

**STEM EDUCATION:
THE ADMINISTRATION'S
PROPOSED REORGANIZATION**

HEARING
BEFORE THE
**COMMITTEE ON SCIENCE, SPACE, AND
TECHNOLOGY**
HOUSE OF REPRESENTATIVES
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STEM EDUCATION: THE ADMINISTRATION'S PROPOSED REORGANIZATION

TUESDAY, JUNE 4, 2013

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Committee met, pursuant to call, at 2:02 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Lamar Smith [Chairman of the Committee] presiding.

LAMAR S. SMITH, Texas
CHAIRMAN

EDDIE BERNICE JOHNSON, Texas
RANKING MEMBER

Congress of the United States
House of Representatives

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

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Committee on Science, Space, and Technology Hearing

***STEM Education: The Administration's Proposed Re-
Organization***

Tuesday, June 4, 2013

2:00 p.m. – 4:00 p.m.

2318 Rayburn House Office Building

Witness

The Honorable John Holdren, Director, Office of Science and Technology Policy (OSTP), Executive
Office of the President

Dr. Joan Ferrini-Mundy, Assistant Director, Directorate for Education and Human Resources,
National Science Foundation (NSF)

Mr. Leland D. Melvin, Associate Administrator for Education, National Aeronautics and Space
Administration (NASA)

**U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY**

HEARING CHARTER

STEM Education: The Administration's Proposed Re-Organization

**Tuesday, June 4, 2013
2:00 p.m. – 4:00 p.m.
2318 Rayburn House Office Building**

Purpose

On Tuesday, June 4, 2013, the House Committee on Science, Space, and Technology will hold a hearing to review the Administration's proposed consolidation and re-organization of federal science, technology, engineering, and mathematics (STEM) programs. With an eye toward COMPETES Act (P.L. 111-358) reauthorization of the National Science Foundation (NSF) and a review of the effectiveness and efficiency of interagency STEM education programs this hearing will provide an opportunity to evaluate the Administration's proposal and how it will affect federal STEM efforts across the Nation.

Witnesses

- **The Honorable John Holdren**, Director, Office of Science and Technology Policy (OSTP), Executive Office of the President
- **Dr. Joan Ferrini-Mundy**, Assistant Director, Directorate for Education and Human Resources, National Science Foundation (NSF)
- **Mr. Leland D. Melvin**, Associate Administrator for Education, National Aeronautics and Space Administration (NASA)

Overview

The Administration's FY14 budget request includes \$3.1 billion across the federal government for STEM education, a 6.7 percent increase over FY12 enacted levels. The request proposes a re-organization of STEM education programs into four key areas: K-12 instruction; undergraduate education; graduate fellowships; and education activities that typically take place outside the classroom, all with a focus on increasing participation and opportunities for individuals from groups historically underrepresented in STEM fields.

The re-organization proposed by the Administration identifies the U.S. Department of Education as the lead for K-12 instruction and the National Science Foundation (NSF) as the lead on undergraduate and graduate STEM education. The Smithsonian Institution would lead the Administration's work on informal education activities (those activities that take place outside the classroom).

The Administration's proposal decreases the number of federal STEM programs from 226 to 112, with 114 programs either eliminated or consolidated into existing programs. The budget request grows the number of agencies with federal STEM programs from 13 to 14, to include the Smithsonian Institution.

Table 1. Federal STEM Education Program Funding by Agency¹
(budget authority in millions)

	FY 2012 Enacted	FY 2014 Request	Change FY12-14 Amount	Change FY12-14 Percent
Agriculture	88	85	-3	-3.7%
Commerce	41	36	-5	-12.7%
Defense	178	136	-42	-23.6%
Education	529	814	285	53.9%
Energy	47	33	-14	-29.9%
Health and Human Services	578	533	-45	-7.8%
Homeland Security	9	9	-1	-8.5%
Interior	3	3	0	-9.0%
Transportation	99	92	-8	-7.5%
Environmental Protection Agency	26	3	-22	-86.8%
NASA	149	100	-49	-32.9%
NSF	1,154	1,243	89	7.7%
Nuclear Regulatory Commission	16	1	-15	-95.5%
Smithsonian Institution	0	25	25	--
Total STEM Education	2,918	3,112	195	6.7%

STEM-related budgets are reduced between 3 and 86 percent among 11 agencies, including a nearly 33 percent cut at NASA. The Smithsonian Institution receives an initial \$25 million. The Department of Education and NSF experience the only STEM-related budget increases at nearly 54 percent and 8 percent respectively (see Table 1).

The proposal includes a request for \$1.24 billion for NSF as lead for the Administration's work on undergraduate and graduate STEM education. This includes a new \$123 million Foundation-wide program, Catalyzing Advances in Undergraduate STEM Education (CAUSE). The request for NSF also includes over \$325 million for a National Graduate Research Fellowship program (to build on the current Graduate Research Fellowship (GRF) program); \$55 million for NSF Research Traineeships (building on the Integrative Graduate Education and Research Traineeship (IGERT) program); and over \$79 million to enhance Research Experiences for Undergraduates (REU) Sites and Supplements.²

The proposal includes a nearly 54 percent increase for STEM activities at the Department of Education. These activities include \$150 million for STEM Innovation Networks to help school districts build strategic partnerships with universities, government agencies, industry,

¹ White House Office of Science and Technology Policy, *Preparing a 21st Century Workforce*. April 10, 2013. http://www.whitehouse.gov/sites/default/files/microsites/ostp/2014_R&Dbudget_STEM.pdf

² FY14 NSF Budget Request to Congress, p. Overview-5.

museums and other educational entities. The proposal also includes \$80 million to support evidence-based STEM teacher preparation programs.³

The request would reduce NASA's STEM education portfolio by nearly 1/3rd to \$100 million. This includes a \$16 million reduction in the NASA Space Grant program and a \$9 million reduction in the NASA Experimental Program to Stimulate Competitive Research (EPSCoR) program. The NASA STEM Education and Accountability programs, including the Minority University Research and Education Program (MUREP) and STEM Education and Accountability Projects (SEA) would be reduced by nearly \$20 million. Education activities within the Mission Directorates are zeroed out in all but the Space Technology Directorate, which would receive over \$15 million for fellowships.⁴

The 2010 COMPETES Act (P.L. 111-358) included a number of requirements for the review and coordination of federal STEM programs. The Act required the National Science and Technology Council, an interagency group led by the White House Office of Science and Technology Policy, to form a Committee on STEM (CoSTEM) to develop and implement a 5-year strategic plan. CoSTEM released an inventory of federal STEM programs in December 2011 and a progress report on its work towards a Strategic Plan in February 2012. The final Strategic Plan has not yet been released, although it was originally expected in early May as required by the Continuing Appropriations Act (P.L. 113-6) and may be released on or about May 31, 2013.

Since the Administration's STEM education reorganization proposal and budget request were released in April, the Administration conducted an additional review of programs targeted for consolidation. According to information received by the Committee staff on May 14th, 78 programs have been slated for consolidation with funding to be redirected outside the original funding agency (including 37 programs at NASA), 49 programs are slated for internal consolidation, and 110 programs remain in their original form or are new to the respective agencies.⁵ This is a significant re-organization of STEM education programs across many different agencies.

Witnesses for today's hearing were asked to discuss the National Science and Technology Council's process for reviewing the STEM education portfolio across many different agencies and the role of CoSTEM in drafting the Administration's proposed re-organization. They were also asked to discuss how decisions were made about program consolidations and cuts. Finally, they were asked how the proposed re-organization affects STEM programs nationwide.

³ White House Office of Science and Technology Policy, *Preparing a 21st Century Workforce*. April 10, 2013. http://www.whitehouse.gov/sites/default/files/microsites/ostp/2014_R&Dbudget_STEM.pdf

⁴ FY14 NASA Budget Request to Congress, p. EDUC-1.

⁵ FY2012 Inventory of STEM Programs, handed out at the OSTP and OMB staff briefing on the Administration's proposal.

Chairman SMITH. The Committee on Science, Space, and Technology will come to order.

Welcome to today's hearing, which is on the subject of "STEM Education: The Administration's Proposed Reorganization." Nice to see a full house today, and those who are standing, you are welcome to come forward if you can find some seats. And if not, you are welcome to stay where you are, too. I am going to recognize myself for an opening statement and then the Ranking Member for her opening statement.

The topic of today's hearing is the President's Proposed Reorganization of Federal STEM education programs. The proposal is part of the President's Fiscal Year 2014 budget request to Congress and includes the consolidation of over 100 Federal STEM education programs.

In order to achieve the innovations of tomorrow, we must better educate American students today. The Science, Space, and Technology Committee looks for ways not only to encourage students to study science, technology, engineering, and mathematics but also to inspire them to pursue careers in STEM fields.

Unfortunately, America lags behind many other nations when it comes to STEM education. American students rank 23rd in math and 31st in science. This is not the record of a great country. And it is not the record of a country that expects to remain a world leader.

The COMPETES Act of 2010 required the National Science and Technology Council to establish a committee on STEM. Today, this is commonly referred to as CoSTEM, which seeks to "coordinate Federal programs and activities in support of STEM education." CoSTEM was directed to develop and implement a five-year strategic plan for the coordination of Federal STEM programs.

Unfortunately, the Strategic Plan was significantly delayed and was only received by Congress last Friday. The Administration proposed a reorganization of Federal STEM programs as part of the budget request in April, prior to the release of the final Strategic Plan.

We need to carefully consider how best to streamline, coordinate, and consolidate programs that specifically engage children and the public in STEM subjects. Our country continues to face a fiscal crisis, and part of our challenge is how to achieve the most benefit from our limited resources in the current budget environment. More graduates with STEM degrees means more advanced technologies and a more robust economy. A well-educated and trained STEM workforce undergirds our future economic prosperity. But we have to capture and hold the desire of our Nation's youth to study science and engineering so they will want to pursue these careers.

Our hearing today will help us evaluate if the Administration's proposal effectively accomplishes those goals.

Now, that concludes my opening statement. And the Ranking Member, the gentlewoman from Texas, Ms. Johnson, is recognized for her opening statement.

[The prepared statement of Mr. Smith follows:]

PREPARED STATEMENT OF CHAIRMAN LAMAR S. SMITH

The topic of today's hearing is the President's proposed re-organization of federal STEM education programs. The proposal is part of the President's FY14 budget request to Congress and includes the consolidation of over 100 federal STEM education programs.

In order to achieve the innovations of tomorrow, we must better educate American students today. The Science, Space and Technology Committee looks for ways not only to encourage students to study science, technology, engineering and mathematics but also to inspire them to pursue careers in STEM fields. Unfortunately, America lags behind many other nations when it comes to STEM education. American students rank 23rd in math and 31st in science. This is not the record of a great country. And it is not the record of a country that expects to remain a world leader.

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Unfortunately, the Strategic Plan was significantly delayed and was only received by Congress last Friday. The Administration proposed a re-organization of federal STEM programs as part of the budget request in April, prior to the release of the final Strategic Plan. I hope our witnesses can tell us what was wrong with the programs the Administration wants to cut or consolidate.

We also need to carefully consider how best to streamline, coordinate and consolidate programs that specifically engage children and the public in STEM subjects. Our country continues to face a fiscal crisis and part of our challenge is how to achieve the most benefit from our limited resources in the current budget environment. More graduates with STEM degrees means more advanced technologies and a more robust economy. A well-educated and trained STEM workforce undergirds our future economic prosperity.

But we have to capture and hold the desire of our nation's youth to study science and engineering so they will want to pursue these careers. Our hearing today will help us evaluate if the Administration's proposal effectively accomplishes those goals.

Ms. JOHNSON. Thank you very much, Chairman Smith, for holding this hearing, and thanks to all of our distinguished witnesses for taking time to appear before the Committee this afternoon.

Improving STEM education is the United States—in the United States has been a major focus of mine since before I came to Congress and I am happy to see the increased focus on STEM education across the Nation. States, universities, companies, and non-profits are working together in unprecedented ways to improve STEM education at all levels. We have also increased our efforts at the Federal level in both Congress and our agencies to improve the effectiveness of our STEM education investments.

In the 2010 COMPETES reauthorization, this Committee required OSTP to form an interagency committee, which became known as CoSTEM, to coordinate Federal STEM programs on an ongoing basis and develop a five-year Strategic Plan for Federal investments in STEM education. I was very supportive of this mandate because I believed it was important to look at what the Federal Government has been doing and how we can improve our efforts. I appreciate all of the hard work that Federal education leaders—especially Mr. Melvin and Dr. Mundy—have put into developing the STEM education Strategic Plan.

Unfortunately, prior to the release of the CoSTEM Strategic Plan, OMB included a proposal in the President's Fiscal Year 2014 budget of a sweeping reorganization of Federal STEM education programs. In addition to being concerned about the process, I have

serious concerns with the budget proposal itself. To be blunt, it seems to me that it was not very well thought out.

While I have many questions and concerns, one point I want to emphasize here is the important role of NASA in supporting outreach activities and informal STEM education. NASA seems to have taken the biggest hit in the budget proposal, and this doesn't make any sense to me. I have visited many classrooms in my home State of Texas, and I can tell you there is nothing that can replace the excitement for kids of hearing directly from a NASA astronaut or visiting a NASA facility. Since the 1960s, NASA has been key in encouraging students to study science and engineering and I hope we don't do anything to compromise this.

That is just the beginning of my own concerns, and I am sure my colleagues on both sides of the aisle will have many questions about both the process and the specifics of the budget proposal. But in the end, all of us today share the same goal of improving the effectiveness and efficiency of Federal investments in STEM education.

We have been investing a lot of money in many programs over many years, and while there are many positive anecdotes and some programs that have been evaluated rigorously, we are failing—falling much too short on evidence and accountability. This also applies to the programs to increase participation in STEM by females and underrepresented minorities. It is not enough just to fund these programs. We need to ensure that they are effective.

Therefore, I hope we can use this hearing for more than just attacking the Fiscal Year 2014 budget proposal. The five-year Strategic Plan that we just received on Friday after much delay is a separate document and hopefully one that stands on its own and remains viable even if Congress refuses to support the specifics of the Fiscal Year 2014 proposal. My hope is that the CoSTEM Strategic Plan can serve as a new starting point for more sensible and well thought out implementation steps in Fiscal Year 2015 and beyond, and I look forward to discussing this further with the panel today.

It is our responsibility on this Committee to work with the agencies and the stakeholder groups to make sure that CoSTEM process we required in COMPETES is successful.

I want to thank Chairman Smith again for calling this hearing and the witnesses as well for being here and I look forward to your testimony and a productive discussion. Thank you and I yield back.

[The prepared statement of Ms. Johnson follows:]

PREPARED STATEMENT OF RANKING MEMBER EDDIE BERNICE JOHNSON

Thank you, Chairman Smith, for holding this hearing, and thank you to our distinguished witnesses for taking the time to appear before the Committee this afternoon.

Improving STEM education in the United States has been a major focus of mine since I came to Congress, and I am happy to see the increased focus on STEM education across the nation. States, universities, companies, and nonprofits are working together in unprecedented ways to improve STEM education at all levels.

We have also increased our efforts at the Federal level, in both Congress and our agencies, to improve the effectiveness of our STEM education investments. In the 2010 COMPETES Reauthorization, this Committee required OSTP to form an inter-agency Committee, which became known as CoSTEM, to coordinate federal STEM

programs on an ongoing basis and develop a five-year strategic plan for federal investments in STEM education.

I was very supportive of this mandate because I believed it was important to look at what the Federal government has been doing and how we can improve our efforts. I appreciate all of the hard work that federal education leaders, especially Mr. Melvin and Dr. Ferrini-Mundy, have put into developing a STEM education strategic plan.

Unfortunately, prior to the release of the CoSTEM strategic plan, OMB included a proposal in the President's FY14 Budget for a sweeping reorganization of Federal STEM education programs. In addition to being concerned about the process, I have serious concerns with the budget proposal itself. To be blunt, it seems to me it was not very well thought out.

While I have many questions and concerns, one point I want to emphasize here is the important role of NASA in supporting outreach activities and informal STEM education. NASA seems to have taken the biggest hit in the budget proposal and this doesn't make any sense to me.

I have visited many classrooms in my home state of Texas and I can tell you there is nothing that can replace the excitement for kids of hearing directly from a NASA astronaut or visiting a NASA facility.

Since the 1960s, NASA has been key in encouraging students to study science and engineering, and I hope we don't do anything to compromise this. That's just the beginning of my own concerns, and I'm sure my colleagues on both sides of the aisle will have many questions about both the process and the specifics of the budget proposal.

But in the end, all of us today share the same goal of improving the effectiveness and efficiency of federal investments in STEM education. We've been investing a lot of money in many programs over many years, and while there are many positive anecdotes and some programs that have been evaluated rigorously, we are falling much too short on evidence and accountability.

This also applies to the programs to increase participation in STEM by females and underrepresented minorities. It's not enough just to fund these programs, we need to ensure that they are effective.

Therefore, I hope we can use this hearing for more than just attacking the FY14 budget proposal.

The five year strategic plan that we just received on Friday after much delay is a separate document, and hopefully one that stands on its own and remains viable even if Congress refuses to support the specifics of the FY14 proposal. My hope is that the CoSTEM strategic plan can serve as a new starting point for more sensible and well-thought out implementation steps in FY15 and beyond and I look forward to discussing this further with the panel today.

It is our responsibility on this Committee to work with the agencies and the stakeholder groups to make sure the CoSTEM process we required in COMPETES is successful.

I want to thank Chairman Smith again for calling this hearing, and the witnesses as well for being here. I look forward to your testimony and a productive discussion.

Chairman SMITH. Okay. Thank you, Ms. Johnson.

You all heard the bells and they indicate that the votes have been called. We originally thought there were three votes; there are only two votes, so we should be able to return in about 30 minutes. And I hope you all will stay here and we will come back as soon as we can. I would also like to encourage all the Members who are here to return as well. We will resume this hearing immediately after that second vote. And until then, we will stand in recess.

[Recess.]

Chairman SMITH. The Science, Space, and Technology Committee will reconvene. I will introduce our witnesses and then we will hear their testimonies.

Our first witness today is the Honorable John Holdren. Dr. Holdren serves as the Director of the Office of Science and Technology Policy at the White House where he is both the Assistant to the President for Science and Technology and Co-Chair of the President's Council of Advisors on Science and Technology, or PCAST. Prior to his current appointment by President Obama, Dr.

Holdren was a professor in both the Kennedy School of Government and the Department of Earth Science at Harvard. Previously, he was a member of the faculty at the University of California Berkeley where he founded and led a graduate degree program in energy and resources. Dr. Holdren graduated from MIT with degrees in aerospace engineering and theoretical plasma physics.

Our second witness is Dr. Joan Ferrini-Mundy, Assistant Director of the Directorate for Education and Human Resources at the National Science Foundation. From 2007 to 2009, Dr. Ferrini-Mundy was a member of the National Science and Technology Council Subcommittee on Education. She currently co-chairs the Strategic Plan Workgroup of the NSTC's Committee on STEM education or CoSTEM. From 1999 to 2011, Dr. Ferrini-Mundy held an appointment at Michigan State University where she was a University Distinguished Professor of Mathematics Education in the Departments of Mathematics and Teacher Education and Associate Dean for Science and Mathematics Education in the College of Natural Science. Dr. Ferrini-Mundy was elected a fellow of the American Association for the Advancement of Science in 2011. She holds a Ph.D. in mathematics education from the University of New Hampshire.

Our third and final witness is Mr. Leland Melvin, the Associate Administrator for Education at NASA. Mr. Melvin chairs the Education Coordinating Committee, an agencywide collaborative structure that maximizes NASA's ability to manage and implement its education portfolio. Mr. Melvin entered NASA's astronaut corps in 1998 and served as a mission specialist on two space shuttle missions to the International Space Station. Mr. Melvin earned a Bachelor of Science degree in chemistry from the University of Richmond where he also excelled as a wide receiver for the Spider Football team. He became an academic All-American and a University of Richmond Athletic Hall of Fame inductee. He was then drafted into the National Football League by the Detroit Lions in 1986 and also spent time at the Dallas Cowboys and the Toronto Argonauts. After injuries sidelined his football career, he returned to academia and earned his Master of Science degree in materials science engineering from the University of Virginia.

We welcome you all and look forward to your testimony. And Dr. Holdren, if you will start us off.

**TESTIMONY OF THE HONORABLE JOHN HOLDREN,
DIRECTOR, OFFICE OF SCIENCE AND
TECHNOLOGY POLICY (OSTP),
EXECUTIVE OFFICE OF THE PRESIDENT**

Dr. HOLDREN. Well, thank you very much, Chairman Smith, Ranking Member Johnson, Members of the Committee. I am happy to be here today to discuss with you the current state of Federal support for science, technology, engineering, and math education—that is STEM education—in the context of the President's Fiscal Year 2014 budget; the five-year Strategic Plan for STEM education delivered to Congress last Friday; and our shared interest in improving the coordination, efficiency, and effectiveness of Federal STEM ed programs.

I think all of us in this room understand that high-quality education in the STEM fields is essential not only to provide our citizens with the skills and training they will need to create and fill the high-tech businesses and jobs of the future but also to ensure that we have a science-savvy citizenry needed for a well-functioning democracy in an era when many of the issues facing government have significant science or technology content.

The President certainly understands this and his Fiscal Year 2014 budget supports that recognition with a STEM education investment of \$3.1 billion, a six percent increase over the 2012 enacted funding level. As important as that dollar amount, though, is the thought that the Administration has given to how to derive maximum value from this investment. That is the focus of the Administration's five-year Strategic Plan for STEM education recently submitted to Members of this Committee and others in Congress, and it is reflected in the STEM education reorganization proposals in the President's Fiscal Year 2014 budget.

Before I describe the key elements of that reorganization, let me note that it is a priority of this Administration to leverage the Federal Government's direct investments in STEM education through partnerships with the philanthropic and private sectors, partnerships that to date have resulted in more than \$700 million in contributions and in-kind services in support of our STEM education goals.

The reorganization of the Federal STEM education programs proposed in the President's Fiscal Year 2014 budget would designate a lead Federal agency for each of four key families of educational activity. The Department of Education would have the lead for K-12 instruction, the National Science Foundation would have the lead both for undergraduate education and for graduate fellowships, and the Smithsonian Institution would have the lead for the informal education activities that typically take place outside the classroom.

As part of the reorganization, 78 of the 226 STEM education programs currently spread across 13 different Federal agencies would be eliminated and another 48 would be consolidated within agencies. Ten new programs would be added, making 110 programs altogether going forward. The 78 programs that would be eliminated accounted in Fiscal Year 2012 for about \$175 million or about six percent of the total appropriation for Federal STEM education activities in that year. Those savings would be distributed to the lead agencies, roughly 100 million to the Department of Education, 50 million to NSF, 25 million to the Smithsonian to help support their added responsibilities.

The Proposed Reorganization was designed to preserve the most viable of the STEM education programs in the mission agencies, those most effectively leveraging unique agency assets were serving unique agency STEM education pipeline needs, and every agency that had a STEM education portfolio in 2012 will continue to have one in 2014 with the addition of the Smithsonian making a total of 14 Federal agencies active in the STEM education domain. I believe that this new structure will help ensure that related programs are coordinated, redundancies are minimized, evaluation is improved, and resources are focused on programs that can deliver

the most impact per dollar in their respective domains. I look forward to working with this Committee on our common vision for improving STEM education for all of America's students and I will be pleased to try to answer any questions the Members may have. Thank you.

[The prepared statement of Dr. Holdren follows:]

**Statement of Dr. John P. Holdren
Director, Office of Science and Technology Policy
Executive Office of the President of the United States
to the
Committee on Science, Space and Technology
United States House of Representatives
on
STEM Education: The Administration's Proposed Reorganization
June 4, 2013**

Chairman Smith, Ranking Member Johnson, and Members of the Committee, it is my distinct privilege to be here with you today to discuss the current state of Federal support of science, technology, engineering, and mathematics (STEM) education in the context of the President's fiscal year (FY) 2014 Budget and our shared interest in improving the efficiency and effectiveness of Federal programs.

President Obama strongly believes that the United States must equip many more students to excel in STEM fields. That's why the President's 2014 Budget invests \$3.1 billion in programs across the Federal government on STEM education, a 6 percent increase over the 2012 enacted funding level. The 2014 Budget includes critical investments in several key areas that will benefit aspiring students: preparing and supporting excellent STEM teachers; supporting more STEM-focused high schools and districts; improving undergraduate STEM education; improving the reach of informal STEM-learning efforts; and investing in breakthrough research on STEM teaching and learning.

The President's 2014 Budget also takes important steps to substantially decrease the fragmentation of STEM programs across the Federal government by decreasing the number of STEM programs from 226 to 110 – a more than 50 percent reduction. These disciplined choices to reorganize and cut back lower-priority or narrow-purpose programs make room for targeted increases, allow for easier coordination, and improve opportunities for rigorous evaluation of the remaining programs.

Science, Technology, Engineering, and Mathematics (STEM) Education

As we look at the President's 2014 Budget, I want to provide some important context. During the first four years of the Administration, the Administration has used four strategies to make progress on improving STEM education.

We have worked to maintain a strong investment in STEM education even during difficult budgetary times. For example, the President's 2014 Budget invests \$3.1 billion in programs across the Federal government on STEM education, an increase of 6 percent over 2012 funding levels. This includes the critical investments I discuss in the remainder of my testimony.

We have made STEM a priority in many more of the Administration's education efforts. For example, in the first round of the Department of Education's \$4.3 billion Race to the Top competition, states were encouraged to apply to a competitive preference priority to develop comprehensive strategies to improve achievement and provide rigorous curricula in STEM subjects; partner with local STEM institutions, businesses, and museums; and broaden participation of women and girls and other groups underrepresented in STEM fields. Other

examples include STEM priorities in the Department of Education's Investing in Innovation (i3) and Supporting Effective Educator Development programs. Prioritizing STEM in existing programs at the Department of Education has the advantage of leveraging existing resources, and embedding STEM within our overall education reform efforts.

The President has set ambitious but achievable goals and challenged the private sector. For example, the President announced the goal to prepare 100,000 excellent STEM teachers in his 2011 State of the Union Address. Answering this call to action, over 150 organizations, led by the Carnegie Corporation of New York, formed a coalition called 100Kin10. Members of the coalition have made over 150 commitments to support STEM teacher preparation, and raised over \$30 million in funds. Additional examples of this all-hands-on-deck approach to challenging companies, foundations, non-profits, universities, and skilled volunteers include Change the Equation, US2020, and increasing the reach of the Advanced Placement (AP) program for children in military families.

The President continues to make STEM a high priority. The President hosted the first-ever White House Science Fair in late 2010, fulfilling a commitment he made at the launch of his Educate to Innovate campaign to directly use his bully pulpit to inspire more boys and girls to excel in mathematics and science. In April, he hosted the third White House Science Fair. The President has also issued a call to action to the 200,000 federal scientists and engineers to volunteer and think of creative ways to engage students in STEM subjects.

STEM Education in the 2014 Budget

In the 2014 Budget, the Administration is proposing a reorganization of STEM education programs into four key areas: K-12 instruction; undergraduate education; graduate fellowships; and informal education activities that typically take place outside the classroom. This reorganization involves the consolidation or restructuring of more than half of these programs and streamlining of functions across agencies to improve the delivery and impact of STEM education.

