



STEM Education: *Perspectives from the Education and Human Resources Directorate*

*Joan Ferrini-Mundy
Assistant Director*

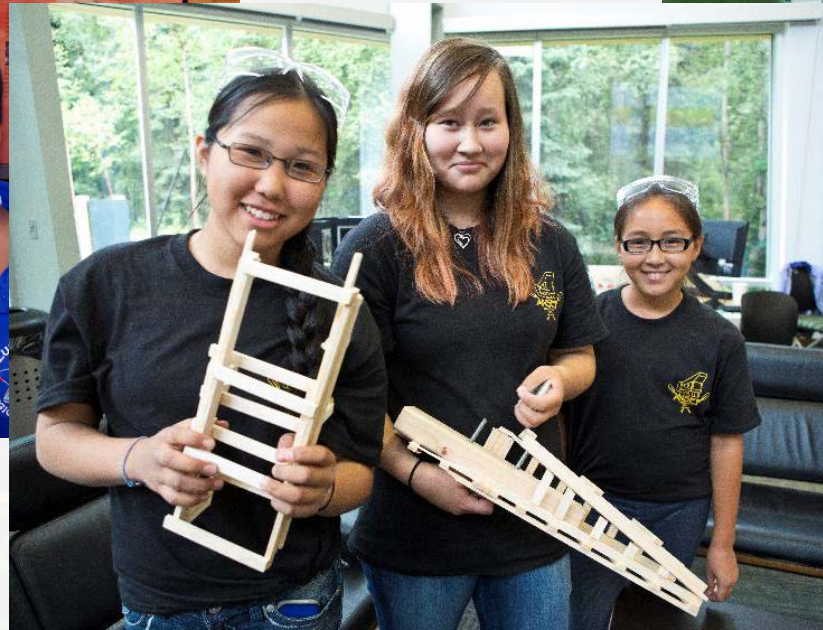
National Science Board, August 9, 2016

“We shall have rapid or slow advance on any scientific frontier depending on the number of highly qualified and trained scientists exploring it.”



