

BUILDING ENGINEERING AND SCIENCE TALENT
Blue Ribbon Panels
Interim Progress Report to Congress

September 26, 2002

The meeting was held at 8:15 a.m. in the Cannon Caucus Room, 345 Cannon House Office Building, Washington, D.C., Representatives Connie Morella and Eddie Bernice Johnson, BEST National Leadership Council Co-Chairs, presiding.

PRESENT

CONSTANCE A. MORELLA, (R-MD) National Leadership Council Co-Chair

EDDIE BERNICE JOHNSON, (D-TX) National Leadership Council Co-Chair

ALLAN ALSON, superintendent, Evanston Township High School *(page 33)*

DAN ARVIZU, senior vice president, CH2M Hill *(page 21)*

EARNESTINE R. BAKER, Meyerhoff Program, UMBC *(page 17)*

ALFRED BERKELEY, vice chair, NASDAQ Stock Market, Inc. *(page 8)*

RITA COLWELL, director, National Science Foundation *(page 6)*

CINDA-SUE DAVIS, director, WISE, University of Michigan *(page 16)*

MARYE ANNE FOX, chancellor, North Carolina State University *(page 12)*

EUGENE GARCIA, professor, Arizona State University *(page 32)*

SHIRLEY MALCOM, head, Education Directorate,
American Association for the Advancement of Science *(page 30)*

WILLIE PEARSON, JR., professor, Georgia Institute of Technology *(page 10)*

ANNE PETERSEN, senior program director, W.K. Kellogg Foundation *(page 35)*

PAULA RAYMAN, professor, University of Massachusetts *(page 23)*

CLAIBOURNE SMITH, president, Delaware Foundation
for Science and Math Education *(page 25)*

RICHARD TAPIA, professor, Rice University *(page 14)*

DEBORAH WINCE-SMITH, president, Council on Competitiveness *(page 37)*

***also* PRESENT**

JOHN YOCHELSON, BEST

TESTIMONY READ INTO RECORD

SHIRLEY ANN JACKSON, president, Rensselaer Polytechnic Institute *(page 4)*

PROCEEDINGS

MORELLA: Good morning. Hi folks. Thank you for assembling with such enthusiasm this morning after the event last evening. I want to welcome you very earnestly to the first progress report of Building Engineering and Science Talent, BEST. BEST is best.

Those of you who were with us last evening recall that I mentioned that this month is the two-year anniversary of the report that came out called "The Land of Plenty." This was a report of the Congressional Commission on Advancement of Women, Minorities, and Persons with Disabilities in Science Engineering and Technology Development.

It is legislation that I introduced a number of years ago, and like so much of what we know, you have to be tenacious and diligent and patient and persevere. The legislation established a commission that you know full well, it looked comprehensively at the challenge of under-representation in America's science and engineering workforce and the educational pathway that feeds into it.

The commission called for the establishment of a public/private partnership to take America into acting to redress the stunning imbalance in America's technical talent pool. Women, African-Americans, Hispanics, Native Americans, persons with disabilities make up two-thirds of our workforce but they hold only one-fourth of the jobs in science, engineering, and technology.

We perceive this really as a vulnerability that threatens the living standards of all Americans. BEST is the partnership recommended by the congressional commission.

It was established with the support of the Council on Competitiveness and was awarded \$2 million in seed funding from a coalition of federal agencies led by the National Science Foundation, Rita Colwell. We're so very proud of the lead that they took in it and also the Council of Competitiveness' perseverance and leadership.

I have the privilege of co-chairing BEST's Advisory National Leadership Council with my colleague who will be joining us later, Congresswoman Eddie Bernice Johnson, and we are joined on the leadership council by our colleague, and if you were there last night you heard from him also, Congressman Ruben Hinojosa, and we have outstanding leaders from industry, academe, and federal agencies.

BEST has a national mandate but it is based in a community that is at the cutting edge of meeting the diversity challenge, San Diego, California. Oversight is provided by a distinguished board of private sector leaders and many of them are with us here today, and the staff is led by John Yochelson who stepped down from the Council on Competitiveness to take on this challenge and John has worked hand-in-hand with Dr. Wanda Ward, whom I know is here, of the National Science Foundation and she serves as BEST's chief advisor and they've made an extraordinary team.