The 2014 Budget is part of a broader Administration commitment to look carefully at the effectiveness of all STEM programs and find ways to improve them. To further this goal, in 2011 I established a Committee on STEM Education under the National Science and Technology Council (NSTC) as called for in Section 101 of the America COMPETES Reauthorization Act of 2010 (Public Law 111-358). The work of this Committee is closely aligned with the vision for STEM education outlined by Congress in the America COMPETES Reauthorization Act and has focused on improving the coordination and effectiveness of all Federal STEM education programs. The Administration released a description of a 5-year Federal STEM education strategic plan and an update to the Federal STEM inventory along with the 2013 Budget. I recently delivered the final strategic plan to this Committee. It outlines a path to increased coordination and collaboration among the Federal agencies that invest in STEM education.

Guided by drafts of the strategic plan, the 2014 Budget makes disciplined choices to consolidate and cut back lower-priority or narrow-purpose programs to make room for targeted increases. This includes the proposed elimination or consolidation of 116 programs, with approximately \$180 million in savings reinvested in new or existing STEM programs. The reorganization will substantially decrease the fragmentation of STEM programs across agencies, allowing potential for easier coordination and strong evaluations of what's working. The

reorganization focuses on: K-12 instruction; undergraduate education; graduate fellowships; and informal education activities that typically take place outside the classroom. Each key area would have a lead agency. The Department of Education's role in K-12 education would be to develop STEM innovation networks, support STEM Teacher Pathways to help reach the President's goal of preparing 100,000 effective STEM teachers over the next decade, and create a STEM Master Teacher Corps to build the STEM instructional skills of others. NSF would promote reform of STEM undergraduate education and enhance graduate fellowships to reach more students and address national needs. The Smithsonian Institution would improve the reach of classroom and informal education materials and activities by ensuring they are aligned with what students are learning in the classroom, and would work with Federal science agencies to harness their unique expertise and resources to create relevant materials, on-line resources, and effective delivery mechanisms to reach more students. Other Federal science agencies would also play an active role in developing and implementing the initiatives at Education, NSF, and the Smithsonian to ensure they align with agency and national goals. The reorganization also includes increasing capacity at key agencies, including \$5 million for a new Office of STEM at the Department of Education.

These disciplined choices to consolidate and cut back lower-priority or narrow-purpose programs make room for targeted increases in high-priority areas. In his 2011 State of the Union address, the President called for a new effort to prepare 100,000 effective STEM teachers with strong teaching skills and deep content knowledge over the next decade. That call had roots in a groundbreaking analysis by the President's Council of Advisors on Science and Technology (PCAST) and remains a priority for this Administration. In this effort, we have been assisted by a robust set of partnerships with the private sector. Earlier this year, I hosted a roundtable of more than 30 professionals from inside and outside government committed to the cause of improving the Nation's corps of K-12 science and math teachers. That day, one of our partners, the Howard Hughes Medical Institute (HHMI), announced that it would donate \$22.5 million to the National Math and Science Initiative (NMSI) to accelerate the scale-up of the UTeach program in American universities. UTeach, pioneered at the University of Texas-Austin, is a program that allows undergraduates to earn simultaneously a teaching certificate and a Bachelor's degree in a STEM field. Along with other initiatives such as 100Kin10 (a collaborative effort between nonprofit, philanthropic, and other private organizations), NMSI and UTeach are helping to achieve the President's goal of preparing 100,000 effective STEM teachers over the next decade. In the 2014 Budget, the Department of Education is investing \$80 million to support this goal.

In line with the government-wide STEM-education reorganization, the Department of Education will also restructure its existing efforts to lead a cohesive and robust initiative around improving K-12 instruction. The Budget invests \$150 million to help school districts, individually or in consortia, to build strategic partnerships with universities, Federal science agencies, businesses, museums, skilled volunteers, and other educational entities. These partnerships – STEM Innovation Networks – will help district leaders harness local, regional, and national resources to transform STEM teaching and learning by, for example, implementing innovative research-based practices and building teacher capacity. Each network will engage in activities based on local needs, such as providing quality professional development to STEM teachers and developing and evaluating instructional models that help students meet STEM-focused, college and career-ready standards. The Innovation Networks are modeled on successful State and local efforts such as the partnership between the Ohio STEM Learning Network, the Cleveland Metropolitan School District, GE, and MC2High School. This investment also includes \$5 million to support a STEM Virtual Learning Network, a national,

online community of STEM educators that will enable them to exchange STEM education materials and best practices, including those developed through the Innovation Networks. Additionally, Networks will leverage the expertise of the Nation's most talented science and math teachers—through the Budget's \$35 million investment in a new STEM Master Teachers Corps—to help improve instruction in their schools and districts, and to serve as a national resource for best practices in math and science teaching. These efforts build on the foundation of the \$150 million Math and Science Partnership program, which provides grants to every State to implement and improve STEM instruction.

The President continues to support undergraduate STEM education reform as a top priority, in part to fulfill a recommendation of PCAST's most recent report on undergraduate STEM education, released in February 2012, calling for the United States to establish a goal of training one million additional STEM graduates over the next decade. To further this goal, the Administration proposes consolidating select STEM undergraduate-education activities into a new consolidated program at NSF. This reform will increase the efficiency and effectiveness of these investments by promoting implementation of evidence-based instructional practices and supporting an expanded evidence base. It also supports research on how new technologies can facilitate adoption and use of new approaches to instruction. The 2014 Budget provides \$123 million for this new program, Catalyzing Advances in Undergraduate STEM Education.

The Administration is also committed to increasing the number of college graduates with degrees in technical fields. Opportunities to work on real-world research problems can help inspire students to pursue such degrees. The 2014 Budget proposes \$79 million, an increase of \$13 million above the 2012 enacted level, for NSF's Research Experiences for Undergraduates (REU) program. Since early opportunities to conduct research can be especially influential in maintaining a student's interest in STEM fields, the program will increase its investment in research experiences for those in their first or second year of college.

By reorganizing or eliminating select fellowship programs, the Budget will provide \$325 million to expand and enhance NSF's Graduate Research Fellowship program, creating a new National Graduate Research Fellowship. The program will not only continue to support the Nation's most promising students in any STEM field, but will also allow students to gain specialized experiences in areas of significant national need or of particular interest to mission agencies. Reorganizing graduate fellowships will position the Administration to implement a national strategy for fellowships and for graduate education more broadly, streamline the application and award process, and reduce administrative costs.

The Budget adds \$25 million to the Smithsonian Institution to improve the reach of informal STEM education by ensuring that materials are aligned to what students are learning in the classroom. The Smithsonian will work with Federal science and technology agencies such as the National Aeronautics and Space Administration (NASA), the U.S. Department of Agriculture (USDA), the National Oceanic and Atmospheric Administration (NOAA), the U.S. Environmental Protection Agency (EPA), the National Institutes of Health (NIH), and other science partners to harness their unique expertise and resources to create relevant materials and curricula, on-line resources, and effective delivery and dissemination mechanisms to reach more teachers and students both inside and outside the classroom.

The Budget also proposes additional steps to increase the capacity of the Department of Education to invest in breakthrough innovation. The Budget proposes up to \$65 million for the

Advanced Research Projects Agency for Education (ARPA-ED) within the Investing in Innovation (i3) program. ARPA-ED will catalyze the development and deployment of new tools and technologies to significantly improve student learning. ARPA-ED will push the education research, development, and demonstration field forward by: sponsoring the synthesis and vetting of public and private R&D efforts; identifying breakthrough development opportunities; shaping the next wave of R&D; investing in the development of new education technologies and tools; and identifying and transitioning the best and most relevant R&D from other federal agencies.

The 2014 Budget leaves intact over 100 programs spread across the agencies. So it by no means is proposing to take away all of the diverse programs the Federal government supports. And there has been a very serious effort to preserve the programs that best leverage the unique assets of the science agencies and are integral to the agencies' missions and goals. The reorganization also preserves programs that provide direct funding to Minority-Serving Institutions (MSIs) because reform in this area must first begin with engagement with the MSI community to determine the best ways to improve services to these institutions. The Administration is committed to ensuring that the new system of delivering STEM education administered through new initiatives at the Department of Education, NSF, and the Smithsonian Institution will be managed so that these lead agencies interact with the mission agencies and preserve the valuable capabilities, translational capacities, goals, and needs of the mission agencies.

Conclusion

The 2014 Budget represents a comprehensive effort to improve STEM education, and will allow us to achieve a number of important goals. It will help Federal STEM efforts reach more students and more teachers more effectively by reorienting Federal policy to meet the needs of those who are delivering STEM education: school districts, States, and colleges and universities. It will reduce fragmentation of the Federal STEM education investment, reorganizing efforts and redirecting resources around clearly defined priorities. It will enable rigorous evaluation and evidence-building strategies for Federal STEM education programs. It will increase the impact of Federal investments in important areas such as graduate education by expanding resources for a more limited number of programs. And it will provide additional resources to meet specific national goals such as preparing and recruiting 100,000 high-quality K-12 STEM teachers, recognizing and rewarding excellence in STEM instruction, strengthening the infrastructure for supporting STEM instruction and engagement, increasing the number of undergraduates with a STEM degree by one million, and broadening participation in STEM fields by underrepresented groups.

I look forward to working with this Committee on our common vision for improving STEM education for all of America's students. I will be pleased to answer any questions the Members may have.

DR. JOHN P. HOLDREN is Assistant to the President for Science and Technology and Director of the White House Office of Science and Technology Policy. Trained in aerospace engineering and theoretical plasma physics at MIT and Stanford, he is a member of the National Academy of Sciences, the National Academy of Engineering, and the American Academy of Arts and Sciences, as well as a foreign member of the Royal Society of London and a former President of the American Association for the Advancement of Science. Prior to joining the Obama administration, he was a professor in both the Kennedy School of Government and the Department of Earth and Planetary Sciences at Harvard, as well as Director of the Woods Hole Research Center. From 1973 to 1996 he was on the faculty of the University of California, Berkeley, where he co-founded and co-led the interdisciplinary graduate-degree program in energy and resources.

Chairman SMITH. And thank you, Dr. Holdren.
Dr. Ferrini-Mundy.

**TESTIMONY OF DR. JOAN FERRINI-MUNDY,
ASSISTANT DIRECTOR, DIRECTORATE
FOR EDUCATION AND HUMAN RESOURCES,
NATIONAL SCIENCE FOUNDATION (NSF)**

Dr. FERRINI-MUNDY. Good afternoon, Chairman Smith, Ranking Member Johnson, and other distinguished Members of the Committee on Science, Space, and Technology. My name is Joan Ferrini-Mundy and I am the National Science Foundation Assistant Director for Education and Human Resources. It is a pleasure to testify before you today on the Proposed Reorganization of Federal STEM education programs and to focus on the role of the National Science Foundation in STEM education.

From its beginnings in 1950, the NSF has supported basic research and education across all fields of science and engineering. The Education and Human Resources Directorate has a unique Federal mission: supporting the preparation of a diverse, globally competent STEM workforce and a STEM-literate society. We do so by investing in research on and development of evidence-based models and materials and approaches to better understand and improve STEM learning and education for the Nation.

Opportunities to learn STEM effectively are the foundation for the diverse, strong workforce that this Nation needs, yet today, the country is educating neither a diverse enough nor a strong enough STEM workforce to power our Nation's economy in the 21st century. NSF's ongoing investments in STEM education are intended to address those complex challenges.

In the Fiscal Year 2014 President's budget request, NSF proposes a coherent framework of investment and undergraduate STEM education and an expansion of the Graduate Research Fellowship program, activities that build on ongoing NSF investment. In the Proposed Reorganization, NSF would have a government-wide leadership role for undergraduate STEM education improvement.

A new NSF-wide activity, Catalyzing Advances in Undergraduate STEM Education, or CAUSE, will consolidate several programs from across the NSF and will emphasize the strong coupling of STEM disciplinary expertise with education research expertise to improve undergraduate persistence and diversity in STEM learning. Development of the framework for CAUSE will be undertaken across all of NSF in concert with other agencies that have been managing undergraduate programs. These conversations build upon and are guided by ongoing work of the NSTC Committee on STEM education, CoSTEM, to leverage the Agency's collective expertise and assets. At NSF, CAUSE will be implemented with full participation of the Science and Engineering Directorates.

For Fiscal Year 2014 the President's budget also proposes that our long-standing successful Graduate Research Fellowship program be expanded into a National Graduate Research Fellowship program. This expanded program will facilitate the opportunities for fellows to gain special experiences and training in key STEM

areas of particular interest to the Nation and to the mission agencies. It will also provide those agencies access to a large pool of fellows to consider for training that might be critical to their missions.

The interagency working group on STEM graduate fellowships has been meeting since 2010 to share best practices in the administration of Federal graduate fellowship programs and it is now extending its work to collaborate on designing the expanded program.

NSF is continuing its programs in informal STEM education and in K-12 STEM education. These programs focus primarily on STEM learning, research, and development. The evidence-based materials and models that result are then available for use at large scale through partnership and leveraging.

CoSTEM has a task force called the Federal Coordination in Stem Education Task Force that I co-chair with Leland Melvin. This task force was charged to produce a five-year strategic plan for STEM education. Federal agencies, including the NSF, the Office of Management and Budget, and the Office of Science and Technology Policy all have participated actively in the discussions of this Committee, and earlier drafts of the plan have been available to inform the development of the Administration's Fiscal Year 2014 request, including the reorganization.

The proposed Federal STEM education reorganization is designed to provide a coherent, cohesive set of STEM education programs to serve the Nation more effectively. NSF is committed to better coordination within our own organization and to participating in collaborations across agencies to leverage investments, all in support of the goal of improving STEM learning for the Nation.

Thank you very much for the opportunity to testify today and thank you for your support of, and interest in, STEM education. I will be pleased to answer any questions that you and other Members of the Committee may have.

[The prepared statement of Dr. Ferrini-Mundy follows:]



Testimony of

Joan Ferrini-Mundy, Ph.D.
Assistant Director
Directorate for Education and Human Resources
National Science Foundation

Before the

Committee on Science, Space, and Technology
U.S. House of Representatives

June 4, 2013

STEM Education: The Administration's Proposed Reorganization

Good afternoon Chairman Smith, Ranking Member Johnson, and other distinguished members of the Committee on Science, Space, and Technology. My name is Joan Ferrini-Mundy and I am the National Science Foundation's Assistant Director overseeing Education and Human Resources (EHR). I appreciate the opportunity to testify before you today on Federal investment in science, technology, engineering, and mathematics (STEM) education, and to focus on the role of the National Science Foundation.

Overview: National Science Foundation and Education and Human Resources

The National Science Foundation (NSF) is the only Federal agency dedicated to the support of basic research and education across all fields of science and engineering. The "Organic Act" of 1950, the original legislation for NSF, included authorization of activities in education that would contribute to producing the scientific and engineering manpower needed for the Nation. Thus, from the beginning, one of the stated objectives of NSF was to strengthen basic research and education in the sciences and engineering. Within NSF, the Directorate for Education and Human Resources provides the focus for NSF's investments to advance STEM learning, scientific literacy, and a globally competitive science and engineering workforce. The Directorate's unique mission is to support the preparation of a diverse, innovative STEM workforce and a STEM-literate citizenry through investments in research and development on STEM education and learning. In carrying out its mission, the Directorate benefits from the advice and participation of engineers and scientists from all fields across the NSF, a unique advantage for the development and management of educational programs in the rapidly changing world of science and technology.

STEM-literate citizens are needed to support science and engineering. STEM workers play critical roles in scientific discovery, technological progress, and innovation. And according to the *Science and Engineering Indicators of 2012*, workers in STEM occupations on average have higher wages and lower levels of unemployment than those in non-STEM occupations. Women and minority groups, including blacks, Hispanics, and Native Americans, continue to have low levels of participation in STEM. The challenge for the Nation, then, is to produce an inclusive workforce with the STEM skills to power our 21st century economy. To respond to this challenge, we must improve STEM education at every level, enabling STEM learning both inside and outside school, to excite and inspire students to persist in learning and applying STEM skills and expertise.

EHR research and development grants, selected through the highly competitive NSF merit review system, are designed to advance knowledge about how to improve STEM learning and teaching. Our mission encompasses teaching and learning from P-16 through post-graduate levels, the education of teachers and administrators, and informal education in out-of-school settings, as well as studies relating to the implementation of innovations and models across STEM education. The outcomes of this research and development can be, and are, leveraged by other Federal agencies as well as non-governmental organizations, schools, and businesses that wish to improve STEM education and participation.

National Science and Technology Council (NSTC) Committee on STEM Education Strategic Plan and the FY 2014 Proposed STEM Education Re-organization

NSF has a history of collaboration with the White House Office of Science and Technology Policy (OSTP) and other Federal agencies to address national priorities and common interests in STEM education and workforce development. The National Science and Technology Council's Committee on STEM Education (known as CoSTEM) is co-chaired by NSF Acting Director Dr. Cora Marrett. I was a member of the Fast-Track Action Committee on Federal Investments in STEM Education, chartered by the Committee on STEM Education, that developed the *Federal Science, Technology, Engineering, and Mathematics (STEM) Portfolio of 2011*, describing how 13 Federal agencies utilized \$3.4 billion in fiscal year 2010 to support STEM education. The Portfolio report has been crucial in the development of the CoSTEM Strategic Plan for Federal STEM education investment.

Mr. Leland Melvin, of the National Aeronautics and Space Administration (NASA), and I co-chair the Federal Coordination in STEM Education Task Force. Together with representatives from other Federal agencies, we have led the development of the five-year Strategic Plan to better coordinate Federal programs on STEM education. This Plan proposes building new models for leveraging assets and expertise across agencies and building and using evidence-based approaches across agencies to improve the impact of the Federal STEM education investment. Members of the Federal Coordination in STEM Education Task Force include representatives from Federal agencies as well as from the Executive Office of the President (EOP), including OSTP and the Office of Management and Budget (OMB), who have participated in discussions on how STEM education may be strengthened with coherent, cohesive programs to better serve all of our communities.

As an NSF assistant director, I participate with the other assistant directors, office heads, and NSF leadership each year in developing NSF's budget requests. These discussions always include ample opportunities to propose and plan for mechanisms for collaborations within the NSF on areas of interest across the Foundation, including education and workforce development. For the FY 2014 budget request, the President proposed consolidation of several NSF programs in the area of undergraduate education, a proposal that will be anchored by bringing together three major programs in EHR. The budget development process also involves close interaction with the EOP, particularly OMB.

In addition to NSF's internal consolidation proposal, the Administration has proposed a government-wide strategic reorganization of STEM education efforts to more effectively and efficiently realize the benefit of Federal investments. I welcome this opportunity to highlight NSF's proposed FY 2014 activities in two key areas of the proposed government-wide STEM reorganization – undergraduate education and graduate fellowships. I am especially excited about the prospects of collaboration and synergy across agencies that may be realized through implementation of the CoSTEM Strategic Plan, and include additional information about NSF's role in K-12 STEM education and learning STEM in informal environments.

Undergraduate Education. The Committee on Science, Technology, Engineering, and Mathematics Education has identified undergraduate STEM education as a priority. The President's Council of Advisors on Science and Technology's *Engage to Excel* report of 2012 identifies the need "for about one million more STEM professionals than the U.S. will produce at the current rate over the next decade if the country is to retain its historical preeminence in science and technology." NSF has a set of programs that invest in the improvement of undergraduate STEM education, an NSF focus area for decades. As one example of success, NSF support for a "STEM Talent Expansion Program" at Indiana University-Purdue University Indianapolis led to a 25 percent increase in STEM degrees over the past three years through the use of peer mentoring, facilitated community college transfers, and a high school-to-college transition program.

NSF's FY 2014 Budget Request includes a new NSF-wide activity called Catalyzing Advances in Undergraduate STEM Education (CAUSE). CAUSE comprises three large programs within EHR's Division of Undergraduate Education (Transforming Undergraduate Education in Science, Technology, Engineering and Mathematics; Widening Implementation & Demonstration of Evidence-Based Reforms; and Science, Technology, Engineering, and Mathematics Expansion Program), and elements of undergraduate programs from NSF's other directorates and offices. CAUSE is a natural evolution and consolidation of the NSF's ongoing internal efforts to couple STEM disciplinary expertise with education research expertise to better understand and improve undergraduate STEM learning and persistence of students from all groups and to support STEM workforce development. CAUSE will provide coherence across NSF undergraduate education programs to maximize the effectiveness of NSF investments. The intent of CAUSE is to build on NSF's unique strengths across the STEM disciplines and STEM education to focus sustained research on ways to improve undergraduate STEM education. In addition, the CAUSE framework, as it evolves, allows for incorporation of undergraduate improvement goals that are shared across Federal agencies, consistent with implementation of the proposed reorganization and the

CoSTEM Strategic Plan. In the proposed reorganization, NSF would become the government-wide lead agency for undergraduate STEM education in FY 2014.

Graduate Fellowships. NSF has a long history of successfully managing and implementing an agency-wide graduate fellowship program. NSF's Graduate Research Fellowship (GRF) Program celebrated its 60th year in December of 2012, having been in operation almost as long as the NSF itself. This program invests in students in any STEM field who have demonstrated potential for significant achievements in science and engineering. These investments have paid off well: Among the more than 200 Nobel laureates who have had NSF support, 40 were selected as Graduate Research Fellows. NSF's Graduate Research Fellows also are well represented among government leaders, business executives, writers, and members of the National Academies. As described in the FY 2014 Budget Request, the NSF's Graduate Research Fellowship Program will be expanded into a National Graduate Research Fellowship (NGRF) Program that will address areas of significant national need, in some cases by incorporating "targeted opportunities" that allow Fellows to gain specialized experiences and training in key STEM areas of particular interest to mission agencies.

The Interagency Working Group on STEM Graduate Fellowships, including representatives from the NSF and other CoSTEM agencies, has been meeting since 2010 to share best practices in the administration of U.S. Federal graduate fellowship programs, and is now extending its work to collaborate on designing NGRF. As described in the FY 2014 Budget Request, the proposed design of the NGRF program will include opportunities for Fellows to obtain technical and professional development specified by other federal agencies. NSF has already implemented targeted opportunities in GRF – examples include Graduate Research Opportunities Worldwide (GROW), a program that enables graduate research fellows to participate in research activities with scientists in partner countries around the world, and the Engineering Innovation Fellows Program, which provides summer research opportunities on-site for fellows in host companies. If NGRF is implemented, management of NGRF will include mechanisms for representatives from other federal agencies to be involved in the selection of Fellows and to determine how Fellows will participate in the specialized technical and professional development relevant to their agencies. Within both the proposed reorganization and the strategic plan, NSF is committed to creating access and opportunities for the large pool of exceptional graduate fellows to participate in training critical to the missions of a range of agencies and to greater research and professional development opportunities than they had previously.

K-12 STEM education and learning STEM in informal environments. The CoSTEM Strategic Plan includes priority areas for improvement of K-12 STEM education and also for increasing and sustaining youth and public engagement in STEM. NSF has been investing in research and development relevant for both of these areas for many decades and supports a large community of science, technology, engineering, mathematics, and education experts who are developing the STEM learning tools and models for tomorrow. The knowledge and evidence generated by NSF-funded research and development produces tested innovations that can be brought to scale through partners with extensive reach such as the U.S. Department of Education and the Smithsonian Institution. For example, many of the projects funded by the Mathematics and Science Partnerships program of the Department of Education are using assessment tools, and technical support for these tools, that were developed

through funding from a variety of programs at NSF. Among the most widely used are the *Misconceptions Oriented Standards-based Assessment Resource for Teachers* – developed at the Harvard Smithsonian Center for Astrophysics; *Assessing Teacher Learning About Science Teaching* – developed at Horizon Research, Inc.; and *Learning Mathematics for Teaching* – a joint project of researchers at the University of Michigan and Harvard University. Another example of how NSF’s “upstream” investments can eventually go to scale is the LASER project. In the 1990s, the NSF invested in the Smithsonian Institution’s *Leadership and Assistance for Science Education Reform Center (LASER)*, which focused on assisting school districts develop five-year strategic plans for implementing a high-quality, inquiry-based science program using appropriate curriculum materials (many of which were developed with funding from NSF). In 2010, the Department of Education’s Investing in Innovation Fund made an award for “The LASER Model: A Systemic and Sustainable Approach for Achieving High Standards in Science Education,” a grant of more than \$25 million to the Smithsonian Institution to conduct a five-year randomized-controlled student trial to validate the LASER strategic planning development model in three regions: rural North Carolina; northern New Mexico; and the Houston Independent School District. This project is a good example of NSF’s longstanding collaborative relationship with the Smithsonian, which we will expand in future.

NSF also makes significant investments to support STEM learning in informal environments. For example, the Advancing Informal STEM Learning (AISL) program supports innovation in anywhere, anytime, lifelong learning through investments in research, development, infrastructure, and capacity-building for STEM learning outside formal school settings. Awards in the AISL program must address how the research and development in their projects advance the field of informal STEM learning, provide innovation at the frontier of informal learning, and/or broaden participation to provide greater access to STEM-learning opportunities for underserved audiences such as racial and ethnic minorities, women and girls, and those with disabilities or learning differences. Examples of informal science models funded by the Advanced Informal STEM Learning program include citizen science projects that engage youth and the general public in conducting scientific research, so that they learn science concepts and understand the process of doing science as they assist researchers with collecting and analyzing data. One example is the *Community Collaborative Rain, Hail, and Snow Network*, which involves 14,000 volunteer scientists of all ages in 50 states who measure precipitation from their homes, schools, public areas, and businesses. Using rain gauges, snow rulers, and hail pads, they collect data and post it to the project web site for research scientists to access. Originating at the Climate Control Center at Colorado State University, this non-profit community-based network is now sponsored by Federal agencies and local and state organizations such as the Texas Floodplain Management Association and the Wyoming Farm Service Agency. A second tested model funded by AISL is the *Portal to the Public* program based at the Pacific Science Center in Seattle, Washington; it provides professional development for scientists so that they can effectively communicate their current research with students and other public audiences. Evaluation of this project is now determining how this model works in different kinds of institutions around the country.

Summary

In summary, the CoSTEM Strategic Plan provides a significant resource through which the CoSTEM agencies can work together to improve the impact of Federal STEM education investments. The priority areas of the Strategic Plan and the proposed government-wide STEM education reorganization are aligned, and the Plan and the reorganization also share the common principles of commitment to evidence, efficiency, and coordination. I look forward to the participation of the National Science Foundation in forging the partnerships with other agencies that will provide a coherent, cohesive set of STEM education investments around national priorities for the benefit of the Nation.

I will be pleased to answer any questions that the Members may have.

Biographical Sketch

Dr. Joan Ferrini-Mundy

Dr. Joan Ferrini-Mundy is NSF's Assistant Director heading the Education and Human Resources Directorate (EHR), a position she has held since February 2011. She serves as a member of the NSF senior management team and is involved in strategic planning and leadership for the scientific and education mission of NSF. Prior to her appointment as Assistant Director, she had served the Foundation in a number of management capacities since 2007.

In connection with her agency-wide responsibilities, Ferrini-Mundy serves as NSF's science, technology, engineering and mathematics (STEM) workforce development goal leader for the Office of Management and Budget's Priority Goal Initiative. From 2007 through January 2010, she was a member of the National Science and Technology Council's (NSTC) Subcommittee on Education and currently serves on two subgroups of the NSTC Committee on STEM Education, including as Co-Chair of the Federal Coordination in STEM Education Task Force (FC-STEM). From 2007-2008, representing NSF, she served as an ex officio member of the president's National Mathematics Advisory Panel, and co-chaired its Instructional Practices Task Group.

Ferrini-Mundy held an appointment at Michigan State University as a university distinguished professor of mathematics education, and was appointed in the departments of mathematics and teacher education. Her research interests include calculus teaching and learning, mathematics teacher learning and mathematics and science education policy at the K-12 level. Ferrini-Mundy holds a Ph.D. in mathematics education from the University of New Hampshire.

