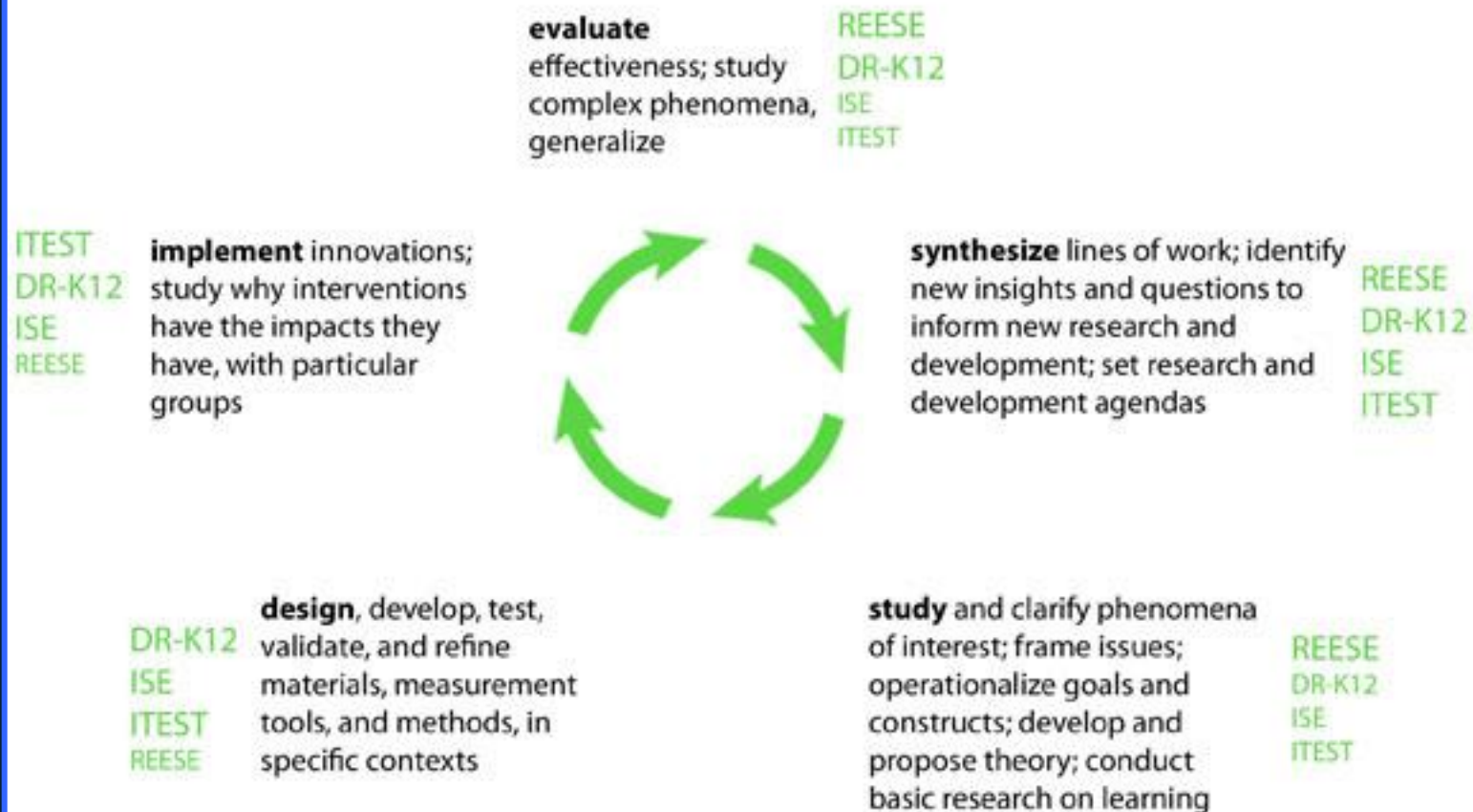
Discovery Research K-12, NSF 08-609

Figure 1. **DRL Cycle of Innovation and Learning**
(Note: Programs whose primary emphases relate to particular components appear in larger type.)

Common Guidelines for Education Research and Development (IES & NSF, 2013)

- Foundational research
- Early-stage exploratory research
- Design and development research
- Efficacy, effectiveness, and scale-up research

CONTINUING CHALLENGES: DRK-12

- Planning and executing/adapting rigorous research designs with appropriate outcome variables

- Accumulation of findings to inform policy and practice, possibly in key priority areas

- Capacity building in the R&D community

- Use and adaptation of DRK-12 findings and models at scale

- Telling the story of DRK-12 impact

6

And new opportunities …

SCIENCE AND ENGINEERING FOR TOMORROW

convergent, networked, data-intensive, international, diverse and multilevel teams, crowdsourced with public participation
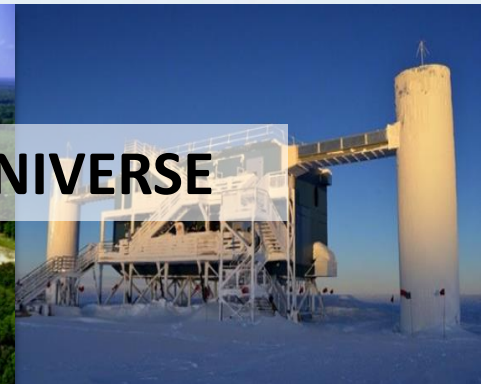
HARNESSING DATA