Since incorporating one year ago, BEST has assembled an extraordinary array of talent, talent to assess what's working across the whole continuum of workforce development, Pre K-12, higher education in the workforce.

These panels will report their findings and recommendations next spring. The benchmarks they identify and the insights they develop into what works, why it works, under what conditions it works, is going to be of very great interest to Congress and to the nation.

BEST's national assessment will provide a foundation for action both at the national level as well as in communities across the country. Now the purpose of today's progress report is to let policymakers know how the work of BEST is going; and first, we're going to get a perspective on the framing of a national action agenda to meet the challenge of under-representations, and then we're going to hear from leaders involved in BEST's assessments of the workplace, higher education and Pre K-12.

The progress report will wrap up with a discussion of BEST's plans to spur action in the field through community engagement. I want you to know how very impressed I am and excited I am about what is happening today because this is the first major step of showing how BEST is functioning so quickly, so well with most distinguished people, I think in the nation and working in those three different areas.

So, to have this initial report of the promise of what is to come and then to get your continued cooperation and input I think is very critical to the progress that we hope to achieve. I have the honor of chairing this segment and Eddie Bernice Johnson will lead the workforce discussion and then I'll return to moderate the other segments.

On this panel, we're going to hear from one of the members of BEST's executive committee, Mr. Alfred Berkeley, everybody knows. He's the vice chairman of NASDAQ, and then he will be joined by Dr. Rita Colwell, the director of the National Science Foundation who, as I said, provided indispensable leadership in the launching of BEST.

As you know, Dr. Jackson, who was with us last night, Shirley Jackson, who chairs the BEST higher education panel, has contributed a compelling position paper. That's the position paper, "The Quiet Crisis" and she could not be here. She had to go to meet with her trustees and receive an endowment and certainly as a college president you know how important that is.

Now this particular segment is going to end at 9:15, which is why I'm trying to rush through this, the contingency plan. Now, we don't need a contingency plan because we're going to complete it by 9:15. We have an extraordinary lineup to get a perspective on BEST's work on higher education, and in that category the lead-off speaker is going to be Dr. William Pearson of Georgia Tech University who's teamed with Shirley Jackson as an expert panel leader on the Blue Ribbon Panel on Higher Education.

Dr. Pearson is one of the country's most distinguished scholars on the issues that surround diversity in science and he has an exceptional background on policy issues as well as via service at the Office of Technology Assessment, and his chairmanship of NSF's advisory panel on diversity. I know I'm jumping ahead and I'm going to get back to our panel, but would Dr. Pearson stand up. Great, thank you, look forward to hearing you later.

Dr. Pearson will be followed by Chancellor Marye Anne Fox of North Carolina State University. She is internationally known as a research chemist and heads the top research university and serves of President Bush's Council on Advisors on science and technology, is a member of BEST's board, and we look forward to hearing from her later too. Thank you very much Chancellor Fox.

And then she will be followed by Richard Tapia, Professor of Mathematics at Rice University, a member of the National Science Board and co-chair of BEST's Research Council. Dr. Tapia has received presidential recognition for his record of achievement of developing the talent of students from under-represented groups into top Ph.D. mathematics.

We will then hear about two exemplars n BEST's panel on higher education that has been identified. The Meyerhoff Program did Mr. Tapia stand? Thank you very much, good. And then we'll hear from two exemplars at BEST's panel on higher education as identified the Meyerhoff Program at the University of Maryland in Baltimore, and the Women in Science and Engineering Program at the University of Michigan.

Dr. Earnestine Baker and Dr. Cinda-Sue Davis will provide insights into the factors that have enabled these programs to become national standards. Will they stand also? Great, thank you very much.

And so, therefore, you've now heard the introductions to two panels and we're going to get back to the first one, and I did not introduce a very special person that's Dr. Anne Petersen. We're going to hear from her first. She is the Senior Vice President for Programs at the Kellogg Foundation and another of BEST's illustrious board members. Petersen is a nationally recognized scholar who has also served in key positions including Deputy Director of the National Science Foundation.

And so now, we can commence with our first panel and Dr. Petersen you are the first up. Thank you.