Chairman SMITH. Thank you, Dr. Ferrini-Mundy.
And Mr. Melvin.

**TESTIMONY OF MR. LELAND D. MELVIN,
ASSOCIATE ADMINISTRATOR FOR EDUCATION,
NATIONAL AERONAUTICS
AND SPACE ADMINISTRATION (NASA)**

Mr. MELVIN. Thank you. Chairman Smith, Ranking Member Johnson, and Members of the Committee, thank you for today's invitation to talk about the Committee on Science, Technology, Engineering, and Mathematics Education and NASA's involvement in coordinating our STEM education assets with a broader STEM framework.

When Congress formed NASA in 1958, it was with a bold goal. Your predecessors charged us to reach for new heights and reveal the unknown so that all we discover and all that we learn will benefit all humankind. This is what inspires us to come to work every single day. For me specifically, I know that the discoveries we make and the things that we learn are directly tied to the quality and quantity of future scientists, technologists, engineers, and mathematicians that are available and inspire to join us in our mission.

To that end, NASA Education's vision is to advance high-quality STEM education using NASA's unique capabilities. NASA's education programs are deliberate in developing and executing strategic partnerships with governmental, academic, industrial, entrepreneurial, and international communities to ensure NASA's education mission and vision are properly addressed.

I am the Co-Chair of the Federal Coordination in STEM Education Task Force, which helped guide the development of the Administration's five-year strategic plan for STEM education. I am also NASA's representative on the CoSTEM. My staff has served in leadership roles on the Fast Track Inventory, Evaluation, and Cross-Agency Priority Goal Subcommittees and working groups. NASA enthusiastically supports greater coordination among the Federal agencies and strengthening the Nation's focus on STEM education. NASA also supports the STEM education reorganization proposal in the President's 2014 budget.

For over two years, 13 Federal agencies have contributed expertise from their education and technical workforce. The strategic plan that my Co-Chair, Joan Ferrini-Mundy and I provide a framework for increased collaboration among agencies. The plan strengthens accountability of Federal project managers, places an emphasis on rigorous evaluation, and establishes increased linkages between federal, state and local education efforts.

NASA's education portfolio will focus on four priorities that contribute toward the Administration's STEM education goals. Those priorities are STEM engagement; NASA internships, fellowships, and scholarships; educator professional development; and institutional engagement.

An overarching operating principle throughout NASA's portfolio is a focus on creating opportunities for diverse groups of institutions, educators, and learners. This includes women, minorities,

and persons with disabilities. NASA will consolidate the education functions, assets, and efforts of the Mission directorate, offices, and field centers into a single STEM Education and Accountability Project managed by my office.

As part of NASA's STEM interagency coordination effort, our available assets will support STEM activities that will be directed by the NSF, the Smithsonian Institution, and the Department of Education. This includes the infrastructure that supports the rigorous collection, evaluation, and dissemination of evidence of NASA's contributions to the Administration's goals.

The Executive Office of the President recommended and the President accepted a Fiscal Year 2014 budget request based in part on the work of the Committee on STEM and the goals are the same. Representatives from the 13 Federal agencies will continue to meet to ensure the Federal assets are coordinated and put to use in support of the Nation's educators and learners. NASA is committed to close collaboration with other STEM agencies and to inspiring future generations to seek careers in aerospace.

NASA has the ability to engage, educate, and prepare a future generation of explorers for employment in the aerospace fields. NASA's people, missions, and spirit of discovery inspire our Nation's youth to pursue STEM careers to benefit all of humankind.

Thank you for letting me testify, and I am happy to take any questions you may have.

[The prepared statement of Mr. Melvin follows:]

**HOLD FOR RELEASE
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Statement of

**Mr. Leland D. Melvin
Associate Administrator for Education
National Aeronautics and Space Administration,
and
Co-Chair of the Federal Coordination in STEM Education Task Force (FC-STEM)**

before the

**Committee on Science, Space and Technology
U.S. House of Representatives**

Chairman Smith, Ranking Member Johnson, and Members of the Committee, I appreciate the invitation to join you today to talk about the Committee on Science, Technology, Engineering, and Mathematics (STEM) Education and NASA's involvement in coordinating our STEM assets within a broader STEM framework.

For the United States to maintain its preeminent position in the world it will be essential that the Nation continues to lead in STEM, but evidence indicates that current educational pathways are not leading to a sufficiently large and well-trained STEM workforce to achieve this goal. Nor is the US education system cultivating a culture of STEM necessary for a STEM-literate public. Thus it is essential that the United States enhance U.S. students' engagement in STEM disciplines and inspire and equip many more students to excel in STEM, and NASA supports the President's goal of utilizing our resources to achieve improvements in STEM, education and instruction.

When Congress formed NASA in 1958, it was with a bold goal. Your predecessors charged us to reach for new heights and reveal the unknown so that all we discover and all we learn will benefit all humankind. This is what inspires us to come to work every single day. For me specifically, I know that the discoveries that we make and the things that we learn are directly tied to the quality and quantity of future scientists, technologists, engineers and mathematicians available and inspired to join us in our mission. NASA's expertise, passion, and resources play a unique role in the Nation's STEM education portfolio.

To that end, NASA Education's vision is to advance high quality science, technology, engineering and mathematics (STEM) education using NASA's unique capabilities. NASA's education programs are deliberate in developing and executing strategic partnerships with intergovernmental, academic, industrial, entrepreneurial, and international communities to ensure NASA's education mission and vision are properly addressed.

I am the Co-Chair of the Federal Coordination in STEM Education Task Force (FC-STEM), which has helped guide the development of the Administration's 5-year Strategic Plan for STEM education, as well as NASA's representative on the CoSTEM. My staff has served in leadership roles on the Fast Track Inventory, Evaluation, and Cross-Agency Priority Goal subcommittees and working groups. NASA is enthusiastically supportive of greater coordination among the federal agencies and strengthening the Nation's focus on STEM education which is called for in the STEM education reorganization proposal in the President's 2014 Budget. A recent report from the Partnership for Public Service highlights the growing number of jobs in STEM fields, while noting that the supply of STEM graduates available and interested in federal jobs is shrinking, challenging the government's ability to recruit and retain top STEM talent. In 2012, NASA, Health and Human Services, the Environmental Protection Agency, the Department of Commerce and other Federal Agencies employed over 524,900 STEM or medical personnel. That accounts for nearly 29% of the entire Federal workforce, and the number is growing.

For over two years, thirteen federal agencies have contributed expertise from their education and technical workforce to wrestle with this issue. FC-STEM has issued an interim report, and two comprehensive inventories of STEM education conducted or supported by the agencies, and we transmitted the Federal STEM Education 5-Year Strategic Plan to Congress recently. I believe the plan that my colleague, Joan Ferrini-Mundi of the National Science Foundation, and I have guided provides a framework for increased collaboration among agencies, strengthens accountability of federal project managers, places an emphasis on rigorous evaluation, and establishes increased linkages between federal, state and local education efforts.

For our part at NASA, we will capitalize on the excitement of the Agency's mission to stimulate innovative solutions, approaches, and tools that inspire learner and educator interest and proficiency in STEM disciplines. NASA education's vision is to advance high quality science, technology, engineering and mathematics education using NASA's unique capabilities. NASA's education programs are deliberate in developing and executing strategic partnerships with intergovernmental, academic, industrial, entrepreneurial, and international communities to ensure NASA's education mission and vision are properly addressed.

NASA's education portfolio, which will be implemented in collaboration with other STEM agencies, will focus on four priorities and will contribute toward the Administration's goals for STEM education:

- STEM Engagement: Providing opportunities for participatory and experiential learning activities that connect learners to NASA-unique resources.
- NASA Internships, Fellowships and Scholarships: Providing NASA work experiences and research opportunities to improve retention in STEM and prepare students for employment in NASA and STEM industry.
- Educator Professional Development: Preparing STEM educators and leaders to deliver quality STEM instruction using NASA-unique content.
- Institutional Engagement: Improving the capacity of U.S. institutions to deliver effective STEM education and conduct NASA mission-related research.

An overarching operating principle consistent throughout NASA's portfolio is a focus on making opportunities available to a diverse audience of educators and learners, including women, minorities, and persons with disabilities.

NASA will continue to support the National Space Grant College and Fellowship Program (Space Grant), Experimental Program to Stimulate Competitive Research (EPSCoR) and Minority University Research and Education Project (MUREP). These education investments link to NASA's research, engineering, and technology missions. Each of these investments provides unique NASA experiences and resources to students and faculty.

In support of the Administration's FY 2014 STEM education plan, NASA will restructure fundamentally the Agency's education efforts into a consolidated education program funded through the Office of Education, which will also lead the Agency's coordination with other Federal agencies in pursuit of the Administration's STEM education goals. The best NASA education and public engagement programs from throughout the Agency will be awarded funding through an internal competitive process. In a new approach, NASA will consolidate the education functions, assets and efforts of the Mission Directorates, Offices and Centers into a single coordinated STEM Education and Accountability Project (SEAP).

As part of NASA's STEM interagency coordination effort, NASA will ensure that the Agency's assets are put to use effectively in support of the STEM activities that will be directed by the National Science Foundation, the Smithsonian Institution, and the Department of Education. NASA will make its rich content knowledge and other assets available to these agencies as they facilitate federal STEM education activities through the Administration's CoSTEM process for agency coordination, bringing NASA's inspirational activities to a broader audience. This includes the infrastructure necessary to support the rigorous collection, evaluation, and dissemination of evidence of NASA's contributions towards the achievement of the wider STEM goals.

The Executive Office of the President recommended, and the President accepted, a FY14 Budget Request based in part on the work of the Committee on STEM, and the goals are the same. Representatives from the 13 federal agencies are meeting to ensure that the federal assets entrusted to each Agency are coordinated and put to best use in support of the Nation's educators and learners. NASA is committed to close collaboration with other STEM agencies and to inspiring future generations to seek careers in aerospace.

In summary, the CoSTEM Strategic Plan provides a significant resource through which the CoSTEM agencies can work together to improve the impact of Federal STEM education investments. The priority areas of the Strategic Plan and the proposed STEM education reorganization are aligned, and the Plan and the reorganization also share the common principles of commitment to evidence, efficiency, and coordination. I look forward to the participation of NASA in forging the partnerships with other agencies that will provide a coherent, cohesive set of STEM education investments for the benefit of the Nation.

Leland D. Melvin, NASA Associate Administrator for Education

Leland D. Melvin, NASA Associate Administrator for Education, is responsible for the development and implementation of the agency's education programs that strengthen student involvement and public awareness about its scientific goals and missions. In this role, he leads the agency in inspiring interest in science, technology, engineering and mathematics, or STEM, through NASA's unique mission, workforce, facilities, research and innovations.

As associate administrator for education, Melvin chairs the Education Coordinating Committee, or ECC, an agency-wide collaborative structure that maximizes NASA's ability to manage and implement its education portfolio. The ECC works to ensure that the agency's education investments are focused on supporting the nation's education efforts to develop the skilled workforce necessary to achieve NASA's goals and objectives.

Melvin currently serves on the White House National Science and Technology Council's Committee on Science, Technology, Engineering and Mathematics Education, or CoSTEM. CoSTEM coordinates the STEM education activities and programs for all federal agencies, encourages the teaching of innovation and entrepreneurship as part of STEM education, reviews STEM education activities and programs to ensure they are not duplicative within the Federal government and develops and implements a five-year STEM education strategy for all federal agencies. He is the United States representative on the International Space Education Board, or ISEB, a global collaboration in space education between NASA, the Canadian Space Agency, the European Space Agency, the Japan Aerospace Exploration Agency and the Centre National d'Études Spatiales. The ISEB shares best practices and unites efforts to foster interest in space, science and technology among the student community worldwide.

Melvin began his NASA career in 1989 as an aerospace research engineer at the agency's Langley Research Center in Hampton, Va. He entered NASA's astronaut corps in 1998 and served as a mission specialist operating the robotic arm on two space shuttle missions to the International Space Station: STS-122 in 2008 and STS-129 in 2009.

Melvin earned a Bachelor of Science degree in chemistry from the University of Richmond, where he also excelled as a wide receiver for the Spiders' football team. He became a National Collegiate Athletic Association Division I Academic All American and University of Richmond Athletic Hall of Fame Inductee. He was then drafted into the National Football League, or NFL, by the Detroit Lions in 1986 and also spent time with the Dallas Cowboys and the Toronto Argonauts. After injuries sidelined his football career, he returned to academia and earned his Master of Science degree in materials science engineering from the University of Virginia in Charlottesville. He holds honorary doctorates from Centre College, St Paul's College and Campbellsville University.

Chairman SMITH. Okay. Thank you, Mr. Melvin.

I recognize myself for questions. And let me direct my first question to Dr. Holdren. Now, Dr. Holdren, I just want to understand the process a little bit better by which current programs were designated as low priority, and I am just curious as to who made the decisions and who evaluated those current programs. Was it your office? Was it the agencies themselves? Was it Office of Management and Budget, OMB? If you could explain the process to us.

Dr. HOLDREN. Well, the process within the Executive Office of the President involved OMB, OSTP, the Domestic Policy Council, which has—

Chairman SMITH. Right.

Dr. HOLDREN. —responsibility for education in general in the Executive Office of the President. Of course, all of us interacted. It was an iterative process. It involved, of course, the usual budget inputs from the various agencies, and it involved the use of a set of criteria that were developed out of various reports that had led up to this reorganization and had in part inspired the President to encourage it, starting with the PCAST report in September 2010 and continuing with the GAO report in January 2012.

Chairman SMITH. Whose idea was it—who came up with the original idea for consolidation and for elimination, that whole subject? Was that OMB?

Dr. HOLDREN. No, I wouldn't say that that was OMB. I would say that, again, leading out of these major reports both from the Congressional side and from the Executive Branch side there was clearly a need to focus more resources on high-priority programs, and the only way you can focus more resources on high-priority programs in a highly constrained budget is to find lower-priority programs to reduce, and that is what we did. It wasn't fun. Those are tough decisions. They are the kinds of tough decisions that are made under constrained budgets with a focus on feeding the most important priorities.

Chairman SMITH. Okay. Thank you. I am glad the funding was increased, as you mentioned, by six percent. That is a good sign.

Dr. Ferrini-Mundy, why was the strategic plan not proposed when the budget was released last April? By coming out with the strategic plan after the budget, in fact just last Friday, it seems to me that it has made CoSTEM almost irrelevant. In other words, it would have been, I think, a lot more helpful had the strategic plan come out either before the budget or concurrent with the budget and I just was going to ask for an explanation.

Dr. FERRINI-MUNDY. Thank you for your question, sir. The team that has been working on the budget has been working diligently for some time and we were well aware when we produced our progress report last spring that the work that it would take to get from there to a final strategic plan would be considerable. And, as you know, the strategic plan is a very detailed plan that goes into substantial commentary about how we will move forward with implementation. We wish it had been earlier, but we were happy with the plan—or I am happy with the plan that we have.

I think also the principles that are in the strategic plan are quite aligned with the President's Proposed Reorganization.

Chairman SMITH. Well, that is really no surprise since it came out after the President's budget, right?

Dr. FERRINI-MUNDY. Well, the principles that were in place even last year in the progress report, too, were still in place, right, principles of coordination—

Chairman SMITH. Right.

Dr. FERRINI-MUNDY. —and consolidation.

Chairman SMITH. Did you make any changes as a result of the budget?

Dr. FERRINI-MUNDY. The development of the strategic plan was an ongoing process and we—of course, we were working through that around the time of the budget release and beyond.

Chairman SMITH. Okay. Thank you.

Mr. Melvin, how did you like the Dallas Cowboys?

Mr. MELVIN. Well, they cut me so they are not my favorite—

Chairman SMITH. I think you know this next question is coming. You are a former astronaut. You have seen NASA from the inside out, from the outside in, from 200 miles up. NASA's STEM programs were cut by 1/3 from 150 million to 100 million, \$50 million. Do you support those cuts?

Mr. MELVIN. Well, as a member of the CoSTEM, we have been working very hard with the other mission agencies. We have been very focused on bringing our unique assets forward to be part of this President's budget. No one likes to be cut, but this is something that we are going to do to help bring our best assets forward to support the Administration's budget. So it is a fairly big cut but we have to make—

Chairman SMITH. Well, it wasn't your idea, was it?

Mr. MELVIN. NASA was part of the CoSTEM process, so whatever pieces of the CoSTEM process that filtered into this budget process that was there. But I didn't come up with the idea, no.

Chairman SMITH. Okay. Thank you. I appreciate your answers and that—yield back the balance of my time and recognize the Ranking Member, Ms. Johnson, for her questions.

Ms. JOHNSON. Thank you very much. Let me first make a little comment that could be considered a little catty. You know, I just appreciate the fact that you can sit there and smile and bring us this report that you put together, and I know how hard it is to try to work within budgets now. I have received so many calls and letters from organizations expressing concerns because they feel that the nonfederal stakeholders—school districts, universities, science museums, and many other nonprofit organizations—had no opportunity to have any input. So I am hoping that you will continue to work with that. And in view of that, I notice that you have Smithsonian as a lead agency, and I would just like to have some rationale for that and how they feel about it.

Dr. HOLDREN. Well, I am happy to take that on. First of all, the rationale for it is the Smithsonian has enormous experience and expertise and success in programs of engagement, of reaching out to very broad communities with educational materials, with inspiring materials, and we feel that by giving the Smithsonian a coordinating role in those engagement activities, we will bring more coherence and coordination to them and we will have in the Smithso-

nian a—sort of a central clearinghouse for the development of new materials in which all the mission agencies will contribute.

The idea is not to eliminate access to the assets of the mission agencies that have been engaged in this multiplicity of outreach programs. We are reducing the multiplicity in the agencies, but a lot of what is being reduced in specific named programs in the agencies will be picked up and coordinated by the Smithsonian. The Smithsonian has an Office of Education and Access. They have an Assistant Secretary for Education and Access. They have an infrastructure. They are getting \$25 million to do this. Our expectation is that this will actually improve the engagement activities in the STEM Ed field across the Federal Government.

Ms. JOHNSON. Thank you. Now, I would take that \$25 million, too, and with a smile on my face, but I can't understand. They have no federal research facilities; they have no external grant-making power. And not having the kind of national stakeholder networks that have been built over the decades with these other agencies gives me somewhat of a concern. Have you set up some type of communication network that would perhaps bring a bit more expertise or knowledge, or do you plan to staff it with someone who has had experience in some of the labs and other scientific endeavors?

Dr. HOLDREN. Well, first of all, we already have the Smithsonian engaged with the rest of CoSTEM in the process of working out in detail how this reorganization would be implemented if in fact it is approved by the Congress. And the Smithsonian folks who are participating in that process have pledged to interact very closely with all the mission agencies that they would be helping with their public engagement efforts.

We intend for CoSTEM, the Committee on STEM education of the National Science and Technology Council, to be the continuing forum where all of the stakeholders come together, where they can express their concerns if they have concerns. If things are not working out as planned, if important activities are being neglected, CoSTEM will be the forum where that comes out and is addressed. And I can give you my personal commitment as Co-Chair of the CoSTEM—in addition to chairing the NSTC—that we intend to carry out that function.

Ms. JOHNSON. Okay. So you will have active participants helping to develop this effective network to carry this out. Will this be an additional staff, I guess, with the 25 million and you would put together expertise?

Dr. HOLDREN. Yes, there will be additional staff at the Smithsonian, and again, they will be interacting with staff across all the mission agencies and of course in the Executive Office of the President.

Ms. JOHNSON. Thank you very much. I yield back.

Chairman SMITH. Thank you, Ms. Johnson.

The gentleman from Texas, the Chairman Emeritus, Mr. Hall, is recognized.

Mr. HALL. Well, thank you, Mr. Chairman.

I will have a question of Dr. Holdren. I have a real problem. I remember things. And I remember back—sometime back, Mr. Chairman, when we came in one vote of losing NASA, and then the next year, if you remember—I am not sure you were here then—

Dr. DeBakey came and walked this whole building out and we carried the vote by over 100 votes.

That was a frightening thing, but I also remember when we had Gina McCarthy here before us and we were talking about jobs and her refusal to use science in making her decisions that affected people and jobs, and her answer was this, "I don't want to give the impression that EPA is in the business to create jobs." I think one of the meanest things I have ever heard anybody say with the situation like it is today, people going home telling their daughter they can't keep her in school or whatever, whatever.

But Dr. Holdren, you made some statements and I imagine you might like to change some time, but in 2010 you were quoted as saying "we can't expect to be number one in everything indefinitely" at the American Association for the Advancement of Science. And is this still your view?

Dr. HOLDREN. Well, Congressman Hall, first of all, I would say that we are in difficult budgetary times. We are making tough choices.

Mr. HALL. I know that. Is this still your view? No matter how you reach that attitude, is this still your view, yes or no?

Dr. HOLDREN. I think it is already true, Congressman Hall, that the United States is not number one in every aspect of every scientific field, and we have to make choices. We have to decide which are—the most important areas are and which we need to lead, and we need to invest in those, just as within STEM education we need to invest in the highest-priority propositions, the one that—the ones that have the potential to really lift our game in STEM education and make us overall continuingly the world's leading science and technology nation, which we remain today and we want to remain so in the future.

Mr. HALL. Well, you are certainly not attaining that. You are not going in that direction, sir. I guess my question when I ask you is this still your view, I will ask a second question: does a Proposed Reorganization help to target areas where the United States can and should strive to be number one or does it do this?

Dr. HOLDREN. An area in which we are striving to be number one, sir, is STEM education, and that is what this proposal is all about.

Mr. HALL. And where are we?

Dr. HOLDREN. Well, right now, if you look at the rankings of math scores, science scores around the world, the United States is unfortunately only in the middle of the pack. We are indeed no longer at the top of the pack in terms of the proportion of our young people who get a college degree of any kind.

The President has made very clear that he wants to change that. He wants to bring us back to the top of the pack both in the comparative scores in math and science across countries and back to the top of the pack in terms of the proportion of our young people who graduate from college.

Mr. HALL. And how do you do that? You know, I will follow up with you on this. The participation of NASA's scientists and engineers in these education programs provides a human dimension to the inspiring work done by NASA. These scientists and engineers also provide role models for students—role models, you hear that—

for students to enter into STEM careers without the participation of NASA scientists and engineers. How are you going to connect teachers, students, and the public to NASA's inspiring work and workforce and expect to get to be number one by the actions that you are taking place now over at the Administration?

Dr. HOLDREN. We are not going to lose the participation of NASA scientists and engineers in classrooms with teachers, with kids, inspiring kids. We are taking a part what NASA has been doing in that domain and consolidating some of it so that we can better evaluate it and decide which are the most effective programs. And some of it will be worked in partnership, as I noted, with the Smithsonian Institution, which is expert in these outreach and engagement activities. But we are by no means even coming close to eliminating the engagement of NASA scientists and engineers in these highly valued activities.

Mr. HALL. You really aren't, sir, and I agree with you on that. I just don't understand why you refuse to encourage EPA, your partner in—I am not going to say your partner in crime because that is—that wouldn't be correct, but your partner in really hurting small companies and hurting the continuation of people obtaining jobs, because if you keep on going the direction you are going, we not only are not going to have any jobs, we are not going to have any employers. So I guess without the participation of NASA scientists, I don't know how you are going to connect teachers and students and the public inspiring the workforce with the direction you are going in.

And I thank you for your answers. I yield back.

Chairman SMITH. Thank you, Mr. Hall. And the gentlewoman from Oregon, Ms. Bonamici, is recognized.

Ms. BONAMICI. Thank you very much, Mr. Chairman.

Thank you so much to all the witnesses for your testimony about what we can do—what the Federal Government can do to do better with STEM. This is a Proposed Reorganization and it is change. Change is difficult. There is a lot of change here.

An important part of this conversation is how to make STEM instruction and programming engaging and more effective. And I join the growing group of stakeholders who submit that integrating the arts and design into STEM—that makes STEAM—can help make the difference. This is especially compelling when we are talking about how to engage underserved populations, including females and minorities, traditionally not involved in STEM. I am pleased that the NSF has funded the SEAD network, which stands for Sciences, Engineering, Arts, and Design. The group is in the midst of some fascinating work on the integration of the disciplines.

Also, recent research at Michigan State University, Dr. Ferrini-Mundy, it is maybe your former colleagues—professors found that there are 14 measurable skills linked to success in sciences that are directly linked to arts education. This is about using both halves of the brain and innovation. Those skills include observing, imaging and visualization, abstracting, pattern recognition and pattern invention, analogizing, dimensional thinking, transforming data into visual or graphic forms, converting theories into mechanical procedures, and more.

When developing this reorganization proposal, did the Administration consider innovative approaches that include multidisciplinary collaboration in order to encourage traditionally unrepresented groups to become more involved in STEM education programs?

Dr. HOLDREN. I guess I am supposed to take the first crack at that. Certainly, we looked at a variety of issues around traditionally underrepresented groups, and one of the decisions we made is, for now, there are no changes being proposed in the range of programs that explicitly address minorities and other underserved groups in the STEM domain. We think to the extent that those programs need a closer look it should be done in close collaboration with the institutions that provide those programs. So that is something that is a task going forward.

Ms. BONAMICI. Dr. Ferrini-Mundy?

Dr. FERRINI-MUNDY. Yes, thank you. I think both within—certainly in the CoSTEM plan and in the Proposed Reorganization, the focus on engagement is the place where there will be enough space and opportunity, I think, to really explore these exciting connections with the arts. We at the National Science Foundation are engaged in some discussions with NEH and NEA at this time to think about what it might look like to fund some explorations in the role of the arts in promoting engagement in STEM education. And so I think we have the infrastructure in place to be able to really take up these questions within the engagement component.

Ms. BONAMICI. Okay. Thank you very much. And I also want to ask about a program that is being used by the Oregon Health and Science University; that is the Science Education Partnership Award. I think it is called SEPA. This program that is administered by NIH, it funds innovative K–12 and informational science education, health education projects.

In Oregon, there is a program called Let's Get Healthy. It has been a success since it began in 2007. It provides valuable education about diet and nutrition at health fairs and underserved communities. So OHSU, the university, has used grant money through SEPA to fund these programs, and with this consolidation, there is some concerns raised in the health community about shifting authority to NSF, Department of Education, and the Smithsonian that don't have a public health focus. So can you talk a little bit about SEPA under the reorganization? And additionally, if a program like Let's Get Healthy is shifted to the Smithsonian, how would States apply for grants considering that the Smithsonian lacks authority to issue grants?

Dr. HOLDREN. I guess in terms of the details of exactly how these collaborative activities would work under the new structure, you know, I have to say that that is something that is being worked out. We are working on it in the CoSTEM Committee and we are determined to figure it out in a manner that will not lose the effectiveness of the engagement programs that already exist. And again, we have the commitments of all concerned.

We had as recently as last Thursday a meeting of the full CoSTEM in which all of the relevant departments and agencies were represented, and we talked about this in detail. And the folks around the table were in agreement that we will be able to work

together to ensure that the implementation details are developed in a way that preserve these important functions. That is our commitment. That is our determination.

Ms. BONAMICI. Thank you. And I see my time is expired. I yield back. Thank you, Mr. Chairman.

Chairman SMITH. Okay. Thank you.

And the gentleman from Illinois, Mr. Hultgren, is recognized.

Mr. HULTGREN. Thank you, Mr. Chairman.

Thank you all for being here today. I appreciate the work that you are doing and these important discussions that we are having today.

Dr. Holdren, I wondered if I could start with you. I have heard from many members from the Illinois science community concerned about multiple aspects of the President's proposal. I am normally one who is very supportive of consolidating duplicative or overlapping Federal programs, but I share a number of concerns with our community because the President's proposal seems like it is taking a number of successful initiatives being done by high-quality institutions at the local level and running a majority of the future initiatives through a central bureaucracy at the Department of Education in Washington. I have got concerns about this approach as well as other aspects of the proposal that seem rushed or poorly planned out.