Vannevar Bush, 1945
Science – The Endless Frontier, p. 14

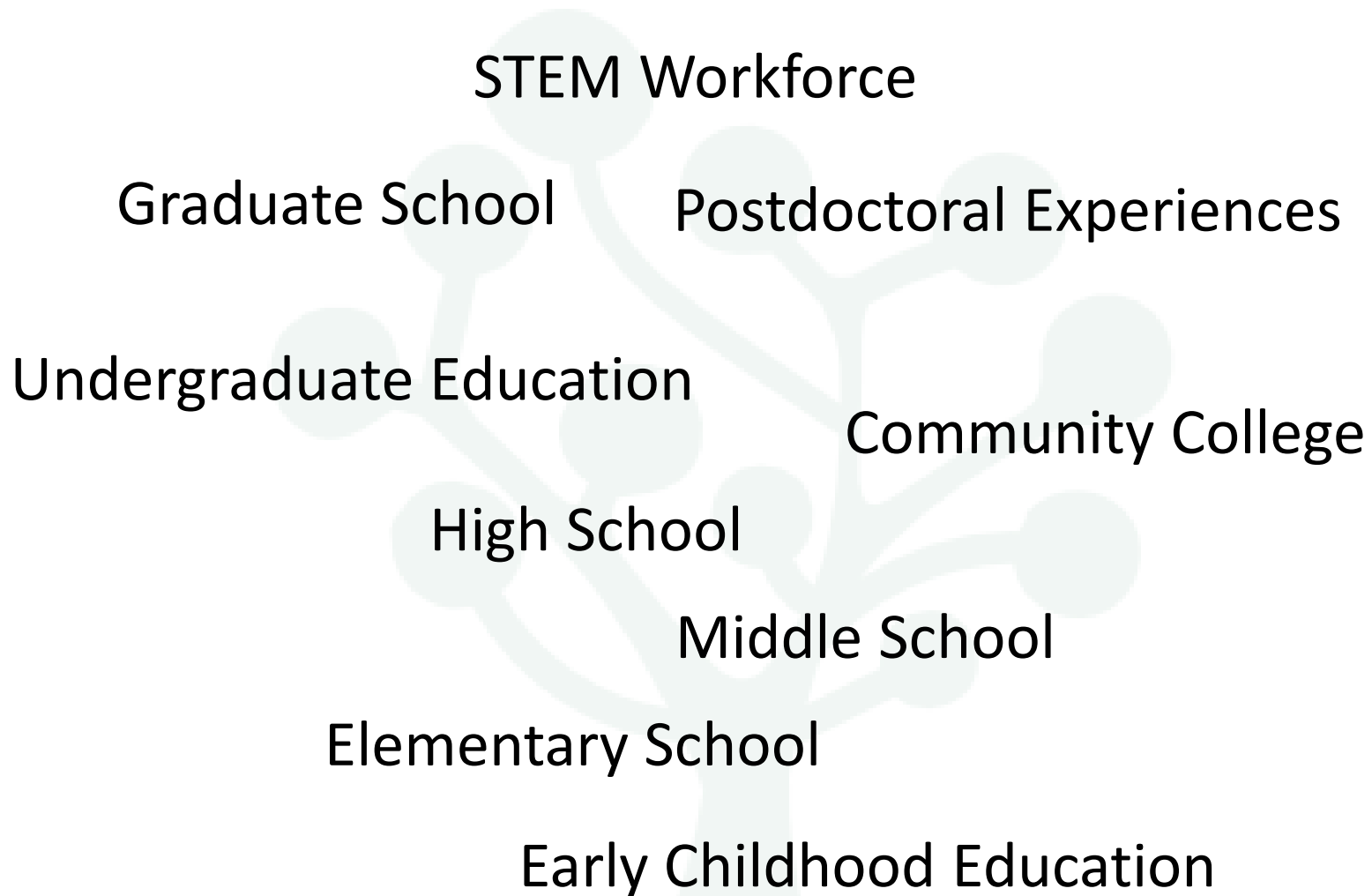




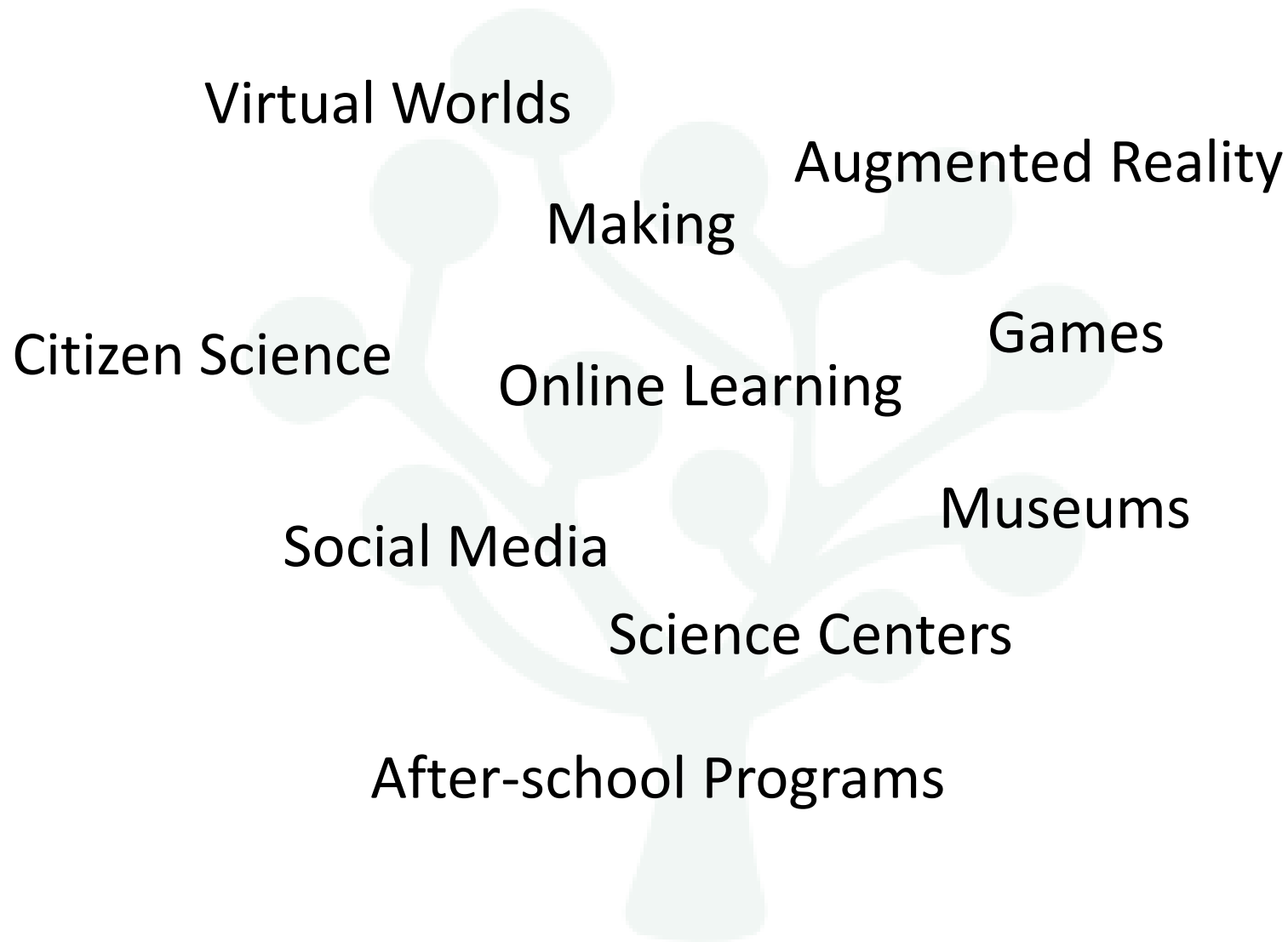
EHR Mission:

- Develop a diverse workforce ready to advance the frontiers of science and engineering for society
- Grow and sustain a STEM-literate public

STEM Workforce and STEM-Literate Public



STEM Workforce and STEM-Literate Public



EHR investments address three goals



**DEVELOP THE
CAREERS OF
SCIENTISTS AND
ENGINEERS**



**BUILD
KNOWLEDGE
THROUGH
RESEARCH**



**TRANSFORM
INSTITUTIONS**





DEVELOP THE CAREERS OF SCIENTISTS AND ENGINEERS



- Scholarships
- Traineeships
- Fellowships

IMPACT: Well-prepared experts in the STEM professions



Scientists and engineers for the research of the future

Cybersecurity experts for government



K-12 STEM teachers



TRANSFORM INSTITUTIONS

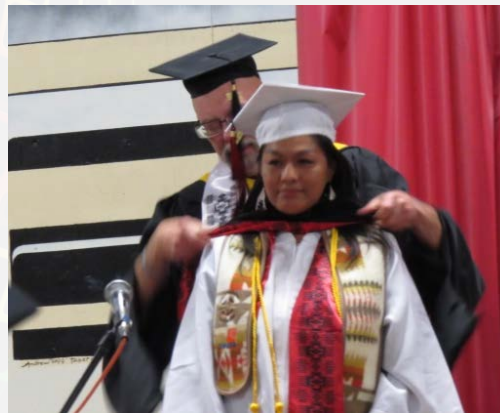


Institutional change to
prepare a diverse STEM
workforce and science-
literate society

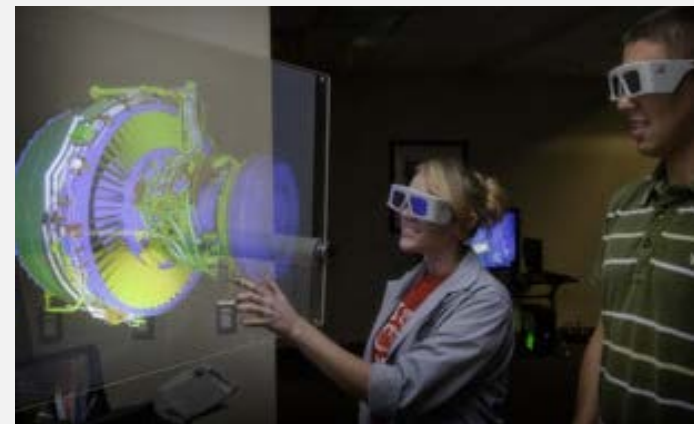
IMPACT: New capacity, practices, partnerships, and pathways