*Testimony of Shirley Ann Jackson, president, Rensselaer Polytechnic Institute
as read in her absence by Anne Petersen, senior vice president, The Kellogg Foundation*

PETERSEN: Thank you. It's a great privilege this morning to be stepping in for Dr. Shirley Ann Jackson. When Dr. Jackson was chair of the U.S. Nuclear Regulatory Commission, she instituted policies for that agency that were based on the assessment of risk to the nation's nuclear power plants and vulnerability to that risk. The process is termed probabilistic risk assessment.

Looking squarely at the vulnerability to risk determines clearly what action must be taken to reduce the risk of a particular threat. This is what BEST is doing. The work that BEST has done this past year has revealed that the United States faces serious risk of losing its economic preeminence, security, and its well-being as a nation without peer.

That risk is embedded in the fact that while there is a growing need for scientists, engineers and other technologically skilled workers, the United States is simply not producing enough of them. That leaves the United States reliant upon scientists and engineers from other nations, a situation that bears its own inherent risks and curtailments as we know.

Most of the numbers are included in the BEST paper, "The Quiet Crisis" which we present to you today, and I understand you have the series of charts as well.

MORELLA: Raise your hand if you need you can't hear. We can try to get some microphones to you. Good, they're all set.

PETERSEN: Apparently, I didn't have the microphone low enough so I apologize to people if they couldn't hear the first part. I'll summarize only a few numbers and show only a few slides because however you present the data, the result is the same. The United States is not producing enough scientists and engineers.

One-quarter of the current science and engineering workforce, whose research and innovation generated the economic boom in the 1990s, is more than 50 years old and will retire by the end of this decade. For two decades, the U.S. college age population declined by more than 21 percent, from 21.6 million in 1980 to 17 million in 2004.

Graduate and undergraduate student populations in engineering and physical sciences, despite the recent up tick remain below levels of the early 1990s and this slide shows that trend. This trend is mirrored for undergraduate and graduate degrees granted to American students in these disciplines. The only positive long-term trajectories are in the life sciences, that top line; and yet, mathematics, physics, chemistry, computer sciences and engineering will be decisive in the war against terrorism and in the maintenance of our economic prosperity.

If we look at the demographics in the next slide, we know that women, ethnic minorities, and persons with disabilities now comprise two-thirds of the population of the United States as MORELLA mentioned earlier. Women make up about 35 percent of the overall workforce and African-Americans, Hispanics, and Native Americans, and persons with disabilities together make up 24 percent of the workforce.

This is the new majority. This too is graphically illustrated on the slide here, and I draw your attention especially to the bottom row that shows the percent of increase and decrease. This is projecting it forward now to 2050 and you can see the very dramatic changes in the population.

Women comprise no more than 15 percent of the science and engineering workforce, while ethnic minorities and persons with disabilities make up only seven percent of this pivotal workforce. Yet interestingly, women are the new majority in higher education and we know that they're not choosing science, mathematics, or engineering, or the technology disciplines.

The question is who will do science in America in the new millennium? If this nation could comfortably do without its scientists and engineers, this question need not concern us, but the U.S. Department of Labor projects that by 2008, jobs requiring technical degrees are projected to grow at three times the rate of occupations in general. An estimated six million jobs are projected for technically trained workers between now and 2008.

The United States has the talent it needs. It is inherent in these new demographics, but the United States is going to have to find a way to access this talent. This will require a new mind set, new initiatives, new practices, and most of all national will. This topic has moved into the realm of a national imperative.

Many have worked on the challenge of under-representation of the new majority in science and engineering but the issue has failed to capture the full attention of national leaders or to energize the American public and isolated efforts have not been focused sufficiently to make a difference.

This is what is required now as our country faces stiff economic conditions from competition from rising nations across the globe, as well as threats to national security from inside and outside our borders.

BEST, Building Engineering and Science Talent, has spent the past year putting together an agenda for action to address this quiet crisis in a coordinated, focused manner.

The responsibility for this agenda rests with all key sectors, institutions of higher education, industry, non-profit organizations, and all levels of government. First and foremost, we need to develop a national strategy of what works to interest, excite, and engage young women and the under-represented minorities in pursuing the study of and degree completion in science, mathematics, technology, and engineering.

This is BEST's mission and congressional mandate. BEST is helping to overcome the quiet crisis in several areas. The BEST Blue Ribbon Panels are compiling a full report on best practices, what really works, to develop the talent of under-represented groups. BEST will take its knowledge and insights to communities so that they can engage the issue directly on their own terms.