Dr. Holdren, why eliminate these grant programs or, in the case of Smithsonian, consolidate them into a single pot for a single institution with limited or no grant-making experience when there are others outside the Beltway, like the Museum of Science and Industry in Chicago, that are providing these exact meaningful STEM experiences and opportunities for our Nation's youth? And exactly how will the funds be expended and who will provide oversight? I am wondering specifically with Smithsonian, how will those projects the Smithsonian proposes to fund be subject to peer review prior to funding?

Dr. HOLDREN. I am afraid I am going to find myself offering the same answers over and over again. That is, when you ask about oversight, the Committee on STEM education—which I co-chair with the NSF Director—will be providing oversight and of course reporting back to the EOP but will have the participation of all of the affected individuals.

When you ask why should we take successful programs and stop funding them or why should we take successful programs and move them, we went through a long process of trying to decide where we could effectively consolidate, where we could cut in order to provide more resources for the highest priorities, all of the reviews of STEM education programs and the Federal Government that have been done.

And again, I say those have been done on the congressional side, by the GAO. They have been done on the White House side, by PCAST. They have been done by CoSTEM coming out with the progress report in February 2012. Every one of these reviews said our programs are too dispersed. They are not coordinated enough. Many of them are not evaluable enough. We have no good way with this degree of dispersion of doing the sort of coordination, creating the efficiencies, doing the evaluations that we need, nor do

we have any way to free up resources for the high priorities such as creating 100,000 new high-quality STEM ed teachers over the next decade or graduating an extra million—

Mr. HULTGREN. Let me get to my point real quick here because, again, I don't want you to repeat answers over and over again. I do understand what you are saying. I just am concerned when you add layers of bureaucracy, it doesn't reduce costs; it increases costs and certainly makes things, I think, more expensive and the potential taking away programs that are being very effective.

Specifically, you know, what can I say back to the Museum of Science and Industry doing great STEM education programs to alleviate their concerns?

Dr. HOLDREN. Well, what I would say to the Museum of Science and Industry is under the new system—again, assuming it is approved by the Congress—the Museum of Science and Industry, which already has an excellent relationship with the Smithsonian, will be able to use that relationship to find resources and means of continuing the high-quality activities in which they are engaged.

Mr. HULTGREN. Dr. Ferrini-Mundy, how will NSF and Department of Education address bio-STEM programs since training and preparing for a bio workforce isn't really part of their core missions? How specifically will you support health-focused K-12 education programs?

Dr. FERRINI-MUNDY. Thank you for the question. At this point, we do not support biomedical areas at the National Science Foundation but, of course, at the K-12 level there is great interest in general preparation in all of the sciences, particularly the biological sciences. And we have a number of programs at NSF that would be available for groups that are interested in improving the instruction in biology at the K-12 level.

Mr. HULTGREN. Let me move on. I just have a little bit of time left. But Mr. Melvin, I wondered if you could quickly address—you know, what, I shouldn't have run out. This time I have a long question. Would it be all right if I follow up with a question maybe that you could respond in writing to if that is all right? I don't want to—

Mr. MELVIN. Yes, sir.

Mr. HULTGREN. —take up too much time from the Committee. So I have got a long question that I will forward on to you if that is all right. Thank you very much. I yield back the balance of my time.

Chairman SMITH. Thank you, Mr. Hultgren.

The gentleman from Massachusetts, Mr. Kennedy, is recognized for his questions.

Mr. KENNEDY. Thank you, Mr. Chairman. And I want to thank the Chairman and Ranking Member for holding what I believe is an extremely important hearing. And I want to thank our witnesses for the research and the tremendous amount of legwork that you have put in in preparation today and for being here to testify.

I have got two basic questions for all the panelists if I may. First, higher education is an essential part of our STEM efforts but I worry that, in my review of the report, we miss a critical area of the middle-skilled job training, jobs that require a high school di-

ploma and maybe some additional coursework and certification but not necessarily an undergraduate degree.

I represent a district in Massachusetts that has several former industrial cities that have suffered from the economic downturn in traditional manufacturing, cities like Attleboro and Fall River. I see STEM education as a critical component in ensuring that our citizens are ready to seize jobs in industries like advanced manufacturing, clean energy, and IT, but I couldn't find one mention of vocational schools in your report and only limited mention of community colleges and associate's degree programs at all. I was hoping that you might be able to shed some light as to: one, how the Administration believes these programs fit into the broader STEM goals; and two, how the strategic plan factors them in, if it all.

And then, related to that, I applaud the work that you have done focusing on minority communities and certainly female participation in STEM fields, and I know that you have put a great deal of focus on that. I would like to hear a little bit more about that and how we plan to achieve that.

Beyond that, I was wondering how the plan will assist the economically disadvantaged. So there are far too many economically distressed communities around the country, certainly in Massachusetts and in some of the communities that I just mentioned. I believe that STEM fields are a crucial and critical way to increase economic development and provide opportunities to all students. How can we ensure that the expansion of STEM efforts includes those communities as well? So just briefly, I guess, the economic disadvantaged portion of it and vocational schools and community colleges.

Dr. HOLDREN. Well, I will take an initial crack and then see what my colleagues have to add.

With respect to middle-skilled job training, this is actually something the Administration has been looking at and working with the private sector and the community college sector to engage on a regional basis, the companies that operate in a given area and the community colleges, so that the curricula at the community colleges will reflect the kind of training that people need to get jobs in their region. And this is something that has been proceeding under the broad rubric of the Educate to Innovate initiative where we have had a huge amount of private and philanthropic collaboration with the Federal Government.

It has certainly been a theme for the President which he has commented on and visited—made a number of visits emphasizing this particular theme and its importance. So we are certainly in agreement with you on the importance of that issue and the value of getting corporations to work in concert with our committee colleges to get kids better educated for the kinds of jobs that are going to be there.

The other thing I would say is that the efforts we are making on K–12 education are going to prepare people better for the post-high school education, whether it is in a community college or research university or a liberal arts college. It will prepare people better to engage in and succeed in STEM fields in ways that will help those that do not go on for a four-year degree nonetheless get high-skills jobs.

Mr. KENNEDY. Doctor?

Dr. FERRINI-MUNDY. Thank you for your questions.

Just briefly on the focus on higher ed, of course, the main focus on undergraduate education in the CoSTEM report does include all institutions of undergraduate education. And the major focus on retaining students at the undergraduate level, whether they are in two-year technical colleges or four year schools is crucial, and that hinges on excellent instruction, evidence-based processes for keeping students interested and engaged. So I think the plan again has the space for us to focus heavily on the preparation of the technical workforce, and there are a number of programs at the—certainly at the National Science Foundation.

I would cite the Advanced Technological Education program, which is all about preparing technicians who are ready to work in emerging areas of science and manufacturing and so forth.

As for focus on economically disadvantaged students, again, I think that the K–12 focus in the strategic plan, as well as the focus on underrepresented minorities, will both serve to help us ensure that high-needs schools are well served, and again, it will occur through partnerships among multiple agencies in part making sure that students in high-needs areas get good access to the STEM assets of the Federal agencies. Ideally, this plan will make more of that possible.

Mr. KENNEDY. I would really like to follow up. We can follow up and writing but it just—how you plan to do that would be great. And, Mr. Melvin, I will ask—I am out of time but I am sorry you might have some busy writing to do. My apologies.

Chairman SMITH. That is—Mr. Melvin, if you want to respond to the question, that is fine.

Mr. MELVIN. Well, just in the community college area, we have a program at NASA called the Curriculum Improvement Partnership Award program, and that focuses on helping strengthening community colleges using NASA content curriculum. It also supports skills in faculty members to do research in ensuring that underrepresented, underserved teachers and students in community colleges have that access. So that is something that we plan to continue moving forward with our program in the future.

Mr. KENNEDY. Thank you, sir. Thank you, Mr. Chair.

Chairman SMITH. Thank you, Mr. Kennedy.

The gentleman from Indiana, Mr. Bucshon, is recognized for questions.

Mr. BUCSHON. Thank you, Mr. Chairman. Thank you to all the witnesses and for your time and preparation for this hearing. I am all for consolidation and streamlining the process at the Federal level and thanks for your work on that. My questions are more technical about how you decided on which programs, and some of those questions have been answered already, but the focus on accountability and success of programs and if there were specific metrics that you used to assess that, and how many programs that you actually eliminated and actually had data available for your use in assessing whether or not they were successful or not? I will start with Dr. Holdren first.

Dr. HOLDREN. Okay. First of all, we had sort of a number of layers of criteria that we used in this sorting process, and one was to

look at the priority areas that were identified in the CoSTEM process, including in the progress report that came out in 2012. And those priority areas were improving K–12 instruction, reforming undergraduate education around evidence-based practices, streamlining the graduate fellowship process, and amplifying engagement activities.

So we looked, first of all, to give priority to programs that addressed one of those four goals. Within that framework, we also tried to look, as your question suggests, at evaluation and ask, for which of these programs do we have evaluations? For the ones that we don't have evaluations for, how evaluatable are they? Do we have a reasonable prospect of developing evaluations? And of course we had to take into account the inefficiency of trying to run rigorous evaluations on very small programs. This is one of the reasons for consolidating, to improve one's capacity to evaluate.

So all of those considerations were taken into account in this process, which I have described as an iterative process in which OMB, OSTP, Domestic Policy Council all participated.

Dr. FERRINI-MUNDY. Thank you. I am not sure that I have a lot to add other than that the report itself, the strategic plan, is very clear about the importance of evaluation and of metrics with a lot of focus on developing common metrics across programs in these four—in these five areas of focus. And I am very optimistic that this is going to lead to even stronger evaluation efforts when we combine our resources and expertise.

Mr. BUCSHON. Yes, I mean I would say going forward that with this experience—from what you are describing, a lot of the programs don't really have metrics and don't have a way to assess them. And going forward, programs probably should have those in place if we don't already have those because I am also on the Education Workforce Committee. I am very interested in these particular subjects. And as you probably know, across the Federal Government, not only in this area but other areas, we have all kinds of programs that haven't been evaluated for their success in decades, literally decades, and I would encourage you to make sure that you have metrics and evaluation process in place.

The other thing I see that—it actually goes from 13 to 14 Federal agencies involved in the STEM education process, and, you know, when you consolidate programs or eliminate programs, are we actually going to downsize so to speak or make more effective and efficient the Federal Government or are we just going to have less programs on the books but really the bureaucracy hasn't significantly changed? In fact, it has been shifted to make it even maybe more difficult?

Dr. HOLDREN. We don't think it is—would be shifted under this proposal to be more difficult or to have additional layers. We think the fragmentation rather has been a source of inefficiency. And again, I would point out that that was the conclusion of the GAO that said very forcefully that we need to reduce fragmentation, we need to increase coordination, and we need to increase focus on the highest priorities. PCAST found the same thing. CoSTEM found the same thing.

Mr. BUCSHON. And just so you know I agree with that. I just find that a lot of times when we, so to speak, consolidate and stream-

line programs, we actually don't change a lot except the paper—on paper and whether or not behind the scenes we actually are making a dent in the bureaucracy. Are we making it more effective and efficient or are we just putting less programs continuing to be in an ineffective and inefficient system?

Dr. HOLDREN. I understand the concern. Our aim is to avoid that problem.

Mr. BUCSHON. I would agree. I yield back, Mr. Chairman.

Chairman SMITH. Thank you, Mr. Bucshon.

The gentleman from California, Mr. Bera.

Mr. BERA. Thank you, Mr. Chairman. Thank you, Ranking Member. And I thank the witnesses for being here.

You know, I would echo some of the concerns or thoughts of my colleagues from Indiana. Change for the sake of change is not necessarily good nor a bad thing, so without drawing a conclusion as to whether this change is a good change or a bad change, what is important though is that we evaluate metrics that say, okay, we are going to consolidate. We are going to try to become more efficient. We are going to try to eliminate redundancy. And I would just emphasize as we undergo this transition that we make sure we have those metrics in place so we are measuring whether we are actually becoming more efficient, whether we are actually advocating for our goals.

That is not my question, however. You know, listening to Mr. Kennedy, I also have a concern. You know, we have been hard hit in the recession and, you know, particularly in that workforce that is in their 30s to 40s, you know, individuals that are well-educated, individuals that received an education and training that prepared them for the 20th century workforce. Unfortunately, we are now in the 21st century and things are rapidly changing.

I want to make sure when we are thinking about training a STEM workforce, there is this large group of individuals that are highly educated, very motivated to get skill sets to fill the workforce needs that we have. And in this consolidation, you know, I see where we are directing funds to K–12, I see where we are directing funds to undergraduate and graduate education, but these are individuals that don't need to go back and get an undergraduate degree or even a graduate degree. They may need to get one year of on-the-job training so they could rapidly fill some of these jobs. And, you know, I would wonder where those of programs fit in a more consolidated program.

Dr. HOLDREN. Let me first resoundingly agree with the concern you expressed about metrics, and if you look at the strategic plan, there is really a tremendous amount of analysis that has gone into the specific question of metrics and what metrics we expect to use for all of the programs that are ongoing. So we completely agree with that.

On the retraining issue, I would admit that that was not a primary focus of the CoSTEM. And the primary focus was, as you point out, K–12 now changed to P–12, that is pre-K–12, undergraduate education, graduate education. That is already a very big agenda, but the retraining question is an important one and one in which I think, you know, a lot of effort is going on out of the

Department of Labor and elsewhere. But maybe my colleagues have more to add on that.

Dr. FERRINI-MUNDY. I would just add quickly that whether the retraining occurs in formal undergraduate degree programs or bachelor's or associate's degree programs or in certificates or badges or other approaches, there still is the central problem of designing instruction and curriculum in ways that will enable students to learn the kinds of skills that industry demands, and we learned a lot about that through the undergraduate focus.

Mr. MELVIN. I think Joan and I were at a conference last week and we saw this whole fusion of the social world with the academic world with the workplace world. How do we get kids to start thinking about themselves and bridging these different gaps? The arts are in there, too. So I think one of the things that we took back and we—this is a five-year strategic plan. The first year is the implementation phase. We will iterate and figure out what are the things that we need to ensure that the students see themselves after they graduate and how they can look at new careers, maybe new interests? The visual badging was one of the pieces that they talked about where students can do online badging and get certificates for it. They actually get college credit for it. So how can we use those types of things also in this new paradigm?

Mr. BERA. Well I would add as you go back and consider the changes that will be taking place that we don't just think about, you know, the folks at the beginning phase of their life as well as those in undergraduate and graduate education, that there really is an incredible talent pool here of individuals that we can rapidly train and we probably do this most efficiently through public-private partnership where in my own community we have a large Intel presence and they are very much engaged in, you know, both going into the K-12 classrooms with Project Lead the Way and some of their programs that they are fending, but many of these technology companies are also taking a chance on this workforce and training them on the job and I would ask us to be open to directing resources in an efficient way to the private sector. So I will yield back.

Chairman SMITH. Thank you, Mr. Bera.

The gentleman from Florida, Mr. Posey, is recognized for his questions.

Mr. POSEY. Thank you, Mr. Chairman. And thank you, witnesses, for your appearance and your testimony and your answers to questions.

Can any of you advise me if the Common Core Initiative is at all tied in with the new STEM programs you propose?

Dr. FERRINI-MUNDY. Thank you for the question. Our proposals and the CoSTEM strategic plan are very general and they aim for quality instruction at K-12 and aim for improved undergraduate education, graduate fellowships, and groups that have traditionally been underrepresented with STEM along with engagement. So they don't speak directly to the Common Core Initiatives.

Mr. POSEY. Okay. Doctor?

Dr. HOLDREN. I agree with my colleague's testimony.

Mr. POSEY. Okay.

Mr. MELVIN. Likewise.

Mr. POSEY. All right. So there is no connection whatsoever to the proposed STEM programs and the Common Core Initiatives? We agree unequivocally?

Dr. FERRINI-MUNDY. I am going to say a little bit more then on this point. The Common Core Initiative is an activity underway in parts of the country, and so as these investments move forward, that will be something, at least for the National Science Foundation, that we are interested in understanding: What is the impact of an effort initiated by States to make for Common Core standards? But it is not a direct part of this reorg.

Dr. HOLDREN. Let me add one further point. At the Department of Education under the Fiscal Year 2014 budget proposal of the President, there would be \$265 million focused on STEM instruction. And obviously, in the framework of that focus clearly the questions of the effectiveness of the core curriculum will come into play.

The other thing I would mention that is germane as to what would go on in the Department of Education under the Proposed Reorganization is a set of STEM innovation networks which would connect schools, businesses, national laboratories, universities to work on the most effective ways to lift our game collaboratively and collectively in STEM education. And again, in that context clearly the core curriculum issues would arise.

Mr. POSEY. Okay. So we have gone from three noes to two yeses?

Dr. HOLDREN. Well, I think, Congressman, with respect, the point was that the strategic plan does not address that issue in detail but the budget provides for substantial resources and programs that clearly would incorporate certainly looking at and understanding the benefits as well as any liabilities of the various approaches that are out there.

Mr. POSEY. I think you have said for the STEM programs pretty forthright and it seems like the Common Core Initiative has already begun to morph and there is a lot of uncertainty about where it is going to end up. I noticed \$5 million for a new STEM office at the Department of Education, and I wondered if you could give me four or five examples of successful departments in the Department of Education that we would like this new one to emulate.

Dr. HOLDREN. I think you probably need a witness from the Department of Education up here to provide that sort of list, but I think—you know, I mean I would certainly say that the Invest in Innovation grant program at the Department of Education has been very successful. It has funded a variety of programs that are increasing participation, increasing success rates. The Pell grant program has been very successful. There is good research that shows that the Pell grant program has very substantially affected the number of people going to college. Folks who otherwise would not have been able to go to college have been able to do so under the Pell grant program.

I think—you know, the Department of Education occasionally comes in for something of a beating in some of these contexts, but in fact I think there are some great successes in the Department. But its own representative might be a better and more effective spokesperson for that.

Mr. POSEY. Does anyone have any idea how many employees we have at the Department of Education now?

Dr. HOLDREN. I assume that you do.

Mr. POSEY. No, I mean I would guess probably 35, 40,000 people over there, you know, looking for a job description every day but I don't know.

Dr. HOLDREN. We can obviously get you that number.

Mr. POSEY. Okay. Thank you. I yield back.

Chairman SMITH. And thank you, Mr. Posey.

The gentleman from California, Mr. Takano.

Mr. TAKANO. Thank you, Mr. Chairman.

You all know that I have a background in K–12 education as a 23-year teacher, not in the sciences but in humanities, and 22 years as a community college trustee. My question, first of all, is directed to Dr. Ferrini-Mundy. The 2007 *America COMPETES Act* authorized NSF to award grants to Hispanic-serving institutions to enhance the quality of undergraduate STEM education at such institutions. Despite guidance from Congress, the NSF has not requested separate funding for HSIs. La Sierra University, Riverside Community College, UC Riverside are three schools in my district that could benefit from this dedicated funding.

As the Administration moves forward with the strategic plan, how will NSF ensure that minority-serving institutions, particularly HSIs, are receiving the support they need to promote STEM education among minority students?

Dr. FERRINI-MUNDY. Thank you for the question, sir. As you know, the National Science Foundation has a very strong commitment to broadening participation and has a number of programs, an entire division in my directorate that is focused on human resource development and broadening participation, so several programs within that unit that are very—particularly aimed at minority-serving institutions. We track very carefully the success rates, and the application rates. We do substantial outreach with Hispanic-serving institutions and other minority-serving institutions. That is an area of great concern and interest for us.

I think going forward the CoSTEM proposed plan is actually wonderful in terms of its focus on improving the participation in STEM of students from groups that have traditionally been underrepresented in STEM, including Hispanic students. And the plan, I believe, is to work in the next several months very closely with stakeholder communities to look across government at the full portfolio of investment for groups that have been underrepresented in STEM to think about the most efficient and effective ways to make a difference. So it is a strong commitment in the strategic plan and for the National Science Foundation.

Mr. TAKANO. Wait. Can you tell me—and one of the areas I am concerned about that I have observed as a weakness in STEM education is elementary school. We are lucky if we get that teacher who has the snakes and the ant farms and all that to engage those students early on, but it is so important to get them early.

And you all—I am glad to hear that you are also interested in pre-K. So can you tell me about this reorganization and what opportunities there are for improving pre-K curriculum and teaching

and also what we are going to do to train and provide the portfolio of activities for those elementary school teachers?

Dr. FERRINI-MUNDY. So I can give the beginnings of an answer really as we are just embarking on this plan and the first stages will be transitioning and implementing the ideas. But I do know that both the National Science Foundation and the Department of Education have invested in pre-K STEM-oriented programs and work to try to improve student learning in those fields and those areas.

And because there is a teacher education component in the strategic plan goal on K–12 instruction, that is a P–12 teacher focus, a lot of the focus there would be on the pre-service preparation of teachers. So the idea about what does the undergraduate curriculum look like for those preschool and primary grades and elementary school teachers, that is certainly very much on the table in this discussion. The planning will take shape as we go but I think there is a strong commitment to it.

Mr. TAKANO. Well, I am really glad to hear it because, you know, often the teachers who prepare for—people who prepare for elementary and pre-K service, they don't often come with that preparation. So obviously we have to get to them in the undergraduate, the general education—

Dr. FERRINI-MUNDY. Absolutely.

Mr. TAKANO.—before they actually do specialize. Can you tell me more about what we are going to do about computer science as a part of STEM? About half of the country's 9.2 million jobs in the STEM fields will be in computing. I don't know if you can—

Dr. FERRINI-MUNDY. I can start and my colleagues may have more to say, but we at the National Science Foundation certainly recognize the need to have a number of initiatives and partnerships between the Directorate for Computer and Information Sciences and Engineering and the Directorate for Education. In particular, we have had a focus on improving high school participation in computer science, so we have had a program to actually stimulate activity to get more high schools across the country to a point where they have the capacity to offer computer science courses, not just advanced placement computer science but prerequisite courses that recognize the centrality of computing, of big data, since so many careers in STEM that are going to depend upon those kinds of capacities and capabilities. So we are actively engaged in investing in those areas, and that can as well fall into the strategic plan.

Mr. TAKANO. Great. I can have the rest of that question answered later, sir, Mr. Chairman.

Chairman SMITH. Thank you, Mr. Takano.

The gentleman from Utah, Mr. Stewart, is recognized.

Mr. STEWART. Thank you Mr. Chairman. To the panelists, thank you for being with us. Thanks for hanging in there. I know it has become a rather lengthy hearing. I am impressed with your ability to pack the house as I look around at this hearing. I have never been to one that had quite so many people, which means you are either the most brilliant set of witnesses ever assembled or maybe the sexiest or whatever it is. Thanks for doing that.

You know, as—all of you have either said this directly or indirectly, alluded to it, and that is your concern—Mr. Holdren, you

mentioned that we are in the middle of the pack when it comes to comparative scores of other nations in math and sciences. True? And I mean that is not really an opinion. That is pretty much—I mean it is a provable fact where we are in these comparative test scores. And the rest of the panel would agree with that determination. That is about where we are, right?

And, I actually wanted to say here, because this is a question that doesn't relate directly to most of the conversation today, but I would really appreciate your opinion on this. That is you have this apparent dichotomy where there is no other nation on earth—on one hand, we are in the middle of the pack and probably have been for a long time. This isn't something that developed in the last 10 or 15 years in, you know, STEM education, yet there is no other nation on Earth that leads as we do in innovation, in business development and patents and job creation in what I would describe as the creative process of taking this information and actually doing something with it, actually creating something with it. You know, when it comes to applying that innovation and doing something that benefits humanity, there is really—no one does it better than we do.

Now, look, there is lots of examples. You know, eBay, Google, NASA, IBM, pharmaceuticals, aerospace, I mean there is lots and lots of areas that are driven by science and technology that we are still the leader and have always been the leader in the world. And I wonder if you could help me explain that a little bit or help me understand that. How is it on one hand we are average and yet when you are—the outcome of this is you are trying to create innovation, you are trying to create jobs, you are trying to better people's lives and we are still the very, very best at that.

And do you have any ideas? Have you considered that, of why it is that, you know, we could have one on the one hand and yet have this real positive outcome on the other still?

Dr. HOLDREN. Absolutely. We have thought about that. I will make a couple of quick points. One is that we still have by far the best university system in the world. Our research universities are the envy of all of the rest of the world, and to some extent some of the shortfalls in our K-12 STEM education system are compensated for by the enormous capabilities of our university system. A second point that—

Mr. STEWART. Well—and so just very quickly, so the universities are able to overcome what we would agree is a deficiency up to that point—

Dr. HOLDREN. In part.

Mr. STEWART. —up to the university point?

Dr. HOLDREN. In part, but as the PCAST study of the first two years of college education in the STEM fields also showed, we are still losing a lot of talent that we don't need to lose. Only 40 percent of American students who enter our universities intending to get a STEM degree do get a STEM degree. The 60 percent that we lose are a loss to our innovation capacity going forward.

The second point I would make is a crucial aspect of our success is having an economic and policy environment that encourages and supports risk-taking and entrepreneurship. And again, we lead the world in that respect and we need to preserve the policy and eco-

conomic environment which involves tax policy, intellectual property rights policy, and many other dimensions of policy including even immigration policy to ensure that we retained an environment that nurtures this creativity, this entrepreneurship, this risk-taking, which has produced so much for our society.

Mr. STEWART. And could I just interrupt to agree with you on that? And that is maybe one of the points of my question is to recognize that these are important subjects that we are talking about with this—with the funding and the organization around STEM and the sciences and math. But there is another very important element to that and that is, you know, who we are as a nation, and as you said, the creativity, the innovation, the risk-taking, the entrepreneurship is something that is also an important consideration.

Dr. HOLDREN. Absolutely.

Mr. STEWART. Yes. Okay.

Dr. HOLDREN. The one other thing I would add though is when you are in the lead, you still need to look over your shoulder from time to time to see if anybody is gaining on you, and it is becoming a more competitive world in these respects. And that is one of the reasons why we have to be concerned about lifting our game in STEM education because we want to continue to be the leader in innovation and creativity, and development of new products and businesses. And with other folks around the world investing larger and larger sums in trying to be able to compete with us in these dimensions, we cannot rest on our laurels.

Mr. STEWART. And I agree with that. And my time is up. I wish it wasn't because I would be interested in the other members of the panel and your thoughts on that because I think it is worth considering. And I agree as well. We should look over our shoulder. We should be aware of who is behind us, but I do think that—you know, I don't prophesize our future demise because of this. I think there are some things that are just inherently a part of our nation that give us some advantages there as well. So again, thank you.

Chairman SMITH. I thank you, Mr. Stewart.

The gentlewoman from Maryland, Ms. Edwards, is recognized for her questions.

Ms. EDWARDS. Thank you, Mr. Chairman. And thank you to the witnesses today. And I think you can see both by the fact that the packed room has stayed but also Members are engaged that we really consider this an important area of focus. And I have to tell you, you have to register me as one of the skeptics about the consolidation proposal. I want to ask Mr. Melvin. Recently in a hearing—and you are like the go-to guy on education in NASA, right? You can just say yes.

Mr. MELVIN. Yes, I am.

Ms. EDWARDS. Okay. So at a recent hearing Administrator Bolden highlighted some of this progress that NASA has made to improve its STEM programs and to establish the first-ever metrics that measure effectiveness. How much of that—and that was under a lot of your guidance and leadership and it is not the first reorganization but it is one that—you know, that you have overseen. How much of those measures have been put into place up until this proposal came forward?