Institutions
broaden
participation and
develop talent



Tribal colleges
and universities
create new
programs and
degrees



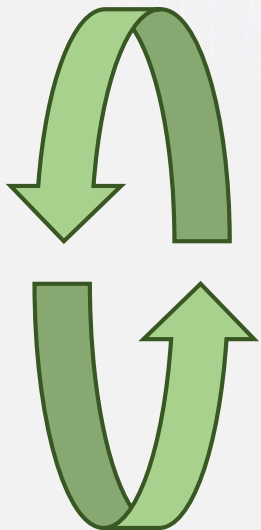
Community
colleges partner
with industry to
provide cutting-
edge training





**BUILD
KNOWLEDGE
THROUGH
RESEARCH**

Research and
development



Strategic Re-envisioning for the Education and Human Resources Directorate

Report of the EHR Advisory Committee, May 2014

“EHR should continue to encourage high-risk/high-pay-off education research proposals that are scientifically rigorous, potentially transformative, and informed by cutting-edge, interdisciplinary discoveries about [STEM] learning....Of special interest are various problem-solving tools and resources that significantly increase students’ interest, persistence, and motivation in building STEM knowledge and skills across the life-span.” (p. 7)

Strategic Re-envisioning for the Education and Human Resources Directorate

A Report to the Directorate for Education and Human Resources National Science Foundation

by the

NSF Federal Advisory Committee for Education and Human Resources

May 1, 2014

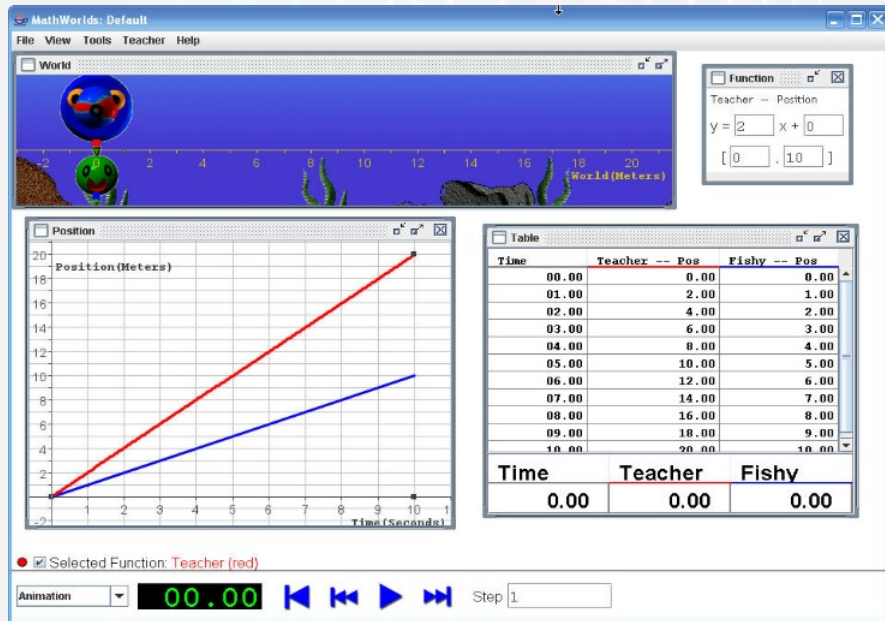


Synthesized by Dr. Anthony E. Kelly, Professor, Georgia Mason University

Any opinions, findings, conclusions or recommendations presented in this material are only those of the authors, and do not necessarily reflect the views of the National Science Foundation.



IMPACT: Findings for improving teaching and learning



Children learn complex STEM concepts earlier than we thought possible



“Active learning” instructional approaches improve achievement in STEM courses



IMPACT: Successful models to engage the public of all ages with STEM



Interactive visualization museum exhibits engage learners and support inquiry



Instructional television promotes learning and STEM engagement (and wins awards!)