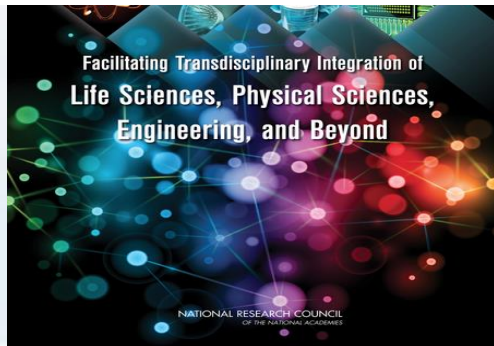SHAPING THE NEW HUMAN-TECHNOLOGY FRONTIER

NAVIGATING THE NEW ARCTIC

UNDERSTANDING THE RULES OF LIFE

THE QUANTUM LEAP

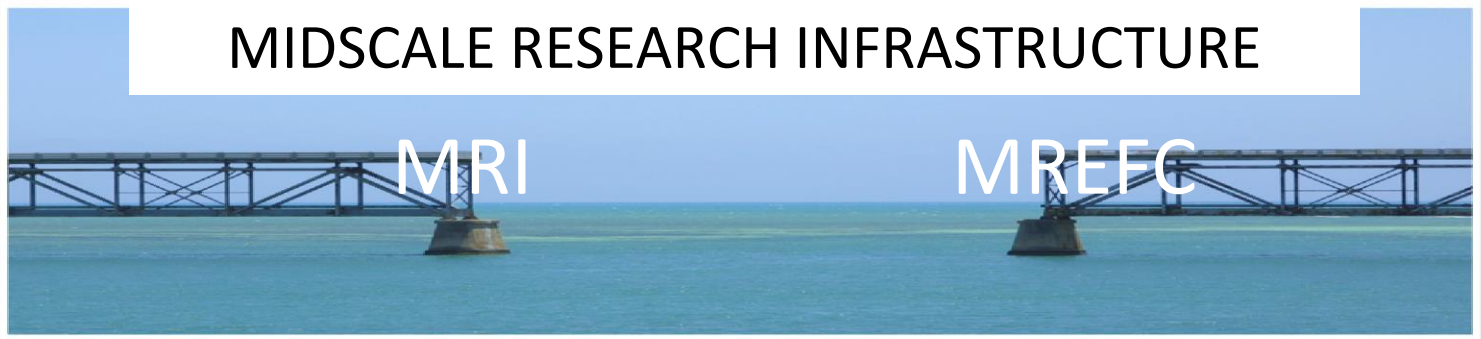WINDOWS ON THE UNIVERSE

GROWING CONVERGENT RESEARCH AT NSF

NSF INCLUDES

NSF 2050

MIDSCALE RESEARCH INFRASTRUCTURE

MRI

MREFC

Computer Science For All

- Announced in the **President's Weekly Address** on January 30, 2016

- Focus is on ensuring **ALL** students have access to learning Computer Science

- **Significant proposed funding**: $4B to empower states, $100M for school districts to train CS teachers, expand access, and build effective regional partnerships