Mr. MELVIN. So before the proposal came forward, we were looking at redesigning one of our flagship programs Summer of Innovation, a program that would do hands-on experiential activities with students in the summertime to try to combat that summer slide, and that program over the course of its inception in 2010 had been redone many, many times, but the final redoing of the program we worked with Gil Noam and the PEAR Institute at Harvard University to see what the dimensions of success would be for the evaluation process of getting this program done. So right now, we are in the process of getting back some of that data from last year to see how effective the program is because one of the toughest things to do is to measure how effective a STEM engagement program is.

Ms. EDWARDS. So let me just ask this. So the data that you are in the process of getting back, was that actually used to develop the consolidation plan?

Mr. MELVIN. That data was not.

Ms. EDWARDS. Okay. And so—and then just in terms of—how many programs were actually cut from NASA in this consolidation?

Mr. MELVIN. There were 78 programs with a science mission directorate that were cut. We were given a pot of money to look at the best programs—

Ms. EDWARDS. Less 40 not—you looked at those best programs?

Mr. MELVIN. We are in the process of doing that right now. My team, the Education Coordinating Council, all the center and directors at the agent centers, as well as my mission directorate leads, we are all going through a process right now to distill down what those programs will be coming forward for the '14.

Ms. EDWARDS. So how much input did you or the Administrator have in the programs that—I mean in the reduction of the \$49 million from NASA? How much input did you provide for that?

Mr. MELVIN. So our input was through the CoSTEM process and just what programs we had. We did not say this should be the program; this should be cut. It was not—

Ms. EDWARDS. So you guys actually have the expertise but you didn't make the recommendation about which programs should be cut or not?

Mr. MELVIN. Correct.

Ms. EDWARDS. And, Dr. Holdren, was that true for the other agencies that are impacted as well?

Dr. HOLDREN. The agencies all provided their information about programs, about budgets, about the evaluations that they had or didn't have, and that information was then taken into account in the process I described—

Ms. EDWARDS. But the people who are the experts didn't contribute to making the decision about what should be cut or not?

Dr. HOLDREN. Ordinarily, if you ask people if they would like any of their programs to be cut, they will say no.

Ms. EDWARDS. Right, but I mean they do have some level of expertise—

Dr. HOLDREN. Yes, and—

Ms. EDWARDS. —about the things that are working and the things that are not?

Dr. HOLDREN. And we drew on that in the inputs we got from all of the agencies about their programs and about their evaluations and so on.

Ms. EDWARDS. So—Mr. Melvin, so if you were to look at the programs that you would identify as the most successful programs at NASA run through STEM, do you still have responsibility for those?

Mr. MELVIN. I still have responsibility and I have resources to bring forward what are the best programs in NASA. So our budget did get cut. We have got tough times. We have got to make sure we bring forward the best things that we have, that we can for the President's plan.

Ms. EDWARDS. Okay. So—and, Dr. Holdren, the Department of Education now is going to get an additional \$285 million, and I think many of us would agree that it is important to build the capacity for the Department of Education around STEM. But wouldn't it be more effective to build that capacity and then enable them to make a decision about how it is that they could most effectively run rather than throwing in a pile of \$285 million in addition and now saying now build your capacity and figure out what you do best?

Dr. HOLDREN. Well, first of all, Congresswoman Edwards, I would say that there are already many strong programs and a lot of real capacity in Education. It is not as if the Department of Education is starting from scratch here. They have a lot of activity, a lot of capability, and we are proposing to add to it in areas of priority that the President has endorsed. And those include the Math and Science Partnership program, the STEM innovation networks that I mentioned, and ARPA-ED to look—which would be under the Investing in Innovation program that would look at out-of-the-box, paradigm-breaking ways to improve our game in STEM education.

We think it is time to place some bets on the highest priorities, on the most transformative potential activities that we can undertake. And we think that the transfer of actually a modest fraction of the total resources being spent in STEM education to those priorities is a good idea. Obviously, people initially can disagree. There is a sense in which transitions are always stressful because people are clear about what is going away and less clear about what they are going to get.

Ms. EDWARDS. Well, so—but currently, the Department of Education only really has one staffer on STEM education. Wouldn't you agree that to get this additional resource and capacity that they have to develop more capacity?

Dr. HOLDREN. Well, there is \$5 million in the proposal to build up a STEM education office within the Department of Education to coordinate a lot of this but it is not as if there isn't an enormous amount of relevant capacity spread across the different domains of the Department of Education that we would be drawing on to expand some of these programs. But we do agree that we need more focused STEM education expertise right attached to the Office of the Director, and that will happen under the proposed plan.

Ms. EDWARDS. Well, I—and my time is greatly run out. I hope we will have, Mr. Chairman, some additional opportunity to dis-

cuss this because I think that there—as you can see, the interest and the programs that are there and people who—as a parent as I was or in community have deep experience with agencies like NASA who actually already know what they are doing in STEM, and it feels like why—I mean, you know, if it ain't broke, don't fix that. I yield.

Chairman SMITH. Okay. Thank you, Ms. Edwards.

The gentleman from California, Mr. Swalwell, is recognized.

Mr. SWALWELL. Thank you, Mr. Chair.

I think the evidence is clear from all of the witnesses that right now in the United States we are facing a shortage of high-skilled workers in technology, advanced manufacturing that our employers are just not able to fill. And I represent northern Silicon Valley and I spent the last week going across the valley talking to these employers, and it is clear that there are positions today that they would like to fill. They can't fill them because of not having enough workers. That means we don't have enough students coming up through the pipeline.

So I think the short-term solution for that of course is comprehensive immigration reform. That includes increasing the H-1B visas.

But the long-term solution is what I believe we are here today to talk about, which is making sure that children in our own country are able to fill those jobs one day because of their STEM education. And their STEM skills will be their ticket to the innovation economy. And so there is certainly a role for the Federal Government to play in helping our children obtain those skills.

I believe education should always be a national obsession but a local possession, and relying on local stakeholders, I think, can really guide us. And so I wanted to first talk about—as we talk about and consider the Proposed Reorganization of STEM, we need to make sure that this reorganization does not come at the expense of valuable programs like in my district at Lawrence Livermore laboratory we have the Computational Science Graduate Fellowship program known as CSGF. It has played a vital role in our lab's effort to have that pipeline of qualified graduate students who can go into our workforce.

A number of students have written to me about their concerns about this program being consolidated into NSF. I have heard from students Jeffrey Oxbury, Teresa Bailey, Brian Gunny, Sam Schofield, and Dr. Jeff Hittinger, who runs the Center for Applied Scientific Computation, and I was hoping, Dr. Ferrini-Mundy, you could address the concerns from these students that moving this away from DOE could affect their ability to obtain meaningful training and then move into the workforce.

Dr. FERRINI-MUNDY. Thanks for your comments and for your question. The NSF is absolutely committed in this reorganization to making sure that we have individual conversations—and those are well underway—with every single agency and every single program that is involved in this Graduate Fellowship consolidation. And our plan for this is fairly straightforward and we hope is one that will serve the needs of the mission agencies and the students that they support really quite well, and that is to enlarge our Graduate Research Fellowship program, which is a very strong selective

program. It spans 11 different disciplines of STEM and has 180 different fields of study that are allowable, so it is quite likely to span the areas of computer science and engineering and mathematics that would be the likely fields that the students in this Computational Science Graduate Fellowship program are in.

Mr. SWALWELL. Great. And I will move to Dr. Holdren. Dr. Holdren, you told my colleague Joe Kennedy that vocational schools were a priority for STEM under the Educate to Innovate program. And I went back and looked at the memo that was prepared for us from your office regarding this program, and that Educate to Innovate program was only mentioned once and is not listed as having a funding source. And also I didn't see any use of the word vocational training.

And I share the same concerns from—that Congressman Kennedy has, which is that of course we want to make sure that all of our students can learn STEM skills and perhaps an undergraduate and graduate or doctoral degree and maybe start the next Google, but not every student is going to be able to do that. And it is just as important that they are able to participate in the innovation economy in other roles, which will help them grow into our middle class. And so what will be the role of vocational training in this program?

Dr. HOLDREN. Well, as I have already said, vocational training was not a major focus of the CoSTEM review, which had a narrower focus, but the role of the community colleges in particular is something that has been of interest to the President, of interest to the OSTP and the OMB and the DPC, and we have been generating in part with substantial private resources partnerships, as I mentioned before, that address that problem by improving the curricula of community colleges to better match the jobs that are available in those regions.

When you ask where the resource is coming from, this is one of the domains in which the private sector has really stepped up precisely for the reason you mention, that high-tech companies are not able to hire the workers that they need. And so they know they have to feed the pipeline and they are stepping up with their own resources to do that.

Mr. SWALWELL. And I will conclude with a concern. I don't think I have time for another question. But I am concerned that right now it appears that as far as underrepresented groups, there is not an assigned lead agency. I understand all three agencies could deal with them right now, but if we are going to move to this lead agency process, which I have concerns just like Congresswoman Edwards does, I do hope that we are not in the scenario where underrepresented groups have no representing agency. So I would like to see underrepresented groups have a lead agency that focuses on them. So thank you, Mr. Chairman.

Chairman SMITH. And thank you, Mr. Swalwell.

The gentlewoman from Connecticut, Ms. Esty, is recognized.

Ms. ESTY. Thank you, Mr. Chairman. I would like to return again to one of the issues that was raised early on, which is our communities who have very active organizations in Connecticut. We have a science museum that has long-standing programs, just as we mentioned the Museum of Science and Industry, which I re-

member as a child. What sort of outreach is being done right now to these nongovernmental organizations who have long records of activity, particularly with the K-12, to give them a heads up about how the process is going to work going forward because we are all getting a lot of questions in our district, a great deal of concern. State budgets are being cut and suddenly they are hearing through the grapevine that this is going away. So how are you reaching out to them? How can we ensure proper information is being shared?

Dr. HOLDREN. Let me start by mentioning again that the Department of Education will have a major role here through its STEM innovation networks, which is a program that, under the President's proposal, would provide \$150 million to school districts to build partnerships with the Federal science agencies, with universities, with businesses, with museums. I think because this is relatively new, the extent of the outreach to these various constituencies is, up until now, not all that extensive, but it will become more so particularly if this budget is approved.

I mean there is a bit of a chicken-and-egg problem here. We are still in Fiscal Year 2013 and we don't have the reorganization plan in place except in the President's proposed budget. But obviously, that sort of outreach is already starting and would have to be expanded.

Ms. ESTY. All right. And if we could turn back to the question about with the Department of Education taking lead for K-12, we know from the work being done on science and certainly from the excitement over decades that NASA has generated in schoolchildren and the importance of having practitioners, of having researchers, of having people who do science being engaged with the youngest of our students, not just with graduate students but the youngest of our students.

How is this—how do we contemplate this is going to work? How is NSF and our other major research institutions, NASA going to share their expertise because there is a content there that is important and an excitement level about what real-world science means—with the Department of Education, which does not—obviously they are the practitioners under the pedagogical side. And how is it contemplated we are going to build out this capacity within the Department of Education as well as sharing that expertise, which admittedly doesn't have. That hasn't been its mission.

Dr. FERRINI-MUNDY. So one thing that the Department of Education does have is reach and extensive opportunity to connect to States, districts, regions around the country. And so we at NSF are very excited about the partnerships that will evolve and in fact that have some precursors in previous work actually. Our Math and Science Partnership program has had good partnering activity with the Department over the years where the kinds of things that NSF invests in, the content that gets developed, the evidence-based practices and tools and learning materials that get developed can then be scaled out in good partnership with the Department, and we are excited about figuring out how that will work well. But I will admit we are at the very beginning stages of this work.

Mr. MELVIN. There is a program called the 21st Century Community Learning Centers, which is an afterschool program that we are currently partnering with the Department of Education and we

have this Summer of Innovation content that has hands-on experiential activities that can be done inside of 21st century. So we are currently actively working on a Memorandum of Agreement with the Department of Education right now to utilize our content in 50 States and 2 territories. So that is one example of how we could start this process of partnering with mission agencies and then the three lead agencies to ensure that we get that content out.

Ms. ESTY. And if I may also add my voice to those of Congressman Kennedy and Swalwell on the importance of vocational education being incorporated. I know it wasn't specifically your focus but it is essential that we have those mid-level skills. It is vital that those get included for those of us—as I come from an aging industrial manufacturing base of the United States, which now is in that transition phase that it is going to be absolutely vital that we incorporate that and that we incorporate computing as an integral part of this.

We have had multiple hearings in this Committee on the importance of big data. If we do not incorporate computing as a core part of this, we are really missing an incredibly important opportunity and strategic necessity for this country.

Dr. HOLDREN. May I just say we agree? Thank you. Thank you very much.

Chairman SMITH. Thank you, Ms. Esty.

The gentlewoman from California, Ms. Brownley, is recognized.

Ms. BROWNLEY. Thank you, Mr. Chair. And I want to thank the panel for being here this afternoon and answering all of our questions. I might be towards the end so—of the line here in terms of questioning. And a lot of my questions have been asked and answered but—so I will just sort of focus on my agreement really with you that restructuring and consolidating is very important and I think we all probably agree that creating a razor-sharp focus on STEM education in our country is very, very important to do.

And I guess, you know, my question I think is focused more around the pre-K–12 education understanding and believing that we need to engage our children at a very early age and there needs to be coherence and relevance and rigor. We have talked about all of those things here today in this hearing. I am wondering if there has been any assessment or look at comparing what we are doing compared to other countries in the world.

Certainly countries around the world don't necessarily have all of the same agencies and expertise that we do, but I think in terms of earlier education, we may lag behind. I think the President has already proposed that in terms of more pre-K education. But have we looked at best practices around the country?

And clearly, I think Dr. Holdren mentioned at the beginning of the hearing that the data—achievement data shows that we are certainly falling behind. And have we looked at—also, have we looked to compare really our investment specifically into STEM education with other countries around the world and how are we doing?

Dr. FERRINI-MUNDY. Thanks for the question and the comments. And I agree; the importance of the early years in terms of both engagement and also a solid foundation in learning to set in place some open pathways for later choice is important.

What I think I would like to do with this question though is ask if we could get back to you with some details about at least what NSF has funded if anything by way of particular looks at comparisons with other countries' early childhood practices or preparation of teachers of early childhood years. I would just have to check the portfolio.

Ms. BROWNLEY. Any other responses?

Mr. MELVIN. I would have to check also to get back to you.

Dr. HOLDREN. One of the things we do know about some of the other countries that we see when we look over our shoulder and ask who is gaining on us is an underscoring of a proposition we haven't really mentioned here, but it relates to the importance of the local in education and particularly the importance not just of teachers and principals and school districts but of parents.

What we find in a lot of these countries—and I know President Obama talked about this when he came back from a visit to South Korea some time ago—when he was talking with the South Korean president about education and the South Korean president said you are really lucky you don't have parents hounding you all the time to improve your STEM education system. The engagement of parents in helping to inspire and excite their kids about education in general and about STEM fields in particular is immensely important and is something that some other countries seem to have an advantage on the United States at this particular point. This is anecdotal, not systematic research, but it is an impression I have also gotten in my travels across some of these countries.

Ms. BROWNLEY. Thank you. And I would appreciate certainly the feedback. And I think, just to conclude, I really firmly believe that intelligence is something that can be learned. It is not a God-given gift that some children have it and others don't, and I think the investment piece of it I think is an important area to look at. And I also, as some of my colleagues have mentioned around vocational education I think is very important but I tend to focus more around career technical education because I do believe that in the earlier years with our children that we have to provide them with, you know, the rigor that they need to be able to choose what they want to do as time goes on.

And certainly I think, you know, one of the benchmarks if you will, for example, in mathematics is 8th grade algebra and, you know, can all of our children in our country really get to a place where they are ready and prepared to be successful in 8th grade algebra? And that is, you know, a gatekeeper in terms of where kids tend to go. So that is not really in the form of a question but I was wondering the thinking around—you know, for the committee on these—I think these early and important investments in the earlier educational years.

Dr. FERRINI-MUNDY. So I think the fact that we—that the first priority is about improving K–12 instruction really does reflect the Committee's sense that, unless we are doing a really wonderful job there, that all of this later career focus and career opportunity really can't come to fruition. And so I think I can assure you that we have a strong interest in and focus on that level. Now, we will work through implementation and we will figure out how to, within there, make the right focus. But it is quite important.

Ms. BROWNLEY. Thank you. And, Mr. Chair, I will yield the balance of my time.

Chairman SMITH. Thank you, Ms. Brownley.

The gentleman from California, the Vice Chairman of the Committee, Mr. Rohrabacher, is recognized for his questions.

Mr. ROHRABACHER. I am sorry that I have been running between different events here and have not been able to participate in the discussion.

And let me just state for the record that when we do talk about education, there is a distinct difference—philosophical difference—between the people who come to Washington, D.C., to want to structure their government. Those people who believe that government is a solution and that giving the Federal Government more power and authority to make changes are definitely going to be focused on if we are going to—this problem with STEM education and the solution is going to be found in Washington, D.C., by restructuring the way various government employees operate and the flow of funds from—that are collected by Federal tax collectors and are shifted to various power sources throughout the country in terms of educational power.

I—that is one group. I think that I represent and a number of people on the Republican side at least believe that that is contrary to what will bring progress to our country. The more centralized our decision-making process, the more restructuring that we do and changing the seats here in Washington and the little flow of money comes to this department rather than that department is not going to change the dynamics that are at play in our country which are leaving us behind when it comes to STEM challenges.

What will help—I will note I meet every student that comes from my district and I always ask them—and they are always interested in education. I always ask them if they have ever driven by the Department of Education while they have been in town and most of them have not. I suggest to their people to do that because there is a huge amount of money being spent on the salaries of the people in those buildings, yet they never see a student.

And perhaps it is a better idea to have more money kept at the local level and provide our local communities with the money they need to handle their own education rather than to focus on how we can restructure things here in Washington, D.C. For example, in Orange County we have—believe it or not, we have some areas that are very depressed financially and mainly through people who live there are mainly illegal immigrants living there in fairly bad conditions for their schools, et cetera, although we are trying to increase the level of education in those community schools as well.

We are experimenting in Santa Ana with a new system of education for these kids for learning mathematics and it is all done at a computer and you don't need the teacher there to teach and it is some—they have—private—or private foundation has developed a system in which these kids can learn basic math and algebra, et cetera, by interacting with a computer system.

And I might add I went down there to check this out and the kids that I saw five years ago were—had—are at the bottom of the run on the testing scores in Orange County in terms of mathe-

metics. And guess what? After introducing the system, they are now at the top level and these are kids who barely speak English.

And I think that type of experimentation that you can do locally, we wouldn't want to have mandates like this or necessarily having Federal dollars being that far out of control of Washington, but we feel very comfortable in having these things done by local schools. And quite frankly, I believe and I am happy to hear the Administration is going to try to do what is best based on their view of what government—the role of government, and I would suggest that there probably are many other things that could be done experimentally, et cetera, that would give us an edge and give us a new creative approach to this challenge, this STEM challenge if we would actually look back to the local areas rather than rearranging the chairs here in Washington, D.C.

But I would be happy to have my friend, the President's Advisor on Science refute what I just said, go right ahead.

Dr. HOLDREN. Congressman Rohrabacher, it is always a pleasure to interact with you on these topics. And I agree with much of what you said about the importance of local experimentation and learning from those experiments. That is one of the things we want to do more of. We want to understand what experiments are successful and where we identify them to assist in their propagation so that successful models can become more widespread and success therefore also more widespread.

This is really at its core about partnerships. The amount of money being spent by the Federal Government on STEM education is a very small fraction of the amount of money being spent on education as a whole around the country. That is as it should be. We are looking for ways to leverage that relatively small percentage in ways that beneficially affect the much larger expenditures that go on across our school districts and systems in universities and colleges around the country.

But we are talking about strengthening federal, state, and local partnerships. We are talking about public-private philanthropic partnerships to leverage this actually relatively modest Federal investment in ways that will empower more local experiments, more local successes. So we don't have as huge a disagreement as you might think.

Mr. ROHRABACHER. Thank you very much. And thank you, Mr. Chairman.

Chairman SMITH. Thank you, Mr. Rohrabacher.

That concludes our hearing. I think we have had a very healthy discussion today. Clearly, there has been a mixed response to the Administration's consolidation proposals, but I think today's discussion has made Members better informed and we certainly appreciate the expert testimony we heard today as well. I want to—I don't need to—I started to say the Members here have two weeks to submit questions but I assume they know that and will submit questions to you all over the next couple of weeks.

Thank you again for being here and I appreciate the interest by the audience today as well in such an important subject. We stand adjourned.

[Whereupon, at 4:33 p.m., the Committee was adjourned.]

Appendix I

ANSWERS TO POST-HEARING QUESTIONS

ANSWERS TO POST-HEARING QUESTIONS

Responses by The Honorable John Holdren

QUESTIONS FOR THE RECORD
THE HONORABLE LAMAR SMITH (R-TX)
U.S. House Committee on Science, Space, and Technology

STEM Education: The Administration's Proposed Re-Organization

Tuesday, June 4, 2013

1. The National Science and Technology Council's Committee on STEM Education (CoSTEM) was required by the 2010 COMPETES Act to coordinate STEM education activities across federal agencies. CoSTEM has been working on the inventory of federal STEM programs and the 5-year Strategic Plan for a number of years. What was the role of CoSTEM in the development of the proposed reorganization of federal STEM programs? Did members of CoSTEM provide direct input on programs selected for consolidation? Please describe the process that led to the proposed reorganization and how it was similar to or different from the process used by CoSTEM.

Guided by the aims articulated in CoSTEM's December 2011 STEM-education inventory, its February 2012 Progress Report, and subsequent pre-final drafts of the 5-year Strategic Plan—as well by the President's desire to re-organize STEM-education programs for greater coherence, efficiency, ease of evaluation, and focus on his highest priorities—the Executive Office of the President (EOP) recommended, and the President accepted, a FY2014 Budget Request for STEM education that would increase the total investment in STEM-education programs by 6 percent over the 2012 appropriated level while reducing the number of programs spread across the 14 CoSTEM agencies from 226 to 110.

The draft 5-year Strategic Plan developed by CoSTEM informed the priority areas around which to focus the reorganization. By reorganizing and realigning resources around these priority areas, the proposed framework and related initiatives at each of the lead agencies are intended to improve the delivery of STEM education in each of these core areas.

Individual members of CoSTEM did not provide direct input in the EOP-led 2014 Budget formulation process, although the CoSTEM agencies participate annually in the budget formulation process within the Executive Branch. In formulating the STEM-education reorganization proposals contained in the President's 2014 Budget, CoSTEM's deliberations and documents were important inputs to the EOP-led process. The Administration actively sought input from CoSTEM agencies on program consolidations, eliminations, and new initiatives through the 2014 Budget process and coordinated discussions on implementation among the CoSTEM agencies to try to ensure that the proposed initiatives address the needs and goals of agencies with eliminated programs.

The CoSTEM will play a key role in developing transition plans and in managing, monitoring, and improving these reorganization initiatives.

2. The Administration proposes to redirect funding from certain federal STEM education activities to the National Science Foundation, the Department of Education, and Smithsonian Institution. These agencies would become lead agencies for STEM activities. What institutional support, staffing requirements, and legal authority are needed for the lead agencies to take on their new roles as proposed by the reorganization?

The institutional support and staffing requirements for the lead agencies to take on their

new roles are provided for in the FY 2014 budget requests of NSF, the Department of Education, and the Smithsonian. All agencies involved in the STEM education reorganization proposal have indicated to the Executive Office of the President that they will be able to take on their new roles upon approval of the proposal, and that none are significantly limited by legislative authority.

QUESTIONS FOR THE RECORD
THE HONORABLE RANDY NEUGEBAUER (R-TX)
U.S. House Committee on Science, Space, and Technology

STEM Education: The Administration's Proposed Re-Organization

Tuesday, June 4, 2013

1. I am concerned that the proposed re-organization could threaten existing public-private partnerships in STEM education. According to an analysis by the Congressional Research Service (CRS), eight programs identified for consolidation require partnerships and 19 encourage them. What are you doing to estimate the total cost of these proposed reductions? What efforts were made to determine the extent to which schools, businesses, states, and non-profit organizations are financially and substantively integrated into particular federal STEM education programs? How have you attempted to determine the effects of these changes on local communities?

I share your appreciation of the importance of public-private partnerships in STEM education. Partnerships are an important part of the Administration's efforts to improve STEM education. As I stated in my testimony, the President has set ambitious but achievable goals and challenged the private sector. For example, the President announced the goal to prepare 100,000 excellent STEM teachers in his 2011 State of the Union Address. Answering this call to action, over 150 organizations, led by the Carnegie Corporation of New York, formed a coalition called 100Kin10. Members of the coalition have made over 150 commitments to support STEM teacher preparation, and raised over \$30 million in funds. Additional examples of this all-hands-on-deck approach to challenging companies, foundations, non-profits, universities, and skilled volunteers include Change the Equation, US2020, and increasing the reach of the Advanced Placement (AP) program for children in military families.

The importance of partnerships is recognized in the reorganization proposal. The lead agencies will continue to make use of partnerships. For example, in P-12 teaching and learning the Department of Education's STEM Innovation Networks proposals will support school districts in partnerships with institutions of higher education, Federal agencies and their facilities and staff, non-profit organizations, museums, businesses, and other partners to provide rich STEM learning experiences. In another example, the Smithsonian will facilitate partnership building as part of its proposed leadership role in informal STEM education.

Although there are proposed reductions for certain programs in the 2014 Budget, the overall Federal STEM education effort would expand. The proposed reorganization, when combined with the 2014 Budget's proposal to increase Federal STEM education investments by 6 percent compared to the 2012 funding level to \$3.1 billion, is intended to reach more students, teachers, researchers, schools, post-secondary institutions, and others than the current fragmented system while sustaining and building on the Federal government's success in supporting public-private partnerships in STEM education. In addition, the Administration and lead agencies are working with the other CoSTEM agencies to fully understand transition and implementation issues facing each agency and to ensure that the reorganization and new framework preserve core functions of eliminated programs.

2. Many of the programs affected by the proposed re-organization serve certain constituencies (e.g., students, teachers, researchers) who may be directly affected by the proposed changes. What efforts have been taken to predict and mitigate the impact of these changes on the constituencies they serve? Can you please provide me with an estimate of how many people might be affected? Have you determined the number of job reductions that will take place as a result of the proposal?

The Department of Education, the National Science Foundation (NSF), and the Smithsonian Institution are working with their CoSTEM partner agencies to address transition issues such as staffing and continuation awards in order to mitigate the impact of the proposed reorganization on students, teachers, schools, and others affected by the transition of functions and activities. For example, the Department of Education is working with agencies that serve P-12 functions to identify connections with its STEM Innovation Networks proposal as well as with existing P-12 STEM investments at the Department of Education and other CoSTEM agencies, to identify and continue best practices, and to use agency input to help develop program priorities. NSF is working with agencies with graduate fellowship programs to establish a mechanism for ongoing input on national and agency needs for STEM workforce. The Smithsonian is working with all CoSTEM agencies to identify existing high-quality products and on-line resources, to identify best practices, and to establish knowledge-transfer systems. The other CoSTEM agencies are making recommendations on how to best engage with the above three agencies to utilize their expertise and experience in identifying continuation award issues and in developing staffing plans to facilitate knowledge transfer. The CoSTEM will play a key role in developing transition plans and in managing, monitoring, and improving these strategies.