At the same time, BEST will develop a national agenda to galvanize a coalition of leaders from government, industry, education, professional societies, and foundations, to build a stronger, more diverse pool of U.S. scientific and technological talent. For the moment, we can share our framework of recommendations as a starting point.

We see on the slide the priorities for the federal government. Priorities for the federal government should include maximizing the value of current programs. We know that various departments have commitments and programs to encourage under-represented groups but the efforts are scattered and would have greater impact if more closely aligned. Perhaps an interagency initiative could ensure better alignment and enhance results.

BEST would like to consider bold federal initiatives, such as those that have worked in the past during World War II, the Cold War, and the space race, initiatives such as the National Defense Education Act of 1958. Federal dollars should not stand alone but should be matched by the states and local communities.

Addressing this does not simply mean re-dividing the pie. We will need to increase the federal investment. Programs with proven track records should be expanded, such as Pell-like financial aid grants for under-represented students in science and engineering majors.

Priorities for education on the next slide are several. Universities need to strengthen their presence in Pre K-12 mathematics and science education. Effective models exist. As one example, students from low-income school districts, from grades 7 through 12 receive advanced instruction by university staff in algebra, chemistry, physics, and trigonometry through the academic year and more intensely in the summer, including a residential component, as well as mentoring and college financial planning seminars for them and for their parents years before they would go to college.

One simple effective step would be to slow the attrition of women and under-represented groups from colleges and universities and from science and engineering programs. The causes are understood. Models exist and college and university leadership can change the learning environment.

Lastly, higher education leaders must commit to expanding faculty diversity both in teaching and research. We have several priorities for industry. Just as universities need to strengthen their presence in the classroom, so does industry. This commitment should become the norm. Discipline-based teacher models enabling scientists and engineers to transition between industry and the classroom have great potential.

Industries that invest in university-based research should make it clear that diversity is a criterion that enhances the value of collaboration with industry. Although the business case for diversity is well understood and widely accepted, industry needs to create a culture of inclusiveness in the workplace which will require attention at the highest executive levels.

Priorities for non-profits on this slide, foundations, professional societies, and institutional advocates for under-represented groups can work together to project a more positive public image of science, engineering, and technology. More professional societies should make diversity a priority. Foundations that support school reform could make mathematics and science more prominent in their focus.

These are just a sampling of the comprehensive recommendations that BEST is considering. A full national agenda is in development. This is our framework for action. Thank you very much for your leadership, Congresswoman Morella and thank you for listening.

MORELLA: Thank you very much, Dr. Petersen. That was a great outline of the really critical issues with regard to education. I'd now like to call on Rita Colwell, the director of the National Science Foundation.

Testimony of Rita Colwell, director, National Science Foundation

COLWELL: Thank you. It is an honor to be part of today's panel on building the U.S. science, engineering, and technology workforce by fully developing the nation's diverse human resources. I thank you for the opportunity to speak about this issue, which has long been a concern of mine personally, as well in my capacity as director of NSF. I wish to acknowledge Congresswoman Connie Morella for her groundbreaking work on the Congressional Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology Development.

The Commission report of 2000, *Land of Plenty*, was a wakeup call. It reminded us that although we're making strides toward including everyone in the general workforce, we still have far to go in making the S&T workforce "look like America." The problem of too few women, minorities, and persons with disabilities in our science and engineering talent pool threatens the future of our nation. Shirley Jackson's new report, *The Quiet Crisis: Falling Short in Producing American Scientific and Technical Talent*, explores the interconnected economic, demographic, social, and scientific realities we must address.

The United States has become increasingly diverse in recent decades and will move steadily in the direction of greater diversity in the future. The Bureau of Labor Statistics projects, for the decade 1998 - 2008, that the general labor force growth rates of minorities will more than triple the overall growth rate.

But, we're not making comparable progress in changing the composition of the science and engineering workforce. It looks the same as it has for generations. We need the talent of every worker in order to keep our nation competitive and prosperous now and in the future. And in the post-9/11 world, we need to also focus more of our talent on homeland security. We live in a unique time in which every citizen must "count" for opportunities and must be "counted" for contributions to our society's well being. The well being of individuals and of the nation will depend on knowledge and skills in science, engineering, and technology. How well we prepare our human resource in these areas will determine how well we are prepared as a nation in this new century.