- **Involving even more partners**: Governors, mayors, and education leaders, CEOs, philanthropists, creative media, technology, and education professionals are deepening their CS commitments; e.g. Governors for CS, Code.org, NMSI (National Math and Science Initiative), Cartoon Network, Google, RI, KY, AR, NYC, San Francisco, Broward County, CSNYC, MassCAN, TFA (Teach for America), Microsoft, the Infosys Foundation USA, NCWIT, and the Computer Science Education Coalition.
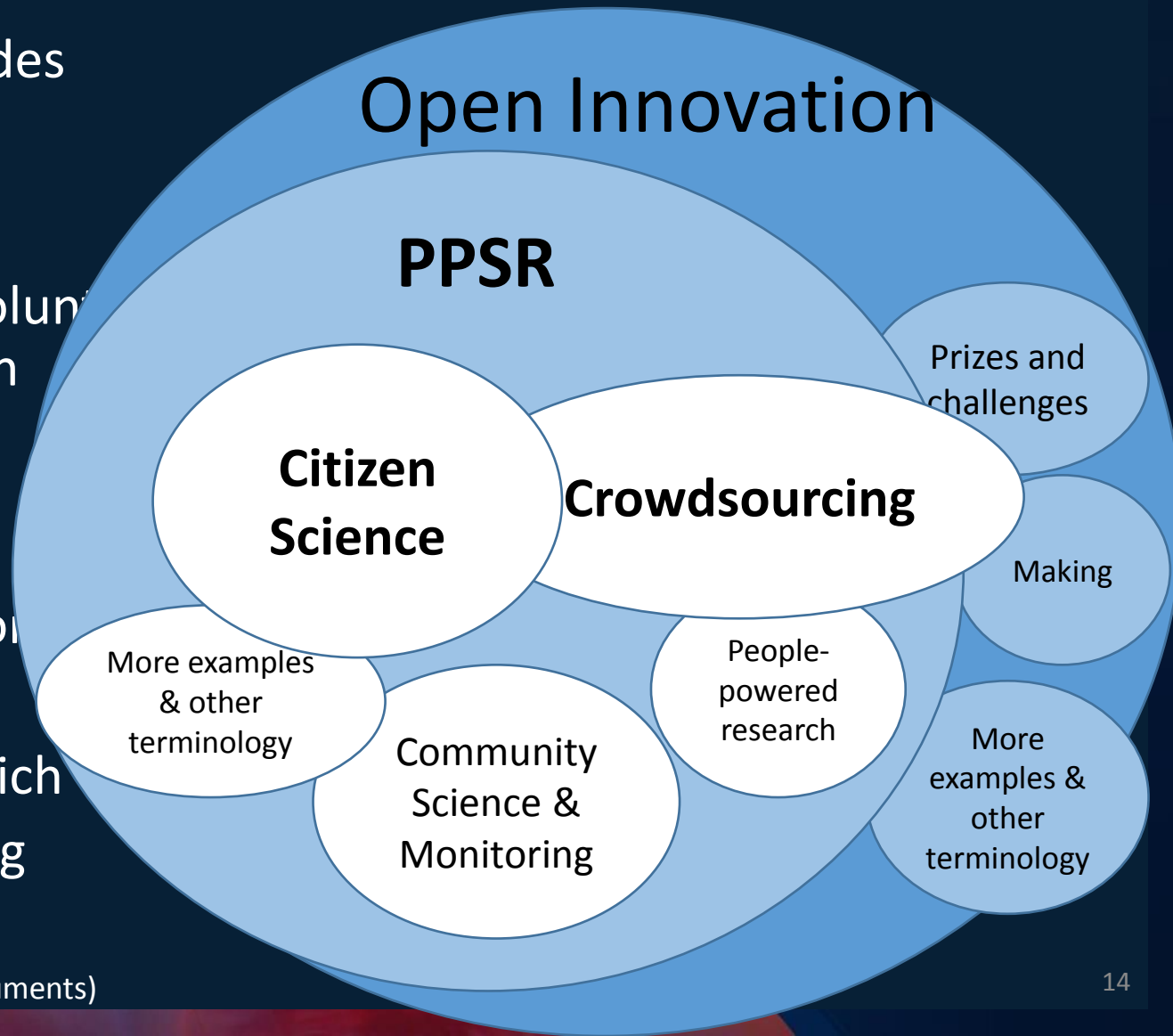
CS for All at NSF

$135M available over 5 years to **build on NSF's research** developing instructional materials, assessments, in-service and pre-service models of teacher professional development, and approaches to ongoing support of classroom teachers.

- 2 new high school courses, currently taught in over 2,000 schools: *Exploring Computer Science* (introductory course for all students) and AP *CS Principles* (Curricular Framework with a number of different, aligned courses)
- Both are rigorous, student-centered, focused on conceptual understandings and societal impacts, accessible (w/o prior experience), project-based, and inspiring
- Professional development to support high school teachers in CS instruction
- Research to integrate CS and Computational Thinking in K-8 STEM curriculum and instruction

What is Public Participation in Science, Technology, Engineering, and Mathematics Research (PPSR)?

- Research that includes partnerships between STEM professionals and "amateurs"/volun to address research questions.

- Always involves the public's participation in some aspects of STEM research, which may require training

(Ref: NSF 2015 Strategic Review documents)

Open Innovation

PPSR

Citizen Science

Crowdsourcing

Prizes and challenges

Making

More examples & other terminology

People-powered research

Community Science & Monitoring

More examples & other terminology

FY16-17 NSF Agency Priority Goal

- Build the capacity of the nation to solve research challenges and improve learning by investing strategically in crowdsourcing and other forms of public participation in science technology, engineering, and mathematics research (PPSR).

    - By September 30, 2017, NSF will implement mechanisms to expand and deepen the engagement of the public in research.

www.performance.gov

NAEP 2014 Technology and Engineering Literacy

Select a task below to begin:

Explore growth in Chicago

Design a safe bike lane

Create an ideal iguana habitat

Promote a teen rec center

NAEP 2014 Technology and Engineering Literacy

Highlights of what we learned about eighth-grade students include the following:
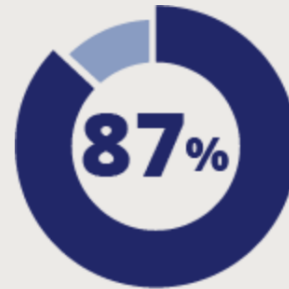
Female students scored **3 pts** higher than **male** students.

NSLP[1] not eligible students scored **28 pts** higher than **eligible** students.

[1] NSLP = National School Lunch Program.

87% reported **figuring out why something was not working in order to fix it** outside of their school work.

50% reported **using a computer to create, edit, or organize digital media** at least once a month in school.

2015 Maker Faires had over 1.1 million visitors (the HUSTLE, December 11, 2015)