The core goal of the proposed reorganization is to reach more students and more teachers more effectively. The proposed reorganization, when combined with the 2014 Budget's proposal to increase Federal STEM education investments by 6 percent compared to the 2012 funding level to \$3.1 billion, is intended to reach more students, teachers, researchers, schools, post-secondary institutions, and others than the current fragmented system. The Administration has not analyzed the net employment impacts of the STEM education reorganization proposal as a whole nor the combined reach of the proposed STEM-education portfolio compared to the current one. The current fragmented approach to investing in STEM education has made it difficult to ensure that Federal efforts are coherent, strategic, and leveraged for greatest impact. By reorganizing and realigning resources, the proposal facilitates greater investment in rigorous evaluation and evidence-building strategies so that the Federal government will be better able to document how many people are affected by Federal STEM education programs, and how.

QUESTIONS FOR THE RECORD
THE HONORABLE STEVEN PALAZZO (R-MS)
U.S. House Committee on Science, Space, and Technology

STEM Education: The Administration's Proposed Re-Organization

Tuesday, June 4, 2013

1. The mission of the DOD Starbase program is to expose youth to the technological environments and positive role models found on military bases and installations. There are 80 total Starbases located in nearly every state in the US. It is apparent that many federal agencies are proceeding with the STEM consolidations proposed in the FY14 budget request without adequate guidance or congressional input. According to the FY 2012 Inventory of STEM programs the Starbase program will be consolidated with funding redirected outside of the DOD. The STEM strategic plan confirms this proposed shift, which means the program will effectively close its doors before FY14.

- a. My question to you is will this program will be implemented at the Department of Education, the National Science Foundation or the Smithsonian with redirected funds, and in what capacity?
- b. Will the agency receiving the redirected funding use lessons learned, or retain the institutional knowledge from the program?
- c. What staffing requirements does the agency receiving the Starbase funding need in terms of institutional support?
- d. Will the current staff be maintained?

The goal of the reorganization initiatives is to preserve core functions and goals of programs proposed for elimination. The new framework consolidates core functions into three lead agencies – the Department of Education (ED) will lead K-12 Education; the National Science Foundation (NSF) will lead undergraduate education and graduate fellowships; and the Smithsonian Institution will become a one-stop-shop for materials and resources, and lead informal education activities.

The Smithsonian will function as a “one-stop-shop” conduit between mission agencies, non-profit partners, ED, and school districts, including DOD. In this role, the Smithsonian will help to develop curriculum and related professional development that is based on agency research and knowledge and aligned with the classroom, including those resources developed through Starbase. ED’s new STEM Innovation Networks would link to the work of the Smithsonian and facilitate knowledge transfer to and from school districts, improving the reach of these resources. Both ED and the Smithsonian will forge strong relationships with DOD and encourage partnerships between schools districts and military facilities to keep connecting students and teachers to DOD’s rich assets.

Both ED and the Smithsonian will need to staff up, as requested in the 2014 Budget, to successfully implement these new initiatives. DOD will need to develop a staffing plan to facilitate knowledge transfer. OSTP will work to ensure that future meetings with DOD will include discussions on how the Smithsonian can factor into their work the results from the Wilder Research study of the STARBASE program.

QUESTIONS FOR THE RECORD
THE HONORABLE LARRY BUCSHON (R-IN)
U.S. House Committee on Science, Space, and Technology

STEM Education: The Administration's Proposed Re-Organization

Tuesday, June 4, 2013

1. How will the proposed STEM Innovation Networks be structured and managed (by state, by region, etc.)? How will the funds be awarded – through competitive grants or existing operating budgets?

The Administration's STEM Innovation Networks proposal is a recognition of the kinds of success that collaborative networks such as STEMx and other state-wide systems have had in connecting students to real-world learning opportunities in fields that meet community needs. The Department of Education is already utilizing knowledge gained from the operation of these model networks to inform the design of the STEM Innovation Networks.

The proposed STEM Innovation Networks (STEM-INS) program would provide competitive grants to local educational agencies (LEAs) or consortia of LEAs (including state or regional consortia), in partnership with institutions of higher education (IHEs), nonprofit organizations, other public agencies, museums, and businesses, to transform STEM teaching and learning, especially for high-need students, and accelerate adoption of practices in pre-K-12 education that help increase the number of students who seek out and are effectively prepared for postsecondary education and careers in STEM fields.

Furthermore, as noted in the Department of Education's Congressional Justification for the 2014 Budget, the possibility of the STEM Innovation Networks engaging with existing networks at the state and local level to increase student engagement and achievement in STEM has been recognized in the design of this program.

2. What does the proposed re-organization mean for the 78 programs and activities whose funding would be redirected outside of their current agencies? Would these activities be terminated? For programs whose activities be transferred outside of their present agencies, would those activities continue more-or-less unchanged or would there be significant changes to program activities? Can you please provide me with a definitive list of terminated activities and programs, as well as a list of programs whose activities would be transferred and reproduced in largely similar ways at a new agency? Is this effective immediately, in FY14, or further out?

The 2014 Budget proposes to terminate 78 STEM-education programs and to redirect these resources and missions outside of their current agencies. Although the 78 programs would be terminated, the goal of the reorganization proposals is to preserve core functions and goals of eliminated programs. The new framework consolidates core functions into three lead agencies – the Department of Education (ED) will lead K-12 Education; the National Science Foundation (NSF) will lead undergraduate education and graduate fellowships; and the Smithsonian Institution will become a one-stop-shop for materials and resources, and lead informal education activities. The lead agencies have already conducted or are in the process of convening meetings with other science agencies to identify modes of cooperation through which valuable assets and activities from programs that would be eliminated under

the reorganization could be brought to bear more broadly and effectively across the government going forward, as well as to discuss agency-mission-specific needs that might be met by STEM education and engagement efforts supported by the leads. While it is premature to define exactly how these interactions will work in the long run, as agencies are currently working to determine how best to structure these collaborations, all lead agencies are committed to engaging the collaborating agencies to leverage their expertise, unique resources, institutional knowledge, and existing relationships as described in the STEM Strategic Plan released in May.

Program-by-program summaries of the STEM-education reorganization proposal are provided in the appendices of the Strategic Plan. Attached is a list of the 226 STEM-education programs in FY 2012, with programs classified according to the 78 consolidations (with funding redirected outside the agency), 48 internal consolidations/eliminations (with funding remaining within the agency), 100 existing programs that would be maintained, and 10 new proposed programs. The reorganization proposal would be effective in FY 2014 assuming congressional approval in FY 2014 appropriations.

QUESTIONS FOR THE RECORD
THE HONORABLE EDDIE BERNICE JOHNSON (D-TX)
U.S. House Committee on Science, Space, and Technology

STEM Education: The Administration's Proposed Re-Organization

Tuesday, June 4, 2013

1. What steps can be taken now to begin implementing the 5-year strategic plan that do not involve moving money or redirecting programs between/among agencies? That is, what new interagency collaborations can be established and new capacity built at the currently designated lead agencies that don't require collaborating agencies to reduce support for their own portfolio of STEM education programs, at least not yet?

The STEM 5-year Strategic Plan prepared by the Committee on STEM Education (CoSTEM) of the National Science and Technology Council (NSTC) which I co-chair with Cora Marrett, Acting Director of the National Science Foundation, lays out a strategy to leverage Federal agency assets and expertise to make progress on the national priority area of STEM education. The Plan aligns in many ways with the goals established in the President's 2014 Budget proposal.

The Plan outlines an updated STEM-education coordination approach with lead and collaborating agencies to leverage capabilities across agencies to maximize the impact of Federal STEM education investments. The Plan includes implementation roadmaps describing objectives and strategies to achieve the outlined goals. The CoSTEM agencies have already started making plans for implementation—contingent, of course, on Congressional action where that is required—and will work together through the CoSTEM structure, as described in the implementation roadmaps, and through additional interagency activities, as necessary, to reach the goals described in each of the priority areas: improve STEM instruction; increase and sustain youth and public engagement in STEM; enhance the STEM experience of undergraduate students; better serve groups historically under-represented in STEM fields; and design graduate education for tomorrow's STEM workforce.

Building new capacity to enable the National Science Foundation, the Department of Education, and the Smithsonian Institution to fulfill their responsibilities as lead agencies according to the Strategic Plan's vision will require some new resources, as proposed in the 2014 Budget. Additionally, through the process of developing the Federal STEM Inventory some agencies have already identified opportunities for internal consolidation of STEM education programs and other ways of making the most effective use of existing resources; these efforts should be encouraged, not restricted.

2. One of my concerns with the reorganization proposal in the FY 2014 budget is that it wasn't vetted at all with the any of the non-federal partners that help make federal STEM investments successful. It is equally troubling that the five-year strategic plan doesn't say very much about engaging the stakeholder community, except in the broadening participation priority. Does CoSTEM plan to seek input from non-federal stakeholders as the committee further develops and, as necessary, revises implementation plans for the other four priority areas? If so, how will CoSTEM seek such input?

Although CoSTEM as an entity will not be seeking formal public input from non-Federal stakeholders as the STEM-education activities described in the Strategic Plan move forward, the CoSTEM agencies will continue to engage with non-Federal stakeholders in ongoing dialogue, consultation, and partnership in advancing the goals of the Strategic Plan and in the operations of Federal STEM-education programs. The 5-Year Strategic Plan is not intended to be a static document; the Plan's preliminary implementation roadmaps for the STEM Education Priority Investment Areas are presented with the full expectation that they will be revised over the next five years and will be supplemented by more detailed roadmaps designed by the Administration and the CoSTEM agencies over the coming months, built on communication and outreach with stakeholder communities. The Strategic Plan commits CoSTEM to assisting in this process. I anticipate that there will be a variety of approaches among the 14 CoSTEM agencies for engaging stakeholders, as is the case right now for the agencies in working with stakeholders on their current STEM-education portfolios.

Responses by Dr. Joan Ferrini-Mundy

QUESTIONS FOR THE RECORD
 THE HONORABLE LAMAR SMITH (R-TX)
 U.S. House Committee on Science, Space, and Technology
STEM Education: The Administration's Proposed Re-Organization
 Tuesday, June 4, 2013

1. The National Science and Technology Council's Committee on STEM Education (CoSTEM) was required by the 2010 COMPETES Act to coordinate STEM education activities across federal agencies. CoSTEM has been working on the inventory of federal STEM programs and the 5-year Strategic Plan for a number of years. What was the role of CoSTEM in the development of the proposed reorganization of federal STEM programs? Did members of CoSTEM provide direct input on programs selected for consolidation? Please describe the process that led to the proposed reorganization and how it was similar to or different from the process used by CoSTEM.

Guided by the aims articulated in CoSTEM's December 2011 STEM-education inventory, its February 2012 Progress Report, and subsequent pre-final drafts of the 5-year Strategic Plan—as well by the President's desire to re-organize STEM-education programs for greater coherence, efficiency, ease of evaluation, and focus on his highest priorities—the Executive Office of the President (EOP) recommended, and the President accepted, a FY2014 Budget Request for STEM education that would increase the total investment in STEM-education programs by 6 percent over the 2012 appropriated level while reducing the number of programs spread across the 14 CoSTEM agencies from 226 to 110.

The draft 5-year Strategic Plan developed by CoSTEM informed the priority areas around which to focus the reorganization. By reorganizing and realigning resources around these priority areas, the proposed framework and related initiatives at each of the lead agencies are intended to improve the delivery of STEM education in each of these core areas.

Individual members of CoSTEM did not provide direct input in the EOP-led 2014 Budget formulation process, although the CoSTEM agencies participate annually in the budget formulation process within the Executive Branch. In formulating the STEM-education reorganization proposals contained in the President's 2014 Budget, CoSTEM's deliberations and documents were important inputs to the EOP-led process. The Administration actively sought input from CoSTEM agencies on program consolidations, eliminations, and new initiatives through the 2014 Budget process and coordinated discussions on implementation among the CoSTEM agencies to try to ensure that the proposed initiatives address the needs and goals of agencies with eliminated programs.

The CoSTEM will play a key role in developing transition plans and in managing, monitoring, and improving these reorganization initiatives.

2. The Administration proposes to redirect funding from certain federal STEM education activities to the National Science Foundation, the Department of Education, and Smithsonian Institution. These agencies would become lead agencies for STEM activities.

What institutional support, staffing requirements, and legal authority are needed for the lead agencies to take on their new roles as proposed by the reorganization?

The institutional support and staffing requirements for the lead agencies to take on their new roles are provided for in the FY 2014 budget requests of NSF, the Department of Education, and the Smithsonian. All agencies involved in the STEM education reorganization proposal have indicated to the Executive Office of the President that they will be able to take on their new roles upon approval of the proposal, and that none are significantly limited by legislative authority.

QUESTIONS FOR THE RECORD
 THE HONORABLE RANDY NEUGEBAUER (R-TX)
 U.S. House Committee on Science, Space, and Technology
STEM Education: The Administration's Proposed Re-Organization
 Tuesday, June 4, 2013

1. I am concerned that the proposed re-organization could threaten existing public-private partnerships in STEM education. According to an analysis by the Congressional Research Service (CRS), eight programs identified for consolidation require partnerships and 19 encourage them. What are you doing to estimate the total cost of these proposed reductions? What efforts were made to determine the extent to which schools, businesses, states, and non-profit organizations are financially and substantively integrated into particular federal STEM education programs? How have you attempted to determine the effects of these changes on local communities?

NSF shares your appreciation of the importance of public-private partnerships in STEM education. Partnerships are an important part of the Administration's efforts to improve STEM education. As Dr. Holdren stated in his testimony, the President has set ambitious but achievable goals and challenged the private sector. For example, the President announced the goal to prepare 100,000 excellent STEM teachers in his 2011 State of the Union Address. Answering this call to action, over 150 organizations, led by the Carnegie Corporation of New York, formed a coalition called 100Kin10. Members of the coalition have made over 150 commitments to support STEM teacher preparation, and raised over \$30 million in funds. Additional examples of this all-hands-on-deck approach to challenging companies, foundations, non-profits, universities, and skilled volunteers include Change the Equation, US2020, and increasing the reach of the Advanced Placement (AP) program for children in military families.

The importance of partnerships is recognized in the reorganization proposal. The lead agencies will continue to make use of partnerships. For example, in P-12 teaching and learning the Department of Education's STEM Innovation Networks proposals will support school districts in partnerships with institutions of higher education, Federal agencies and their facilities and staff, non-profit organizations, museums, businesses, and other partners to provide rich STEM learning experiences. In another example, the Smithsonian will facilitate partnership building as part of its proposed leadership role in informal STEM education.

Although there are proposed reductions for certain programs in the 2014 Budget, the overall Federal STEM education effort would expand. The proposed reorganization, when combined with the 2014 Budget's proposal to increase Federal STEM education investments by 6 percent compared to the 2012 funding level to \$3.1 billion, is intended to reach more students, teachers, researchers, schools, post-secondary institutions, and others than the current fragmented system while sustaining and building on the Federal government's success in supporting public-private partnerships in STEM education. In addition, the Administration and lead agencies are working with the other CoSTEM agencies to fully understand transition and implementation issues facing each agency and

to ensure that the reorganization and new framework preserve core functions of eliminated programs.

2. Many of the programs affected by the proposed re-organization serve certain constituencies (e.g., students, teachers, researchers) who may be directly affected by the proposed changes. What efforts have been taken to predict and mitigate the impact of these changes on the constituencies they serve? Can you please provide me with an estimate of how many people might be affected? Have you determined the number of job reductions that will take place as a result of the proposal?

The Department of Education, the National Science Foundation (NSF), and the Smithsonian Institution are working with their CoSTEM partner agencies to address transition issues such as staffing and continuation awards in order to mitigate the impact of the proposed reorganization on students, teachers, schools, and others affected by the transition of functions and activities. For example, the Department of Education is working with agencies that serve P-12 functions to identify connections with its STEM Innovation Networks proposal, as well as with existing P-12 STEM investments at the Department of Education and other CoSTEM agencies, to identify and continue best practices, and to use agency input to help develop program priorities. NSF is working with agencies with graduate fellowship programs to establish a mechanism for ongoing input on national and agency needs for STEM workforce. The Smithsonian is working with all CoSTEM agencies to identify existing high-quality products and on-line resources, to identify best practices, and to establish knowledge-transfer systems. The other CoSTEM agencies are making recommendations on how to best engage with the above three agencies to utilize their expertise and experience in identifying continuation award issues and in developing staffing plans to facilitate knowledge transfer. The CoSTEM will play a key role in developing transition plans and in managing, monitoring, and improving these strategies.

The core goal of the proposed reorganization is to reach more students and more teachers more effectively. The proposed reorganization, when combined with the 2014 Budget's proposal to increase Federal STEM education investments by 6 percent compared to the 2012 funding level to \$3.1 billion, is intended to reach more students, teachers, researchers, schools, post-secondary institutions, and others than the current fragmented system. The Administration has not analyzed the net employment impacts of the STEM education reorganization proposal as a whole nor the combined reach of the proposed STEM-education portfolio compared to the current one. The current fragmented approach to investing in STEM education has made it difficult to ensure that Federal efforts are coherent, strategic, and leveraged for greatest impact. By reorganizing and realigning resources, the proposal facilitates greater investment in rigorous evaluation and evidence-building strategies so that the Federal government will be better able to document how many people are affected by Federal STEM education programs, and how.

QUESTIONS FOR THE RECORD
THE HONORABLE LARRY BUCSHON (R-IN)
U.S. House Committee on Science, Space, and Technology
STEM Education: The Administration's Proposed Re-Organization
Tuesday, June 4, 2013

1. The proposed STEM reorganization would establish the National Graduate Research Fellowship. Under the plan, funding for certain fellowships at other federal science agencies would be reduced or redirected to NSF, and NSF would become the primary federal source for fellowships. How will this arrangement work in practice? What will happen to fellowships that serve specific, but relatively narrow, mission needs?

NSF staff will work with representatives from other Federal agencies to ensure that goals to support graduate students through fellowship programs are met in the National Graduate Fellowship Program. NSF's staff will build on ongoing relationships with colleagues at agencies whose graduate fellowship programs are involved in the proposed reorganization. NSF will also pursue discussions to fully understand the specific goals and operational features of those programs, as well as the agency assets (e.g. laboratories, facilities, instruments, scientists) that have been available to participants in those programs. NSF staff will work collaboratively with other agencies to identify 'targeted opportunities' for Fellows supported through the proposed National Graduate Research Fellowship Program (NGRF) to gain the specialized technical and professional development relevant to the agencies. These targeted opportunities could include, for example, research-based internships and training particular to an agency's specific mission. NSF anticipates involving staff from other agencies in the National Graduate Fellowship Program planning and review processes through such groups as the Federal Coordination in STEM Education Task Force (FC STEM), the Interagency Working Group on STEM Graduate Fellowships, and the Graduate Education Modernization (GEM) Working Group.

QUESTIONS FOR THE RECORD
 THE HONORABLE EDDIE BERNICE JOHNSON (D-TX)
 U.S. House Committee on Science, Space, and Technology
STEM Education: The Administration's Proposed Re-Organization
 Tuesday, June 4, 2013

1. What steps can be taken now to begin implementing the 5-year strategic plan that do not involve moving money or redirecting programs between/among agencies? That is, what new interagency collaborations can be established and new capacity built at the currently designated lead agencies that don't require collaborating agencies to reduce support for their own portfolio of STEM education programs, at least not yet? What specific steps can NSF take to increase collaboration in the short term?

The Federal Coordination in STEM Education Task Force (FC STEM), a task group of CoSTEM, has moved from its task of developing the strategic plan to beginning to plan for implementation. A number of key steps will be taken, including a series of convenings of agency representatives to discuss the strategic plan objectives within each of the five priority areas, and to assess and add detail to the preliminary roadmaps of potential actions/outcomes/metrics. These convenings have already been initiated with a meeting hosted by the Department of Education on P-12 STEM education. NSF is planning to host meetings on undergraduate education and graduate fellowships this summer. In addition to these meetings, ongoing partnerships and new potential partnerships are being discussed across agencies.

The Interagency Working Group on STEM Graduate Fellowships, including representatives from the NSF and other CoSTEM agencies, has been meeting since 2010 to share best practices in the administration of U.S. Federal graduate fellowship programs, and is now extending its work to collaborate on designing the National Graduate Research Fellowship Program. As described in the FY 2014 Budget Request, the proposed design of the program will include opportunities for Fellows to obtain technical and professional development specified by other federal agencies. NSF has already implemented targeted opportunities in the current Graduate Research Fellowship Program; examples include Graduate Research Opportunities Worldwide, a program that enables graduate research fellows to participate in research activities with scientists in partner countries around the world, and the Engineering Innovation Fellows Program, which provides summer research opportunities on-site for fellows in host companies. In FY 2014 when the new program is implemented, management will include mechanisms for representatives from other federal agencies to be involved in the selection of Fellows and to determine how Fellows will participate in the specialized technical and professional development relevant to their agencies. Within both the proposed reorganization and the strategic plan, NSF is committed to creating access and opportunities for the large pool of exceptional graduate fellows to participate in training critical to the missions of a range of agencies and to greater research and professional development opportunities than they had previously.

The Catalyzing Advances in Undergraduate STEM Education (CAUSE) framework allows for incorporation of undergraduate improvement goals shared across the federal government. NSF has already initiated internal planning for CAUSE across the directorates, and has had preliminary conversations with staff from programs in agencies whose undergraduate programs are proposed for consolidation. CAUSE leadership will be provided by an Assistant Director (AD) Council comprised of ADs designated by the Director and chaired by the EHR Assistant Director. EHR is charged with implementing CAUSE across directorates and with other federal agencies as a means of focusing on making significant improvements in undergraduate STEM education for the nation.

2. One of my concerns with the reorganization proposal in the FY 2014 budget is that it wasn't vetted at all with any of the non-federal partners that help make federal STEM investments successful. It is equally troubling that the five-year strategic plan doesn't say very much about engaging the stakeholder community, except in the broadening participation priority. Does NSF plan to seek input from non-federal stakeholders as you further develop and, as necessary, revise implementation plans for the other four priority areas for which NSF has lead responsibility? If so, how will NSF seek such input?

NSF employs numerous mechanisms for input from non-federal stakeholders for all of its endeavors, including the implementation plans for the undergraduate and graduate education priority areas for which NSF has lead responsibility. The Directorate for Education and Human Resources (EHR) will continue to make frequent use of its Advisory Committee, whose role is to provide guidance, recommendations, and oversight, including recommending effective and efficient strategies for assessing the condition of STEM education in the U.S., evaluating program results, achieving overall program balance, and contributing to long-term strategic planning. The EHR Advisory Committee is made up of 20-25 STEM education experts from a variety of institutions of higher education, non-governmental organizations, and industry. Elements of the CoSTEM plan have been discussed with the EHR Advisory Committee and will be taken up in depth in the November meeting.

NSF looks forward to using its additional avenues for stakeholder input. For each competition EHR relies on a merit review process, which involves convening (in person or virtually) experts from the relevant fields. NSF sponsors meetings of Principal Investigators for its larger programs, gathering both formal and informal feedback on effectiveness of the programs as well as on topics of current interest. NSF sponsors workshops, reports, and briefings at the meetings of professional societies, where stakeholder input is both sought and offered. EHR sponsors a Graduate Dean in Residence, who brings the perspective of the larger graduate education community to all graduate support mechanisms at NSF. All of these mechanisms will be used as the implementation of the CoSTEM strategic plan is undertaken and its elements vetted and discussed.

Dr. Ferrini-Mundy's Response to Ms. Brownley's Question During the Hearing:

With respect to comparisons with other countries' early childhood practices or preparation of teachers, NSF does not currently have an inventory of such awards, although would be pleased to receive research proposals on this topic. A great deal of comparative information of this kind can be found at the web site of the Organisation for Economic Co-operation and Development (OECD), in which the United States is a member nation, and for which NSF has provided some project funding. Education indicators of many kinds can be found here: <http://www.oecd.org/education/>

With respect to your question about best practices in early childhood education elsewhere in the world, I would like to draw your attention to a series of publications by the OECD called Starting Strong. This series includes the following:

Starting Strong: Early Childhood Education and Care (OECD, 2001)

Starting Strong II: Early Childhood Education and Care (OECD, 2006)

Starting Strong III: A Quality Toolbox for Early Childhood Education and Care (OECD, 2012)

These publications can be read on the OECD web site or downloaded from that site.

Of the three publications, Starting Strong II would be the best place to find comparative information on education and related topics that includes the United States.

Responses by Mr. Leland D. Melvin

QUESTIONS FOR THE RECORD
THE HONORABLE LAMAR SMITH (R-TX)
U.S. House Committee on Science, Space, and Technology
STEM Education: The Administration's Proposed Re-Organization
 Tuesday, June 4, 2013

1. **The National Science and Technology Council's Committee on STEM Education (CoSTEM) was required by the 2010 COMPETES Act to coordinate STEM education activities across federal agencies. CoSTEM has been working on the inventory of federal STEM programs and the 5-year Strategic Plan for a number of years. What was the role of CoSTEM in the development of the proposed reorganization of federal STEM programs? Did members of CoSTEM provide direct input on programs selected for consolidation? Please describe the process that led to the proposed reorganization and how it was similar to or different from the process used by CoSTEM.**

Guided by the aims articulated in CoSTEM's December 2011 STEM-education inventory, its February 2012 Progress Report, and subsequent pre-final drafts of the 5-year Strategic Plan—as well by the President's desire to re-organize STEM-education programs for greater coherence, efficiency, ease of evaluation, and focus on his highest priorities—the Executive Office of the President (EOP) recommended, and the President accepted, a FY 2014 Budget Request for STEM education that would increase the total investment in STEM-education programs by 6 percent over the 2012 appropriated level while reducing the number of programs spread across the 14 CoSTEM agencies from 226 to 110.

The draft 5-year Strategic Plan developed by CoSTEM informed the priority areas around which to focus the reorganization. By reorganizing and realigning resources around these priority areas, the proposed framework and related initiatives at each of the lead agencies are intended to improve the delivery of STEM education in each of these core areas.

Individual members of CoSTEM did not provide direct input in the EOP-led 2014 Budget formulation process, although the CoSTEM agencies participate annually in the budget formulation process within the Executive Branch. In formulating the STEM-education reorganization proposals contained in the President's 2014 Budget, CoSTEM's deliberations and documents were important inputs to the EOP-led process. The Administration actively sought input from CoSTEM agencies on program consolidations, eliminations, and new initiatives through the 2014 Budget process and coordinated discussions on implementation among the CoSTEM agencies to try to ensure that the proposed initiatives address the needs and goals of agencies with eliminated programs.

The CoSTEM will play a key role in developing transition plans and in managing, monitoring, and improving these reorganization initiatives.

2. **The Administration proposes to redirect funding from certain federal STEM education activities to the National Science Foundation, the Department of Education, and Smithsonian Institution. These agencies would become lead agencies for STEM activities. What institutional support, staffing requirements, and legal authority are needed for the lead agencies to take on their new roles as proposed by the reorganization?**

The institutional support and staffing requirements for the lead agencies to take on their new roles are provided for in the FY 2014 budget requests of the National Science Foundation (NSF), the Department of Education (ED), and the Smithsonian Institutions (SI). All agencies involved in the STEM education reorganization proposal have indicated to the Executive Office of the President that they will be able to

take on their new roles upon approval of the proposal, and that none are significantly limited by legislative authority.

QUESTIONS FOR THE RECORD
THE HONORABLE RANDY NEUGEBAUER (R-TX)
U.S. House Committee on Science, Space, and Technology
STEM Education: The Administration's Proposed Re-Organization
 Tuesday, June 4, 2013

1. I am concerned that the proposed re-organization could threaten existing public-private partnerships in STEM education. According to an analysis by the Congressional Research Service (CRS), eight programs identified for consolidation require partnerships and 19 encourage them. What are you doing to estimate the total cost of these proposed reductions? What efforts were made to determine the extent to which schools, businesses, states, and non-profit organizations are financially and substantively integrated into particular federal STEM education programs? How have you attempted to determine the effects of these changes on local communities?