Our collective goal in BEST is to improve opportunities for those who have been locked out of careers in science and engineering – women, minorities, and persons with disabilities. This objective is specific to individuals and their personal goals. Meeting this need is also vital to our nation's safety and prosperity. Our society must encourage, educate, and enlist as many citizens as possible into the jobs and professions that drive the knowledge economy. These jobs will have to be filled by people trained in every aspect of science, engineering, and technology.

As we educate our diverse workforce, we need graduates in science and engineering and also to fill the millions of technical jobs that require only certification. No industry or institution can function today without such specialists. Our productivity, our rate of innovation, and our long-term economic momentum would be slowed or even stopped without the technical specialists who keep things moving fast. Contemporary society is increasingly rooted in and dependent on science and technology. We need many more scientists and engineers to continue our momentum. Our leaders AND our *general* workforce must be educated, trained, and capable to run this complex societal engine.

Our science and engineering workforce must grow at a faster rate. That growth will only come from expanding the pool of science and engineering talent – from our mostly untapped potential of underrepresented minorities and women. By developing this overlooked resource, America can maintain its competitive edge in the 21st century. By the year 2050, the Census Bureau projects, the terms minority and majority will be almost meaningless.

Our challenge is formidable, but one we can meet. The *general* workforce already reflects more gender equality, and racial and cultural diversity than ever before. We still have a long way to go but we are reaching out and cashing in on the talents and skills of many more of our citizens. Unfortunately, the science and engineering workforce does not show that same trend toward a more balanced representation. Science and engineering are the frontier of human progress. We must look to the nation's richness in diversity for our next generation of explorers.

We should do this for our citizens and for our country's future. Our future economic strength will come almost entirely from the technologies emerging from our laboratories today. Technology is the single most important determining factor in sustained economic growth, estimated to account for as much as half the nation's growth over the past 50 years. Yet we also know that the ratio of science and engineering degrees to the college-age population in European and Asian countries is higher than in the United States.

We know, from a recent Commerce Department report, that a projected 60 percent of the new jobs in 2020 will require skills possessed by only 22 percent of today's workers. That's a sobering prospect! We also

know from the Labor Department that new jobs requiring science, engineering, and technical training are projected to increase by 21 percent by 2008.

The accelerated pace of change has advanced our world more in the past century than in the previous hundred centuries. It took 10,000 years to get from the dawn of civilization to the airplane, but just 66 years to get from powered flight to the moon landing. The early 21st century will be an exciting time for leading-edge science and technology research and its translation to the marketplace in the form of new products, processes, and services.

At NSF we often speak of this research in the “shorthand” nano, info, and bio, for nano-science and technology, information technology, and the biological sciences including genomics. These three areas alone will revolutionize society over the next twenty years. And yet, as noted in *The Quiet Crisis*, the source of U.S. innovative capacity and technological ability is thinning. A quarter of today’s S&T workforce is more than 50 years old. Their research fueled the economic boom of the 1990s. But as they retire, will we be able to replace them?

We are not currently replacing our high-level scientific and technical talent in sufficient numbers. We must not continue to neglect this important training and education. To compete with other nations we will need a broad expansion of our science and engineering talent. Anything less means being left behind. The purpose of the BEST initiative is to make sure that will not happen. I look forward to working with the Congress and with my colleagues in industry, government, and in the research and teaching community to reach this important objective.

No one group or sector can do it alone. Collaboration will be an important component for success. I look forward to working with all of you. Thank you.

MORELLA: No under-represented person left behind, right, your slogan. Thank you. I hope Dr. Colwell, that you'll give us a copy of your statement also.

COLWELL: I'd be delighted to.

MORELLA: So we have it on record. Dr. Petersen, we have your wonderful charts and "The Quiet Crisis." Mr. Berkeley, we look forward to hearing from you and thanks for your work.

Testimony of Alfred Berkeley, vice-chairman, NASDAQ Stock Market, Inc.

MR. BERKELEY: Thank you, CHAIR MORELLA. I thank you for your persistence. I think persistence is a valuable, valuable attribute. We will not win this problem without staying focused and persistent.