IMPACT: Groundbreaking research that generates new inquiry approaches



Diagnostic assessments open windows into undergraduate science learning

International collection of data about mathematics instruction through video leads to new ways of studying teaching





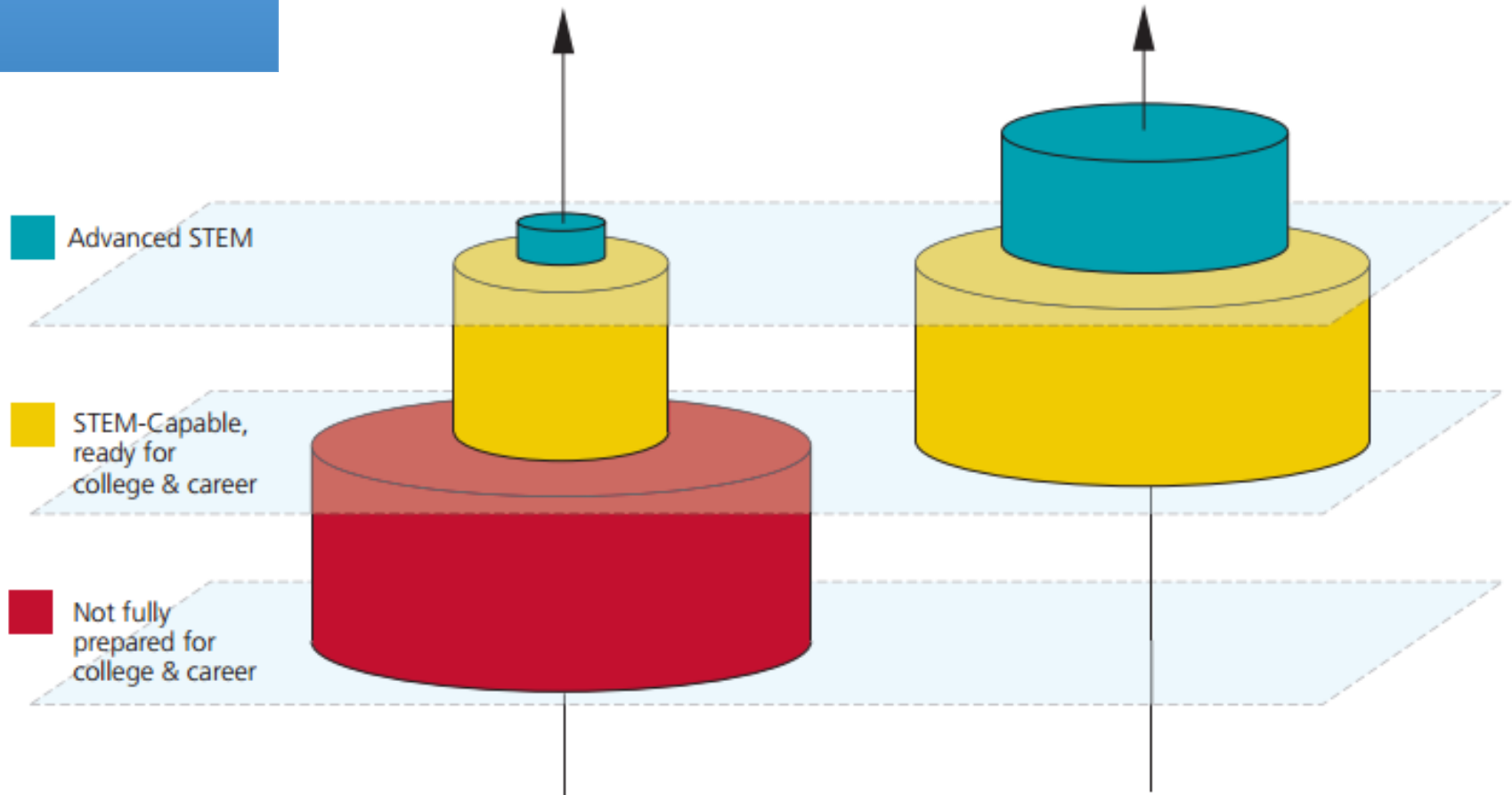
A Continuing Journey...