Answer: I share your appreciation of the importance of public-private partnerships in STEM education. Partnerships are an important part of the Administration's efforts to improve STEM education. As Dr. Holdren stated in his testimony at the hearing, the President has set ambitious but achievable goals and challenged the private sector. For example, the President announced the goal to prepare 100,000 excellent STEM teachers in his 2011 State of the Union Address. Answering this call to action, over 150 organizations, led by the Carnegie Corporation of New York, formed a coalition called 100Kin10. Members of the coalition have made over 150 commitments to support STEM teacher preparation, and raised over \$30M in funds. Additional examples of this all-hands-on-deck approach to challenging companies, foundations, non-profits, universities, and skilled volunteers include Change the Equation, US2020, and increasing the reach of the Advanced Placement (AP) program for children in military families.

The importance of partnerships is recognized in the reorganization proposal. The lead agencies will continue to make use of partnerships. For example, in P-12 teaching and learning the ED's STEM Innovation Networks proposals will support school districts in partnerships with institutions of higher education, Federal agencies and their facilities and staff, non-profit organizations, museums, businesses, and other partners to provide rich STEM learning experiences. In another example, SI will facilitate partnership building as part of its proposed leadership role in informal STEM education.

Although there are proposed reductions for certain programs in the 2014 Budget, the overall Federal STEM education effort would expand. The proposed reorganization, when combined with the 2014 Budget's proposal to increase Federal STEM education investments by 6 percent compared to the 2012 funding level to \$3.1 billion, is intended to reach more students, teachers, researchers, schools, post-secondary institutions, and others than the current fragmented system while sustaining and building on the Federal government's success in supporting public-private partnerships in STEM education. In addition, the Administration and lead agencies are working with the other CoSTEM agencies to fully understand transition and implementation issues facing each agency and to ensure that the reorganization and new framework preserve core functions of eliminated programs.

2. Many of the programs affected by the proposed re-organization serve certain constituencies (e.g., students, teachers, researchers) who may be directly affected by the proposed changes. What efforts have been taken to predict and mitigate the impact of these changes on the constituencies

they serve? Can you please provide me with an estimate of how many people might be affected? Have you determined the number of job reductions that will take place as a result of the proposal?

Answer: The ED, NSF, and SI are working with their CoSTEM partner agencies to address transition issues such as staffing and continuation awards in order to mitigate the impact of the proposed reorganization on students, teachers, schools, and others affected by the transition of functions and activities. For example, ED is working with agencies that serve P-12 functions to identify connections with its STEM Innovation Networks proposal, as well as with existing P-12 STEM investments at ED and other CoSTEM agencies, to identify and continue best practices, and to use agency input to help develop program priorities. NSF is working with agencies with graduate fellowship programs to establish a mechanism for ongoing input on national and agency needs for STEM workforce. SI is working with all CoSTEM agencies to identify existing high-quality products and on-line resources, to identify best practices, and to establish knowledge-transfer systems. The other CoSTEM agencies are making recommendations on how to best engage with the above three agencies to utilize their expertise and experience in identifying continuation award issues and in developing staffing plans to facilitate knowledge transfer. The CoSTEM will play a key role in developing transition plans and in managing, monitoring, and improving these strategies.

The core goal of the proposed reorganization is to reach more students and more teachers more effectively. The proposed reorganization, when combined with the 2014 Budget's proposal to increase Federal STEM education investments by 6 percent compared to the 2012 funding level to \$3.1B, is intended to reach more students, teachers, researchers, schools, post-secondary institutions, and others than the current fragmented system. The Administration has not analyzed the net employment impacts of the STEM education reorganization proposal as a whole nor the combined reach of the proposed STEM-education portfolio compared to the current one. The current fragmented approach to investing in STEM education has made it difficult to ensure that Federal efforts are coherent, strategic, and leveraged for greatest impact. By reorganizing and realigning resources, the proposal facilitates greater investment in rigorous evaluation and evidence-building strategies so that the Federal government will be better able to document how many people are affected by Federal STEM education programs, and how.

QUESTIONS FOR THE RECORD
 THE HONORABLE RALPH HALL (R-TX)
 U.S. HOUSE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
STEM Education: The Administration's Proposed Re-Organization
 Tuesday, June 4, 2013

1. The Space Grant program has operated since 1988 according to the same practice—every five years states submit 5-year plans to NASA that are competitively reviewed. NASA then makes a 5-year award to the states based on the funding levels provided by Congress. NASA makes annual increments under the approved 5-year plans to a lead consortia institution in the state, subject to annual performance reviews. The Space Grant consortia then funds state projects and activities based on a merit review of proposals. For the last four years Congress has appropriated \$40 million annually to the Space Grant Program. In FY 2012, NASA changed course from its standard operating procedures and did not fully fund all of the states according to the 5-year plans and the money appropriated by Congress. Rather, NASA took the additional money Congress appropriated to the program beyond the President's budget request and forward-funded 28 states for FY 2013. Space Grant Program stakeholders feel that the decision not to provide augmentation grants left states without their full funding in FY 2012.

What happened to the funding and when can states expect to receive the funding that Congress intended for them based on appropriations? What were the criteria used to determine which states were forward-funded for FY 2013 using FY 2012 appropriated dollars? Were those criteria clearly spelled out to all consortia members?

Additionally, the Space Grant offices are being told that a portion of future Space Grant dollars will be allocated by NASA Headquarters and decisions centralized in Washington, not by the consortia operating in the states. Why did you make this change to the program without consulting Congress?

Answer: In 1989, The National Space Grant College and Fellowship Program (Space Grant) was enacted by Congress (Public Law 100-147) and established under Title II of the NASA Authorization Act. NASA implements the Space Grant program in all 50 states, the District of Columbia, and the Commonwealth of Puerto Rico through 52 university-based Space Grant consortia. These consortia form the basis for the national network of colleges and universities, industry partners, State and local government agencies, other Federal agencies, museum and science centers, and nonprofit organizations, all of whom are stakeholders in science, technology, engineering and mathematics (STEM) education and training. The national network currently comprises 1,014 affiliates, of which 672 (66 percent) are institutions of higher education nationwide, and serves 14,894 direct participants (STEM engagement ≥ 160 hours and/or $\geq \$5,000$) by leveraging NASA funds and providing cost share. Space Grant consortia annually fund fellowships and scholarships to support the participation of students and faculty in authentic NASA-related research, emphasize diversity of participants, institutions and human resources, support curriculum enhancement, and the communication of the benefits of STEM disciplines through public engagement activities in their states.

Space Grant's 2010-2015 objectives are linked to NASA Office of Education's current areas of emphasis:

- Authentic, hands-on student experiences in science and engineering disciplines.
- Engaging middle school teachers in hands-on curriculum enhancement capabilities using NASA-specific content.

- Summer opportunities for secondary students on college campuses with the objective to increase enrollment in STEM disciplines and STEM careers.
- Community Colleges- developing new relationships as well as sustaining and strengthening existing institutional relationships.
- Aeronautics research- research in traditional disciplines; research in areas that are appropriate to NASA's unique capabilities; research that directly addresses the Next Generation Air Transportation System (NextGen).
- Environmental Science and Global Climate Change- research and activities to better understand Earth's environments.
- Diversity of institutions, faculty and students.
- Enhancing the capacity of institutions to support innovative research infrastructure activities to enable early career faculty to focus their research toward NASA priorities.

Current Grant Cycle

NASA Space Grant Timeline Summary

	2010	2011	2012	2013	2014	2015
<i>Current Cycle</i>	<i>Year 1 of Base Augmentations CDC Competition</i>	<i>Year 2 of Base Augmentations</i>	<i>Year 3 of Base Forward Funding</i>	<i>Year 4 of Base Targeted Competitions</i>	<i>Year 5 of Base (end of current grant cycle)</i>	
<i>Future Plan</i>					<i>Qtr 1: Solicitation preparation Qtr 2: Solicitation Release Qtr 3: Selections</i>	<i>Qtr 1: Start of new awards (pending fund availability)</i>

In FY 2010, NASA established new awards for the 52 Space Grant consortia based upon the President's Budget Request and the projected outyear requests. The awards support multi-year grants to be funded over a five year period (FY 2010-FY 2014). Funded at two levels, there are 35 "designated" awards at \$575,000 annually and 17 "non-designated" awards at \$430,000 annually. These are referred to as "Base Awards." Over a 5-year period, the higher funded consortia would receive \$2.875M in total base awards (\$575K X 5 years) and the lower funded consortia would receive \$2.150M in total (\$430K X 5 years) base awards. The anticipated total grant awards for the 5-year period would be \$137.175M.

Fiscal Year 2010

- President's Budget Request: \$28.4M
- Appropriated Funds for Space Grant: \$45.6M
 - Congressional language – *House Conference Report 111-366, National Space Grant College and Fellowship program.—For this program, the Committee recommends*

\$45,600,000 to fund 42 states or jurisdictions at \$900,000 each and 10 states or jurisdictions at \$700,000 each.

- Funding Actions:
 - NASA obligated \$27.563M toward base awards. NASA also issued solicitations and released \$13.949M in funding for one-year augmentation awards, and a targeted consortium development opportunity.
 - Augmentation award totals: Designated: \$270,000; Non-Designated: \$230,000
 - Remaining funds supported Evaluation and Program Accountability (\$1.791M), support service contracts (\$2.28M), and travel (\$.017M).

Fiscal Year 2011

- President's Budget Request: \$27.7M
- Appropriated Funds for Space Grant: \$45.6M
 - Congressional language – Full-Year Continuing Resolution; see FY 2010 language
 - Amount subsequently reduced by \$1.16M for mandatory rescission
- Funding Actions:
 - NASA obligated \$33.005M toward base awards. NASA also issued a solicitation and released \$10.315M in funding for one-year augmentation awards.
 - Augmentation award totals: Designated funded: \$215,000; Non-Designated: \$185,000
 - Remaining funds (after mandatory rescission) included travel (\$.003), and support service contracts (\$1.005M).

Fiscal Year 2012

- President's Budget Request: \$26.6M
- Appropriated Funds for Space Grant: \$40.0M
 - Congressional language – House Conference Report 112-284: Education – *For necessary expenses, not otherwise provided for, in carrying out aerospace and aeronautical education research and development activities.....\$138,400,000, to remain available until September 30, 2013, of which \$18,400,000 shall be for the Experimental Program to Stimulate Competitive Research and \$40,000,000 shall be for the National Space Grant College program.*
- Funding Actions:
 - NASA obligated \$36.714M toward base awards and did not issue any augmentations or targeted opportunities.
 - Given anticipated budget reductions based upon the President's Budget Request for FY 2013 and the need to reduce the amount of FY 2012 carryover funds, NASA made the decision to forward fund (as much as possible) awards for Year 4 of 5 for the consortia in order to insure that the Base Awards continued to be fully covered.
 - Forward-funding decisions were based upon consortium performance over the first three years of the grant period. Consortia receiving forward-funding consistently exceeded proposed goals and objectives stated in their original proposals and consistently achieved their diversity measures.
 - Remaining funds supported administrative costs (\$.288M), travel (\$.016M), Evaluation and Program Accountability (\$2.300M), civil service labor (\$.003M), and support service contracts (\$.679M). The remaining balance (\$.467M) was used to support a portion of year 4 base award.

Fiscal Year 2013

- President's Budget Request: \$24M
- Appropriated Funds: 37.2M

- Congressional language – *Full year Continuing Appropriations: Aerospace Research and Career Development (ARCD).*--\$40,000,000 is for the National Space Grant College program, and \$18,000,000 is for the Experimental Program to Stimulate Competitive Research (EPSCoR). *Language from the Senate report regarding the distribution of Space Grant funding to states and jurisdictions is not adopted.*
- Funding actions: NASA intends to obligate \$12.495M toward base awards. NASA issued a solicitation and intends to obligate \$5.0M toward a one-year targeted funding opportunity to support undergraduate STEM retention, and K-12 STEM Educator recruitment and retention. Other obligations include, Program Accountability and Evaluation at(\$2.190M), Support Service Contracts (\$.900M) and an external NRC evaluation estimated at (\$1.5M)
 - Targeted solicitation released in first quarter of fiscal year 2013. Anticipate award decisions in August/September 2013.

NASA anticipates using additional funds above base awards and current targeted solicitation (approximately \$9.7M) to offer further targeted opportunity grants that focus on CoSTEM and the Agency's priorities: Educator Professional Development, STEM Engagement, Institutional Engagement, and NASA Internships, Fellowships, and Scholarships.

None of the administrative decisions made in the implementation of Space Grant funds have been contradictory to Congressional guidelines; and the Associate Administrator for Education has directly addressed consortia leadership multiple times via teleconferences and the annual Directors meeting for Space Grant, regarding the decisions described above.

Fiscal Year 2014

- President's Budget Request: \$24M
- Funding actions:
 - NASA intends to obligate \$16.56M toward base awards.
 - In addition, funds are planned to be used for administrative costs, travel, STEM consolidation, evaluation and program accountability, civil service labor, and support service contracts (\$7.44M)
 - Determination regarding utilization of any additional funds will be made in alignment with Administration and Agency priorities.

Fiscal Year 2015

- President's Budget Request: (TBD) Funding actions: Funds will be utilized to close any continuing actions from previous awards and in alignment with Administration and Agency priorities.
- Future preparation: NASA will release a new solicitation for the Space Grant program, for start in FY 15, which aligns with the Administration and Agency priorities.

QUESTIONS FOR THE RECORD
THE HONORABLE LARRY BUCSHON (R-IN)
U.S. House Committee on Science, Space, and Technology

STEM Education: The Administration's Proposed Re-Organization

Tuesday, June 4, 2013

1. NASA programs account for nearly half of the programs whose funding would be redirected to other agencies under the Administration's proposal. The policy of the NASA Science Mission Directorate has been to allocate at least 1 percent of each space mission's budget to education and public outreach activities. Is that policy effectively terminated with this proposal? Will individual space missions, such as the Hubble Space Telescope or the MESSENGER probe of the planet Mercury, still be permitted and/or encouraged to engage in education and public outreach?

Answer: NASA remains committed to supporting education and public outreach activities for its portfolio of exciting missions of exploration and discovery.

Education content and efforts that are no longer funded by NASA will be reviewed by NSF, ED, and SI. Elements or activities that support the Administration's STEM reorganization goals will be considered for incorporation into the broader reorganization initiatives. NSF, ED, and SI are currently developing the guidelines and procedures for securing funds for education activities under these broader initiatives; once the process is established, NASA's Science Mission Directorate (SMD) will work closely with NASA's Office of Education to seek funding for evidence based education activities at the mission level. NASA will also work closely with the three lead agencies and other CoSTEM partners to ensure that the Agency's unique resources (workforce, innovative approaches, and facilities) remain available to help inspire students and support educators..

Although the current budget proposal alters the method of coordination of education and public outreach activities between SMD and the Office of Education, it does not alter the commitment to collaborate.

QUESTIONS FOR THE RECORD
HONORABLE EDDIE BERNICE JOHNSON (D-TX)
U.S. House Committee on Science, Space, and Technology

STEM Education: The Administration's Proposed Re-Organization

Tuesday, June 4, 2013

1. As part of the OSTP STEM Inventory, NASA reported a total of 62 STEM education programs in 2011. Of those, 54 programs would either be consolidated outside the agency or terminated or consolidated internally as part of the Administration's FY 2014 budget proposal. You were already undertaking significant efforts to improve the coordination and effectiveness of NASA's broad STEM portfolio long before the FY 2014 budget proposal was developed, including, as you indicated in your testimony, through some program consolidations. I remain concerned that the decisions made as part of the FY 2014 budget proposal were not based on your own internal deliberative process for improving NASA's STEM portfolio.

- What actions, if any, has NASA taken since April 1, 2013 to begin implementing the 54 consolidations and terminations included in the FY 2014 budget proposal, including any terminations to current grants, any notices to grantees and potential grantees that no new awards will be made, and any relevant headquarters staff moved around or terminated?
- What similar actions, if any, did NASA take prior to April 1, 2013 (and since the 2011 inventory) with respect to any one of the 54 programs?

NASA's Office of Education remains responsible for coordinating NASA's education efforts under the Administration's FY 2014 STEM reorganization proposal. NASA Education's vision is to advance high quality science, technology, engineering and mathematics (STEM) education using NASA's unique capabilities. NASA has held a number of briefings and discussions with its workforce and external partners on the proposed FY 2014 strategy. Furthermore, NASA has in place an **Education Coordinating Council (ECC)**. The ECC includes representatives from all mission directorates, centers and Office of Education, serving as the Agency's senior decision-making body for strategic direction and planning related to education. Through the ECC, the Associate Administrator for Education has the ability to coordinate and direct a comprehensive portfolio of activities funded by the Office of Education and NASA Mission Directorates.

The ECC has met multiple times between April-June to discuss the Administration's proposed budget and reorganization guidance. No actions have been taken to a) terminate current grants, b) notify grantees and potential grantees that new awards will not be made, nor c) notify any relevant headquarters staff of reassignment or termination for FY 2014.

The Agency's education efforts will use evidence-based competitive processes to fund the best education and outreach programs within NASA. This includes executing a unified, systematic and standardized approach for data collection and performance assessment across NASA Education. NASA will align its STEM education investments with the federal strategic plans of the National Science and Technology Council's Committee on STEM Education (CoSTEM).

Content and efforts that are no longer funded by NASA will be reviewed by NSF, ED and SI. Elements or activities that support the STEM reorganization goals will be considered for incorporation into the broader reorganization initiatives. As part of this effort, NASA will work closely with the lead agencies

and other CoSTEM partners to ensure that the Agency's unique resources (workforce, innovative approaches, and facilities) remain available to help inspire students and support educators.

Based on the reorganization guidance we received, NASA's proposed FY 2014 STEM Education Programmatic and Budget structure consists of two programs (Aerospace Research & Career Development Program and STEM Education and Accountability Program). Within those programs are four projects (Space Grant College and Fellowship Project (Space Grant), Experimental Program to Stimulate Competitive Research (EPSCoR), Minority University Research & Education Project (MUREP) and STEM Education and Accountability Projects). Additionally, three activities (Global Learning and Observations to Benefit the Environment (GLOBE), STEM Interagency Coordination, and STEM Facilitation) are proposed. Listed below is an illustration of our programmatic and budget structure:

Aerospace Research & Career Development Program

- Space Grant College and Fellowship Project
- Experimental Program to Stimulate Competitive Research (EPSCoR)

STEM Education and Accountability Program

- Minority University Research & Education Project (MUREP)
- STEM Education and Accountability Projects
 - GLOBE
 - STEM Facilitation
 - STEM Interagency Coordination

NASA's ECC made decisions during FY 2012 that were implemented in FY 2013, with FY 2013 designated as a transition year towards a reorganized and more strategic education portfolio positioned to more effectively address the Administration's STEM priorities and the anticipated direction framed in the progress report of the CoSTEM strategic plan. We decided that the best way to focus more resources on high priority activities within a highly constrained budget was to reduce or consolidate lower priority activities. Twenty-seven activities were initially identified within the Office of Education. Sunsetting of activities was proposed as a natural element of a project's life cycle (e.g., end of performance period).

This one-year transition period allowed for deliberate planning to minimize any disruption of service to external customers and internal coordination by program managers in the consolidation and sunsetting of activities. No cooperative agreements were cancelled under this process. Furthermore, at this time, cooperative agreements at the end of performance period (FY 2013) are proceeding with transition and close-out actions. In some instances existing cooperative agreements may have been re-scoped at the beginning of FY 2013 as a step in the transition process and funding levels reduced to align with strategic program direction. Our own internal deliberative process for improving NASA's STEM education portfolio was used to make strategic decisions associated with the FY 2014 reorganization proposal.

2. **What steps can be taken now to begin implementing the 5-year strategic plan that do not involve moving money or redirecting programs between/among agencies? That is, what new interagency collaborations can be established and new capacity built at the currently designated lead agencies that don't require collaborating agencies to reduce support for their own portfolio of STEM education programs, at least not yet?**

- **What specific steps can NASA take to increase collaboration in the short term?**

The STEM 5-year Strategic Plan prepared by the Committee on STEM Education (CoSTEM) of the National Science and Technology Council (NSTC) which I co-chair with Cora Marrett, Acting Director

of the National Science Foundation, lays out a strategy to leverage Federal agency assets and expertise to make progress on the national priority areas of STEM education: improve STEM instruction; increase and sustain youth and public engagement in STEM; enhance the STEM experience of undergraduate students; better serve groups historically under-represented in STEM fields; and design graduate education for tomorrow's STEM workforce. The Plan aligns in many ways with the goals established in the President's 2014 Budget proposal, but the Plan has been developed by agency representatives and agreed to by agency leadership and therefore implementation can proceed absent any other action.

The Plan outlines an updated STEM-education coordination approach with lead and collaborating agencies to leverage capabilities across agencies to maximize the impact of Federal STEM education investments. The Plan includes implementation roadmaps describing objectives and strategies to achieve the outlined goals. The CoSTEM agencies have already started making plans for implementation and will work together through the CoSTEM structure, as described in the implementation roadmaps, and through additional interagency activities, as necessary, to reach the goals described in each of the priority areas.

Building new capacity to enable NSF, ED, and SI to fulfill their responsibilities as lead agencies according to the Strategic Plan's vision will require some new resources, as proposed in the 2014 Budget. Additionally, through the process of developing the Federal STEM Inventory some agencies have already identified opportunities for internal consolidation of STEM education programs and other ways of making the most effective use of existing resources; these efforts should be encouraged, not restricted.

NASA actively engaged with NSF, ED, SI, and other agencies in the review and completion of the CoSTEM five-year strategic plan. NASA continues to regularly participate in CoSTEM and FC-STEM meetings and to help facilitate the implementation steps of the five-year strategic plan. In addition, NASA offered an initial assessment of the types of assets that seemed to align with the initiatives each lead agency proposed under the STEM reorganization through direct exchanges with them in April, and has offered to host an interagency meeting on behalf of ED in August.

NASA has suggested new collaboration and workforce models for consideration to the three lead agencies in advance of the development of implementation subcommittees during summer 2013 to address the CoSTEM priority areas. Examples of a new collaboration models are the establishment of interagency agreements with reimbursable work (Reimbursable Work for Federal Agencies under the Economy Act; 31 U.S.C. § 1535, Economy Act; the Economy Act provides authority for all Federal agencies to engage in interagency reimbursable activity within certain constraints) and NASA's Space Act Agreement (SAA) authority in the short term. NASA and ED are currently completing an SAA with reimbursable work for pilot (Aug 2013-Nov 2014) under ED's 21st Century Community Learning Centers. The lessons learned under this reimbursable work may position NASA to develop further collaborations with ED and similar opportunities with NSF and SI, linking existing activities across agencies to develop new capacities without the necessity of significant redirection of program priorities between/among agencies.

NASA has also offered ideas on looking closely at a flexible workforce model, whereby the skill sets/expertise across the civil servants of science mission agencies and support services could be available NSF, ED and SI. These ideas include IPAs (e.g., one-year assignments of NASA personnel to lead agencies), details in place (e.g., personnel remains at home institution performing targeted work associated with lead agency/CoSTEM priorities with occasional travel to Washington, DC for key milestones/meetings), and short-term details to lead agencies with rotating professionals.

3. One of my concerns with the reorganization proposal in the FY 2014 budget is that it isn't vetted at all with any of the non-federal partners that help make federal STEM investments successful. It is equally troubling that the five-year strategic plan doesn't say very much about engaging the stakeholder community, except in the broadening participation priority.

- **Does NASA plan to seek input from non-federal stakeholders as you develop and, as necessary, revise NASA's part in implementing the CoSTEM strategic plan? If so, how will NASA seek such input?**

Answer: Although CoSTEM as an entity will not be seeking formal public input from non-Federal stakeholders as the implementation of the Strategic Plan moves forward, the CoSTEM agencies will continue to engage with non-Federal stakeholders in ongoing dialogue, consultation, and partnership in advancing the goals of the Strategic Plan and in the operations of Federal STEM-education programs. The 5-Year Strategic Plan is not intended to be a static document; the Plan's preliminary implementation roadmaps for each of the priority areas are presented with the full expectation that they will be revised over the next five years and supplemented by more detailed roadmaps designed by the Administration and the CoSTEM agencies over the coming months, built on communication and outreach with stakeholder communities. The Strategic Plan commits CoSTEM to assisting in this process. I anticipate that there will be a variety of approaches among the 14 CoSTEM agencies for engaging stakeholders, as is the case right now for how agencies work with stakeholders on their current STEM-education portfolios.

The Associate Administrator for Education has addressed multiple stakeholder communities on the STEM reorganization since April 2013 and highlighted the CoSTEM strategic plan and its implications since its official release at the end of May 2013. The Associate Administrator for Education has used a variety of communication methods (e.g., teleconferences, videoconferences, and Webex) to engage the entire NASA Education community, including the extensive network constituting NASA's Science Mission Directorate (SMD) Education and Public Outreach Forums. Feedback from these communities of practice has been incorporated into the strategic discussions associated with the development of NASA Education's FY 2013 and FY 2014 plans.

Additionally, the following stakeholder communities have been directly engaged by the Associate Administrator for Education in determining NASA's part in implementing the CoSTEM strategic plan:

- Aerospace Industries Association
- American Institute for Aeronautics and Astronautics
- Universities Space Research Association
- National Space Grant Alliance
- National Science Foundation's National Science Board
- American Astronautical Society
- National Science Teachers Association
- Space Telescope Institute (Johns Hopkins University)

More focused and targeted engagement with non-federal stakeholders is being considered as the implementation phase of the CoSTEM plan begins. A few near term methods include:

- Hosting virtual meetings (e.g., Webinars, teleconferences, and videoconferences) with NASA grantees and cooperative agreement recipients
- Independent third parties (e.g., Board of Science Education/National Academies/American Association for the Advancement of Science) host expert meetings or series of public workshops to provide a neutral ground for stakeholder input.

It is anticipated that there will be a variety of approaches among the 14 CoSTEM agencies for engaging stakeholders, as is the case right now for the agencies in working with stakeholders on their current STEM-education portfolios.

Material requested for the record by Representative Brownley

- In 2008, the Pearson Foundation/CCSSO International Conference on Science and Mathematics Education conducted a study in this area. According to their comparison study, students in Singapore, England, and Canada scored higher in science and math than their United States counterparts. This study sought to investigate and learn from the advancements of Singapore in science and math education and also to explore innovative practices in science and math education in other systems from around the world.

Source: Report and Recommendations for Education Policy Leaders from the Pearson Foundation/CCSSO International Conference on Science and Mathematics Education (2008)
http://www.pearsonfoundation.org/downloads/PF-CCSSO_Report.pdf

- In 2013, the Organization for Economic Development and Cooperation (OECD), *A Skills Beyond School Review of the United States* report compares the United States policy on career and technical education with that of other nations. This report addresses secondary and postsecondary “career and technical education,” career-focused associate degrees, postsecondary certificates, and industry certifications.

Source: The Organization for Economic Development and Cooperation (OECD) (2013)
<http://www.oecd.org/edu/skills-beyond-school/skills-beyond-school/ASkillsbeyondSchoolReviewoftheUnitedStates.pdf>

Comparison of STEM Funding to Other Countries

The President’s 2014 Budget funds \$3.1B for STEM education programs, a six percent increase over 2012. However NASA is unaware of a comparison of the STEM budget to those of other countries.