You might ask what does the stock market have to do with the education business? I will tell you: a constant theme of my conversations with the chief executive officers of the largest technology companies in the country, both in information technology and biotech, is where are they going to get enough technically trained workers and that handful of brilliant scientists that make the difference in breakthroughs.

I think that this audience should know that the technology community has been shaken to its foundation by the loss of U.S. supremacy in supercomputing. Japan now has supercomputers 30 times more powerful than ours having followed a technology path that we abandoned about ten years ago.

This is an extraordinary example of what happens when you don't invest enough and when you don't build the talent to stay at the cutting edge. It's very difficult to overestimate how important supercomputers are in design, in seismic, in code-breaking, and in many of the most advanced genomic designs.

I use that specific example to reinforce Director Colwell's point that we will not have the talent we need unless we build the size of the talent pool, and unless we find effective ways to keep our smartest people focused and rewarded, and feeling socially successful for being scientists.

The path that we've taken so far is not working. It may be societal. It may be the way we're going about educating. BEST (Building Engineering and Science Talent) and the three panels that you're going to see later today are all following a common methodology. What we're doing right now is finding out what's out there.

We are essentially collecting as many promising approaches as possible, sorting through them to see which ones have a real research basis, which approaches have real research behind them to prove their effectiveness, and then promoting and propagating the best ones around the country.

I can tell you that the business community has been guilty of dabbling in education in a thousand small ways and is actively looking for someone like BEST to identify the things that actually work.

The great frustration in the business community is that many things are tried and none are proven, none are scaled. What we can do with this particular initiative is identify the things that actually do work, bring them to the attention of the Congress and the country, and take them out into the communities as John Yochelson is going to talk about later.

My goal this morning was to affirm to you that the business community is firmly interested in this endeavor and that we can bring substantial resources to bear on research-based solutions that are working and are proven to work. Thank you.

CHAIR MORELLA: Great, thank you. Mr. Berkeley.

MR. BERKELEY: Well, I think that the key for my participation is to take what we learn here back to the nearly 4,000 CEOs of the companies that make up the NASDAQ Stock Market and bring them and their energies to bear on solutions when we get to our final report next spring.

CHAIR MORELLA: Extremely important because you are going to be the recipients of the work that is done here too. Well then I thank you all very much for giving us a great start this morning and all the work that went up to making this a great start.

Panel Discussion on Under-representation in Science, Engineering and Technology Fields

MORELLA: Thank you, Mr. Berkeley. This first panel actually does reflect the concept of the need for the public sector, certainly the private sector, and of course academia in terms of coming to grips with the problem.

So, you've set a great landmark for where we are progressing and I think it's most critical that we look to the fact that if we want to be competitive, we're just going to have to take hold now, and there have been a lot of programs out there that you're looking at. What is going to work best is very appropriate for our acronym here.

So, I want to thank you all. I know there's going to be another panel later on Pre K-12 as well as of course higher education and workforce, but had you all looked at the Glenn Commission report which dealt with math and science teaching in our schools?

So much of what you commented on kind of dwelt with well yes, we should be building on all of these things that have been looked at, and I find it interesting, Petersen, that women have been getting these degrees in tremendous numbers and so, that's been happening. But now, we're doing pretty well at the time.

Since we do have time, in fact, I'd give you even another five minutes since I spent a little longer than I had planned to by introducing the next panel. If anybody in the audience would like to ask a question or make a comment, this would be a great opportunity to do it. I think they've laid out the base for the rest of the initial reports, preliminary reports.

Now you know as somebody who used to teach, if nobody had a question, you either thought they all grasped it magnificently or else did I leave something out and they don't quite absorb it? Would any of you like to make any final comments?

COLWELL: I'd only say that it's really reassuring that there has been the tremendous support demonstrated last night by key members of Congress and by the community, especially those who have contributed to the panels that are being represented today and the work that John Yochelson and Wanda Ward have done to bring all this together.

I really feel very harkened that the future looks good, that there are things we can do. We at NSF, obviously, are looking at our programs in a way that we can make them more effective and more efficient. So, I think the future augurs well. Thank you for your support and your leadership.