LIFTING THE SYSTEM

Student Attainment
in the Current
U.S. Educational System



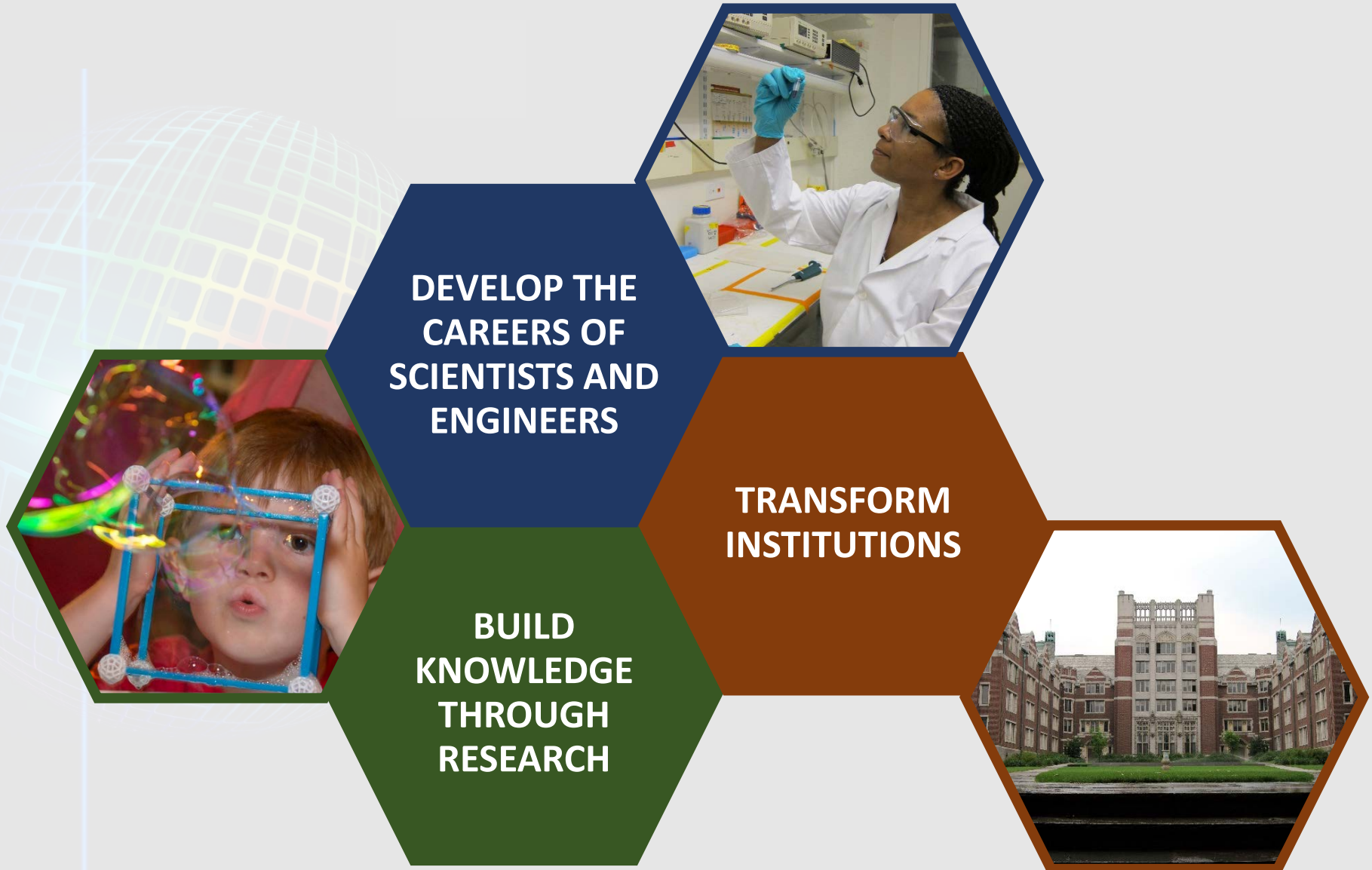
Student Attainment
in a Transformed
U.S. Educational System



Carnegie Corporation of New York and Institute for Advanced Study, 2009, *The Opportunity Equation: Transforming Mathematics and Science Education for Citizenship and the Global Economy*, p. 6



Increased Coherence Across Investments



Looking to the Future

**PREPARATION
FOR
TOMORROW'S
SCIENCE**

**DEVELOP THE
CAREERS OF
SCIENTISTS AND
ENGINEERS**

**NETWORKS OF
NETWORKS**

**TRANSFORM
INSTITUTIONS**

**BUILD
KNOWLEDGE
THROUGH
RESEARCH**

**SHARED
RESEARCH
INFRASTRUCTURE**



The education of the scientists and engineers and the public of 2050 begins today.





Thanks to Layne Scherer
for her help in preparing
these slides.



QUESTIONS AND DISCUSSION



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