Source: Preparing a 21st Century Workforce Science, Technology, Engineering, and Mathematics (STEM) Education in the 2014 Budget
http://www.whitehouse.gov/sites/default/files/microsites/ostp/2014_R&Dbudget_STEM.pdf

Additional STEM Trend and Statistical Reference Sites

A U.S.-Finnish research collaboration, support through the National Science Foundation’s Science Across Virtual Institutes (SAVI) activity, aims to bring new innovations to science, technology, engineering and mathematics (STEM) education in environments from kindergarten through undergraduate education in both countries. The project is producing several comparative studies that are collaborations between Finnish and American researchers.
http://www.nsf.gov/news/news_summ.jsp?cntn_id=127063

The European Commission funded a 2011 report focused on efforts to increase STEM education in 21 European Schoolnet Member Countries. While this report does not compare European strategies with the U.S., it does provide an excellent summary of actions taken by 21 countries to increase interest in STEM, including the development of centers to improve the teaching of STEM, curricular reform, and strategies to increase the participation of women in STEM:
http://spice.eun.org/c/document_library/get_file?p_l_id=16292&folderId=16435&name=DLFE-9323.pdf

A 2011 European report that examines science education strategies across Europe:
http://eacea.ec.europa.eu/education/eurydice/documents/thematic_reports/133EN.pdf.

A 2012 Congressional Research Service primer on STEM education, which includes a short discussion of the comparative international assessment and attainment data in science and mathematics (see pages 13-14): <http://www.fas.org/sgp/crs/misc/R42642.pdf>.

The National Center for Education Statistics
<http://nces.ed.gov/surveys/international/ide/>

The Global Competitiveness Report 2011 – 2012
<http://reports.weforum.org/global-competitiveness-2011-2012/#>

The National Science Board
<http://www.nsf.gov/statistics/seind12/>

Appendix II

ADDITIONAL MATERIAL FOR THE RECORD

SUBMITTED STATEMENT FOR THE RECORD BY REPRESENTATIVE FEDERICA WILSON

Committee on Science, Space, and Technology
*Hearing on STEM Education: The Administration's Proposed
 Reorganization*

Opening Statement
 By
 Representative Frederica Wilson

Mr. Chairman, the excitement and allure of spaceflight and other scientific missions help STEM curricula motivate a diverse cross-section of our young people—including so many who have been under-represented—to enter the STEM fields.

This is pivotal.

The underrepresentation of minorities and women in STEM fields remains a serious problem. This is not only an equity issue—it's a competitiveness issue. As our nation becomes more diverse, our science and engineering workforce must as well.

A majority of underrepresented students come from urban areas, and if we are to tackle this issue nationally, we will need to concentrate on this population. The strategic plan allocates 10% of current funding to minority-serving institutions. Minority-serving institutions, especially large, urban, public universities and public school districts educate the bulk of our minority students, but the plan seems silent on building an initiative around these students and institutions.

In Miami, Florida International University and the Miami Dade County Public Schools have formed an innovative partnership in STEM education to increase student success rates. I would like to see these kinds of programs replicated nationwide, as they have the potential to deliver on the plan's goals. We need to incentivize STEM programs for urban, public schools and universities so that we can raise the number of minorities in these key areas.

I know President Obama is committed to training a world-class workforce—this is the centerpiece of all his policies—and I know that the President's Council on Science and Technology recommended the creation of a Presidential Higher Education Commission on STEM Education in their 2010 report "Prepare and Inspire." I want to be sure the President and the Council recognize the importance of NASA and other scientific agencies as a vehicle for training our young people.

SUBMITTED LETTER FOR THE RECORD BY REPRESENTATIVE JOSEPH P. KENNEDY

WGBH
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June 18, 2013

<p>The Honorable Lamar Smith Chairman House Committee on Science, Space and Technology 2321 Rayburn House Office Building Washington, DC 20515</p>	<p>The Honorable Eddie Bernice Johnson Ranking Member House Committee on Science, Space and Technology 394 Ford House Office Building Washington, DC 20515</p>
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Dear Chairman Smith and Ranking Member Johnson:

We followed with interest your June 4 hearing entitled "STEM Education: The Administration's Proposed Reorganization," and would like to share some additional information and related concerns regarding federal support for informal science learning.

WGBH is a public broadcaster in Boston, and the largest producer of content for the Public Broadcasting Service (PBS.) We have been actively involved in creating programs that teach STEM for decades. As you know, many Americans experience learning in STEM fields via engagement in informal settings. Public broadcasting, which reaches 99% of American households, is a very effective way for families to gain exposure to science and technology content for free.

The work that WGBH puts into developing STEM content for TV, as well as the web and direct outreach, is thoughtful, rigorous, time-consuming, and expensive. Support from the National Science Foundation (NSF) Advanced Informal Science Learning (AISL) program has allowed us to develop high-quality media resources including educators' guides, face-to-face trainings, webinars, and student handouts that are useful to educators in a variety of settings -- such as afterschool programs, museums, summer camps, science cafes, and on the web.

Federal support for broad-based STEM learning has been vital to our series *NOVA*, now in its 40th season, and still the most popular primetime science series on American television. Many of *NOVA*'s most celebrated and impactful programs -- including miniseries like *The Fabric of the Cosmos* (audience: nearly 12.5 million) and *Making Stuff* (audience: 14.6 million), as well as ongoing series like *NOVA ScienceNOW* -- would not have been possible without funding from the NSF's AISL program.

The same can be said of *Design Squad* - a series for teens focused on STEM concepts. Since 2007, over 100 engineering and education organizations throughout the country have used *Design Squad*'s educational materials to initiate

introduction to engineering course for the Massachusetts Department of Education, an online workshop in partnership with NASA on how to lead engineering activities, and a year-long high school freshman technology education course.

Because of the positive impact of these compelling and successful programs, we are concerned about the extent to which the President's Fiscal Year 2014 proposal would cut AISL funding and focus the program on primary research rather than public engagement. We would not want to see this successful program weakened, or diminish the direct engagement that comes with media outreach to students in their classrooms and homes.

We also are concerned about the proposed shifting of responsibility for informal STEM education to the Smithsonian, given that the NSF AISL program has been very successful in supporting informal STEM learning. We are concerned this focus on the Smithsonian will negatively affect our opportunity to continue to engage audiences through public media.

WGBH's work in informal education is at the core of our public media mission, and we look forward to continuing to create the STEM programming we have been providing to American audiences, in partnership with the NSF, for decades. We would respectfully request that your draft NSF reauthorization legislation include robust support for AISL and its successful informal STEM education focus.

Thank you for the opportunity to share these concerns. We would be pleased to offer any additional information that would be useful.

With best regards,



Jonathan C. Abbott
President and CEO
WGBH Boston

Cc: Members of the Committee

SUBMITTED LIST OF STEM PROGRAMS FOR THE RECORD
BY THE HONORABLE JOHN HOLDREN

7/12/2013

FY 2012 Inventory of STEM Programs

Program	Program Type
Agriculture	
Consolidations (Funding Redirected Outside of Agency)	
Agriculture in the Classroom	Engagement
AITC Secondary Postsecondary Agriculture Education Challenge Grants (SPECA)	Engagement
Food and Agricultural Sciences National Needs Graduate and Postgraduate Fellowship Grant Program	Fellowship/ Scholarship
Higher Education Challenge Grants (HEC)	Undergraduate Education
Higher Education Multicultural Scholars Program (MSP)	Fellowship/ Scholarship
Women and Minorities in Science, Technology, Engineering and Mathematics Fields Program (WAMS)	Fellowship/ Scholarship
Internal Consolidations/Eliminations (Funding Remains within the Agency)	
Distance Education Grants for Institutions of Higher Education in Insular Areas (DEG)	Fellowship/ Scholarship
Resident Instruction Grants Program for Institutions of Higher Education in Insular Areas	Fellowship/ Scholarship
Existing Programs Maintained (Not Consolidated)	
1890 Facilities Grant Program	Minority Serving Institutions
1890 Institutions Capacity Building Grants Program: Extension	Minority Serving Institutions
1890 Institutions Capacity Building Grants Program: Teaching	Minority Serving Institutions
4-H Science, 4-H Youth Development Program	Engagement
AgDiscovery	Fellowship/ Scholarship
Alaska Native-Serving and Native Hawaiian-Serving Institutions Education Competitive Grants Program	Minority Serving Institutions
Hispanic-Serving Institutions Education Grants Program	Minority Serving Institutions
NIFA Fellowship Grants Program	Minority Serving Institutions
New Programs	
Insular Programs	None
Commerce (includes National Oceanic and Atmospheric Administration)	
Consolidations (Funding Redirected Outside of Agency)	
Competitive Education Grants (Including Environmental Literacy Grants)	STEM Instruction
Dr. Nancy Foster Scholarship Program	Fellowship/ Scholarship
National Sea Grant College Program*	STEM Instruction
NIST Summer Institute for Middle School Teachers	STEM Instruction
NOAA Office of Ocean Exploration and Research (Education Only)	Engagement
NOAA Teacher at Sea Program	STEM Instruction
Internal Consolidations/Eliminations (Funding Remains within the Agency)	
Coral Reef Conservation Program	Engagement
National Estuarine Research Reserve System	STEM Instruction
NOAA Bay Watershed Education and Training (B-WET)	STEM Instruction
NOAA Fisheries Education Program	STEM Instruction
Satellite and Information Service	Engagement
Existing Programs Maintained (Not Consolidated)	
Educational Partnership Program with Minority Serving Institutions	Minority Serving Institutions
Ernest F. Hollings Undergraduate Scholarship Program	Fellowship/ Scholarship
STEM Pipeline for the Next Generation Scientists and Engineers.	Fellowship/ Scholarship
Summer Undergraduate Research Fellowship (SURF)	Fellowship/ Scholarship
* \$4M in activities within the National Sea Grant College Program (including funding for the Sea Grant Knauss Policy Fellowships, Sea Grant/NMFS Graduate Fellowship Program, and STEM instruction) was redirected outside of the agency.	
Defense	
Consolidations (Funding Redirected Outside of Agency)	
DoD STARBASE Program	Engagement
Iridescent Learning	Engagement

Program	Program Type
National Defense Education Program (NDEP) K-12 component	Engagement
National Science Center (NSC)	Engagement
Uniformed Services University of the Health Sciences (USUHS)	Fellowship/ Scholarship
University Laboratory Initiative (ULI)	Fellowship/ Scholarship
Existing Programs Maintained (Not Consolidated)	
Army Educational Outreach Program (AEOP)	STEM Instruction
Awards to Stimulate and Support Undergraduate Research Experiences (ASSURE)	Fellowship/ Scholarship
Historically Black Colleges and Universities/Minority Institutions Research and Education Partnership	Minority Serving Institutions
National Defense Education Program (NDEP) Science, Mathematics And Research for Transformation (SMART)	Fellowship/ Scholarship
National Defense Science and Engineering Graduate (NDSEG) Fellowship Program	Fellowship/ Scholarship
Navy - Science and Engineering Apprenticeship Program (SEAP)	Engagement
SeaPerch	Engagement
Stokes Educational Scholarship Program	Fellowship/ Scholarship
The Naval Research Enterprise Intern Program (NREIP)	Engagement
University NanoSatellite Program	Engagement
Education	
Internal Consolidations/Eliminations (Funding Remains within the Agency)	
Improving Teacher Quality State Grants/Effective Teacher and Leader State Grants Set Aside	STEM Instruction
Teacher Incentive Fund	STEM Instruction
Existing Programs Maintained (Not Consolidated)	
Developing Hispanic Serving Institutions STEM and articulation programs	Minority Serving Institutions
Graduate Assistance in Areas of National Need (GAANN)	Fellowship/ Scholarship
High School Longitudinal Study of 2009	None
Investing in Innovation	STEM Instruction
Mathematics and Science Partnerships/Effective Teaching and Learning for a Complete Education	STEM Instruction
Minority Science and Engineering Improvement Program	Minority Serving Institutions
Research in Special Education	None
Research, Development, and Dissemination	None
Strengthening Predominantly Black Institutions	Minority Serving Institutions
Teacher Loan Forgiveness	STEM Instruction
Upward Bound Math and Science Program	STEM Instruction
New Programs	
Fund for the Improvement of Education (FIE): Math Initiative	STEM Instruction
STEM Innovation	STEM Instruction
Energy	
Consolidations (Funding Redirected Outside of Agency)	
American Chemical Society Summer School in Nuclear and Radiochemistry	Engagement
Computational Science Graduate Fellowship	Fellowship/ Scholarship
Global Change Education Program	Fellowship/ Scholarship
Graduate Automotive Technology Education	Fellowship/ Scholarship
National Undergraduate Fellowship Program in Plasma Physics and Fusion Energy Sciences	Fellowship/ Scholarship
Plasma/Fusion Science Educator Programs	STEM Instruction
QuarkNet	STEM Instruction
Wind for Schools	Engagement
Existing Programs Maintained (Not Consolidated)	
Advanced Vehicle Competitions	Engagement
Community College Internships (formerly Community College Institute of Science and Technology)	None
Visiting Faculty Program (formerly Faculty and Student Teams)	Engagement
HBCU Mathematics, Science & Technology, Engineering and Research Workforce Development Program	Minority Serving Institutions

Program	Program Type
Industrial Assessment Centers	Engagement
Minority Educational Institution Student Partnership Program	Minority Serving Institutions
Minority University Research Associates Program (MURA)	Minority Serving Institutions
National Science Bowl	Engagement
Science Undergraduate Laboratory Internships	Engagement
Solar Decathlon	Engagement
Special Recruitment Programs/Mickey Leland Fellowship	Engagement
New Programs	
Graduate Student Research Program (formerly Office of Science Graduate Fellowship)	Engagement
Environmental Protection Agency	
Consolidations (Funding Redirected Outside of Agency)	
Greater Research Opportunities (GRO) Fellowships for Undergraduate Environmental Study	Fellowship/ Scholarship
Science to Achieve Results Graduate Fellowship Program	Fellowship/ Scholarship
Internal Consolidations/Eliminations (Funding Remains within the Agency)	
Environmental Education Grants	Engagement
National Environmental Education and Training Partnership	Engagement
Existing Programs Maintained (Not Consolidated)	
Cooperative Training Partnership in Environmental Sciences Research	Fellowship/ Scholarship
P3-People, Prosperity & the Planet-Award: A National Student Design Competition for Sustainability	Engagement
University of Cincinnati/EPA Research Training Grant	Fellowship/ Scholarship
Health and Human Services (includes National Institutes of Health)	
Consolidations (Funding Redirected Outside of Agency)	
Clinical Research Training Program	Fellowship/ Scholarship
Curriculum Supplement Series	STEM Instruction
NIAID Science Education Awards	STEM Instruction
NINDS Diversity Research Education Grants in Neuroscience	Fellowship/ Scholarship
NLM Institutional Grants for Research Training in Biomedical Informatics	Fellowship/ Scholarship
OD Science Education Partnership Award	STEM Instruction
Office of Science Education K-12 Program	Engagement
Public Health Traineeship	Fellowship/ Scholarship
Science Education Drug Abuse Partnership Award	Engagement
Short Term Educational Experiences for Research (STEER) in the Environmental health Sciences for Undergraduates and High School Students	Fellowship/ Scholarship
Internal Consolidations/Eliminations (Funding Remains within the Agency)	
Health Careers Opportunity Program	Engagement
Short Courses on Mathematical, Statistical, and Computational Tools for Studying Biological Systems	Engagement
Existing Programs Maintained (Not Consolidated)	
Bridges to the Baccalaureate Program	Fellowship/ Scholarship
Initiative for Maximizing Student Development	Engagement
MARC U-STAR NRSA Program	Minority Serving Institutions
Mathematics and Science Cognition and Learning (MSCL) Program	Engagement
National Cancer Institute Cancer Education and Career Development Program	Fellowship/ Scholarship
RISE (Research Initiative for Scientific Enhancement)	Minority Serving Institutions
Ruth L. Kirschstein National Research Service Award Institutional Research Training Grants (T32, T35)	Fellowship/ Scholarship
Ruth L. Kirschstein NRSA for Individual Predoctoral Fellows, including Underrepresented Racial/Ethnic Groups, Students from Disadvantaged Backgrounds, and Predoctoral Students with Disabilities	Fellowship/ Scholarship
Short Courses in Population Research (Education Programs for Population Research R25)	Engagement
Short-Term Research Education Program to Increase Diversity in Health-Related Research	Engagement
Student Intramural Research Training Award Program	

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Program	Program Type
Summer Institute for Training in Biostatistics	Engagement
Undergraduate Scholarship Program for Individuals from Disadvantaged Backgrounds	Fellowship/ Scholarship
New Programs	
Medical Research Scholars Program (MRSP)	Fellowship/ Scholarship
Homeland Security	
Consolidations (Funding Redirected Outside of Agency)	
Homeland Security STEM Career Development Grant Program	Fellowship/ Scholarship
Existing Programs Maintained (Not Consolidated)	
National Nuclear Forensics Expertise Development Program	Fellowship/ Scholarship
Scientific Leadership Awards Program	Minority Serving Institutions
Interior	
Existing Programs Maintained (Not Consolidated)	
Conservation and Land Management Internship Program	Engagement
EDMAP	Engagement
George Melendez Wright Climate Change Youth Initiative	Fellowship/ Scholarship
Geoscientists-in-the-Parks Program	Fellowship/ Scholarship
National Aeronautics and Space Administration	
Consolidations (Funding Redirected Outside of Agency)	
Aeronautics Academy	Fellowship/ Scholarship
Aeronautics Content - Smart Skies/Product Content Upgrade	Engagement
Aeronautics Scholarship	Fellowship/ Scholarship
Aqua	Engagement
Astrophysics Forum	Engagement
Aura	Engagement
Cassini	STEM Instruction
Chandra	STEM Instruction
DAWN	STEM Instruction
Design Competitions	Engagement
Earth Science E/PO Forum	Engagement
eEducation Small Projects/Central Operation of Resources for Educators (CORE)	Engagement
EPOESS	Engagement
GCCE - Global Climate Change Education	STEM Instruction
GRAIL	Engagement
GSRP - Graduate Student Researchers Program	Fellowship/ Scholarship
Heliophysics E/PO Forum	Engagement
HEOMD-NASA's Beginning Engineering, Science and Technology (BEST) Students (NBS)	Engagement
HST	STEM Instruction
Innovation in Higher Education STEM Education	Fellowship/ Scholarship
INSPIRE - Interdisciplinary National Science Program Incorporating Research and Education Experience	Engagement
JPPF - Jenkins Pre-Doctoral Fellowship Program	Fellowship/ Scholarship
Juno	Engagement
LDCM	Engagement
LEARN - Learning Environment and Research Network	STEM Instruction
Mars E/PO Formal Ed	Engagement
Mars E/PO Informal Ed	Engagement
MESSENGER	Engagement
NAS - NASA Aerospace Scholars	Engagement
NES - NASA Explorer Schools	Engagement
Planetary Science E/PO Forum	Engagement
Reduced Gravity Student Flight Opportunity Project	Engagement
SEMAA - Science Engineering Mathematics and Aerospace Academy/FIRST Buckeye	Engagement
SOFIA (Stratospheric Observatory for Infrared Astronomy) Education and Public Outreach	STEM Instruction
SQI - Summer of Innovation/NASA IV&V Engineering Apprenticeship Program	Engagement

Program	Program Type
Spaceward Bound	Engagement
USRP - Undergraduate Student Research Project	Engagement
Internal Consolidations/Eliminations (Funding Remains within the Agency)	
AESP - Aerospace Education Services Project	Engagement
CEP - Career Exploration Project	Engagement
Curriculum Improvement Partnership Award for the Integration of Research into the Undergraduate Curriculum (CIPAIR)	Minority Serving Institutions
EFP - Education Flight Projects	Engagement
ESMD Space Grant Project	Fellowship/ Scholarship
HEOMD-Goldstone Apple Valley Radio Telescope (GAVRT) Project	None
HEOMD-University Student Launch Initiative	Engagement
Informal STEM Education	Engagement
Innovation in Aeronautics Instruction Competition	None
LARSS - NASA Langley Aerospace Research Summer Scholars Program	Fellowship/ Scholarship
LERCIP - Lewis Educational Research Collaborative Internship Project (College)	Fellowship/ Scholarship
LTP - Learning Technologies Project	Engagement
MUST - Motivating Undergraduates in Science and Technology	Fellowship/ Scholarship
NETS - NASA Education Technologies Services	Engagement
NSBRI Higher Education Activities - National Space Biomedical Research Institute	Fellowship/ Scholarship
Research Cluster	None
SEED - Systems Engineering Educational Discovery	Engagement
Existing Programs Maintained (Not Consolidated)	
GLOBE Program	Engagement
Space Grant - National Space Grant College and Fellowship Program	Engagement
Space Technology Research Fellowships	Fellowship/ Scholarship
MUREP (4 STEM programs in FY 2012 Inventory: MUREP Small Projects, NASA Science and Technology Institute for Minority Institutions, NASA Tribal College and University Project, University Research Centers)	Minority Serving Institutions
New Programs	
STEM Education & Accountability Project*	
*NASA's STEM Education & Accountability Project will take on a new structure to ensure the continuation of the most effective functions of its engagement and STEM instruction activities.	
National Science Foundation	
Internal Consolidations/Eliminations (Funding Remains within the Agency)	
Climate Change Education (CCE)	Undergraduate Education
Computing Education for the 21st Century (CE21)	Undergraduate Education
Cyberinfrastructure Training, Education, Advancement, and Mentoring for Our 21st Century Workforce (CI-TEAM)	STEM Instruction
Engineering Education (EE)	Undergraduate Education
Geoscience Education	Undergraduate Education
Geoscience Teacher Training (GEO-Teach)	Undergraduate Education
Global Learning and Observations to Benefit the Environment (GLOBE)	Engagement
Graduate Teaching Fellows in K-12 Education (GK-12)	STEM Instruction
Integrative Graduate Education and Research Traineeship (IGERT) Program	Fellowship/ Scholarship
Math and Science Partnership (MSP)	STEM Instruction
Nanotechnology Undergraduate Education in Engineering	Undergraduate Education
Opportunities for Enhancing Diversity in the Geosciences	Undergraduate Education
Research in Disabilities Education (RDE)	Fellowship/ Scholarship
Research on Gender in Science and Engineering (GSE)	Engagement
Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP)	Undergraduate Education
Transforming Undergraduate Biology Education (TUBE)	Engagement
Transforming Undergrad Education in STEM (TUES)	Undergraduate Education
Widening Implementation and Demonstration of Evidence-based Reforms (WIDER)	Undergraduate Education
Existing Programs Maintained (Not Consolidated)	
Advanced Informal STEM Learning (AISL), formerly Informal Science Education (ISE)	Engagement

Program	Program Type
Advanced Technological Education (ATE)	STEM Instruction
Alliances for Graduate Education and the Professoriate (AGEP)	Fellowship/ Scholarship
Centers for Ocean Sciences Education Excellence	STEM Instruction
Discovery Research K-12 (DR-K12)	STEM Instruction
East Asia & Pacific Summer Institutes for U.S. Graduate Students (EAPSI)	Fellowship/ Scholarship
Enhancing the Mathematical Sciences Workforce in the 21st Century (EMSW21)	Fellowship/ Scholarship
Excellence Awards in Science and Engineering (EASE)	STEM Instruction
Federal Cyber Service: Scholarship for Service (SFS)	Fellowship/ Scholarship
Graduate Research Fellowship Program (GRFP)	Fellowship/ Scholarship
Historically Black Colleges and Universities Undergraduate Program (HBCU-UP)	Minority Serving Institutions
Innovative Technology Experiences for Students and Teachers (ITEST)	STEM Instruction
International Research Experiences for Students (IRES)	Engagement
Louis Stokes Alliances for Minority Participation (LSAMP)	Fellowship/ Scholarship
NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM)	Fellowship/ Scholarship
Research Experiences for Teachers (RET) in Engineering and Computer Science	STEM Instruction
Research Experiences for Undergraduates (REU)	None
Research on Education and Learning (REAL), formerly Research and Evaluation on Education in Science and Engineering (REESE)	STEM Instruction
Robert Noyce Scholarship (Noyce) Program	STEM Instruction
Tribal Colleges and Universities Program (TCUP)	Minority Serving Institutions
New Programs	
Catalyzing Advances in Undergraduate STEM Education (CAUSE)	Undergraduate Education
STEM-C Partnerships	STEM Instruction
NSF Research Traineeships (NRT)	None
Nuclear Regulatory Commission	
Consolidations (Funding Redirected Outside of Agency)	
Integrated University Program*	Fellowship/ Scholarship
Nuclear Education Curriculum Development Program*	Undergraduate Education
Existing Programs Maintained (Not Consolidated)	
Minority Serving Institutions Program (MSIP)	Minority Serving Institutions
*Funding was retained at the agency due to the nature of the program's funding mechanism (it is largely funded through a fee). Once 2014 funding is final, funds would be transferred to NSF through a mechanism to be determined for undergraduate and graduate programs.	
Smithsonian Institution	
New Programs	
STEM Informal Education and Instruction	Engagement
Transportation	
Existing Programs Maintained (Not Consolidated)	
Air Transportation Centers of Excellence	None
Dwight David Eisenhower Transportation Fellowship Program	Fellowship/ Scholarship
Garrett A. Morgan Technology and Transportation Education Program	Engagement
National Summer Transportation Institute Program (STI)	Engagement
Summer Transportation Institute Program for Diverse Groups (STIPDG)	Engagement
University Transportation Centers Program	None

Program	Program Type
Agency Summary	N
Consolidations (Funding Redirected Outside of Agency)	78
Agriculture	6
Commerce	6
Defense	6
Energy	8
Environmental Protection Agency	2
Health and Human Services	10
Homeland Security	1
National Aeronautics and Space Administration	37
Nuclear Regulatory Commission	2
Internal Consolidations (Funding Remains with the Agency)	48
Agriculture	2
Commerce	5
Education	2
Environmental Protection Agency	2
Health and Human Services	2
National Aeronautics and Space Administration	17
National Science Foundation	18
Existing Programs Maintained (Not Consolidated) and New Programs	110
Agriculture	9
Commerce	4
Defense	10
Education	13
Energy	12
Environmental Protection Agency	3
Health and Human Services	14
Homeland Security	2
Interior	4
National Aeronautics and Space Administration	8
National Science Foundation	23
Nuclear Regulatory Commission	1
Smithsonian	1
Transportation	6

SUBMITTED LETTER TO CORRECT STATEMENTS IN THE RECORD
BY THE HONORABLE JOHN HOLDREN



EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20502

John P. Holdren, Director

June 7, 2013

The Honorable Eric Swalwell
501 Cannon House Office Building
Washington, DC 20515

Dear Congressman Swalwell:

I write to correct a misimpression I conveyed—in Tuesday's hearing on STEM education before the House Committee on Science, Space, and Technology—in response to your question about the locus of programs linking community-college curricula to the employment needs of businesses in the regions these colleges serve.

I stated that the Administration has been advancing such programs under the rubric of the Educate to Innovate Initiative, but that was incorrect. On checking into the matter, I have learned that the programs in question are being pursued through the public-private partnership called Skills for America's Future (<http://www.aspeninstitute.org/policy-work/economic-opportunities/skills-for-americas-future>) and under the Department of Labor's Trade Adjustment Assistance Community College and Career Training Program (<http://www.doleta.gov/taacct/>).

I apologize for this error, while thanking you for your interest in this important matter. I am copying Chairman Smith and Ranking Member Johnson, and I ask that this correction be entered into the hearing record.

Sincerely,

A handwritten signature of John P. Holdren in black ink, written in a cursive style.

cc: Honorable Lamar Smith
Honorable Eddie Bernice Johnson