MORELLA: We're going to give information, a synopsis of today. Maybe "The Quiet Crisis" with the preliminary sheet to all members of the Science Committee, as well as to the chair of the Hispanic Caucus. We'll get Ruben to distribute it, and Eddie Bernice Johnson to the Black Caucus also, and then I am the co-chair of a new Bipartisan Disabilities Caucus and will make sure that we distribute it to them. That's the start.

Eventually we want all of Congress, you know, to get a lot of the details so they can use it back in their communities showing awareness of it, promote partnerships. Dr. Petersen, did you have any final comments you wanted to make?

PETERSEN: Thank you very much for your interest in leading this effort. I think it's extremely important that we all come together now for action. We know what to do and we now need to put it into place.

MORELLA: Great, thank you. Mr. Berkeley.

BERKELEY: Well, I again think that the key for my participation is to take what we learn here back to the 4,000 CEOs of the companies that make up the NASDAQ Stock Market and bring them and their energies to bear on solutions when we get to our final report next spring.

MORELLA: Extremely important because you are going to be the recipients of the work that is done here too. Well then I thank you all very much for giving us a great start this morning and all the work that went up to making this a great start.

“What’s Working in Higher Education” Panel

Testimony of Willie Pearson, Jr., Georgia Institute of Technology

CHAIR MORELLA: Now, I'm going to jump ahead and it just seems to me that since I already introduced Dr. Pearson, Dr. Fox, Professor Tapia, that maybe we should jump to that panel, what's working in higher education, if that's acceptable with everybody. Good. Eddie Bernice Johnson was actually going to chair the next panel, but since she's not here and I can be here a little bit longer, I am honored to do so.

I mentioned that Dr. Pearson is from Georgia Tech University, very distinguished scholar, and Chancellor Fox internationally known research chemist and heads a top research university, and Professor Tapia, I hope I pronounced that name right, did I? Tapia.

PROFESSOR TAPIA: Yes.

MORELLA: Professor Tapia, Professor of Math at Rice University, and then Earnestine Baker I had mentioned earlier from the great state of Maryland, Meyerhoff Scholarship Program, and Cinda-Sue Davis of Women in Science Engineering at the University of Michigan. So, perhaps we'll start off then with Dr. Pearson.

PEARSON: Yes, good morning, Madam Chairwoman. First, I'd like to acknowledge some of the contributions of various members who have helped the panel. First of all, it has been my privilege and honor to work with Dr. Shirley Jackson. Her leadership and vision are absolutely brilliant.

John Yochelson's leadership has been instrumental in bringing a systemic approach to the challenges facing BEST. Much of the panel's progress to date can be attributed directly to Dr. Wanda Ward's tireless efforts. She has contributed countless hours advising the panel's leadership and managing much of the daily operations of the panel.

I'm also grateful to the small but dedicated group of individuals from diverse employment sectors that have served as integrators. These individuals function as critical advisors and bridges to the three panels. Members of the panels have distinguished themselves in academe, industry, government, and non profits. Their collective experiences and expertise have been indispensable to the panel. Finally, the panel is fortunate to have been supported by the small, dynamic staff at BEST.

Now I will briefly discuss the objectives of the higher education panel. First, we wanted to have a comprehensive examination of the challenge of increasing both the quantity and quality of university graduates from under-represented groups in science, engineering and technology.

The second goal was to identify and critically analyze exemplars whose design principles merit adaptation and replication across the country. The third was to further develop policy recommendations discussed in "The Quiet Crisis" paper.

Because higher education provides a strategic bridge between Pre K-12 and the workplace, the panel has focused on measurable outcomes reinforced by the earlier discussions. Figure 1 shows the criticality of the issues discussed yesterday by you and your colleagues and this morning by the previous panel.

As you can see, at each segment beyond the high school level the science and engineering talent gets smaller and smaller for the whole population in particular but especially for African Americans, Hispanics, and Native Americans. Although not shown on this slide, the trend is very similar for those with disabilities. It underscores Al Berkeley's point about the need to develop this talent, particularly at the advanced degree levels.

One of the things the panel focused on was the identification of exemplars as previously mentioned. We wanted to have a more effective way of identifying best practices. The panel has systematically utilized a small subgroup of experienced, nationally recognized evaluators across various workplace sectors to identify exemplary programs at various points along the higher education continuum.

We've also noted some policy recommendations. The panel engaged in a productive discussion of what needs to be done to increase both the quantity and quality at varying points along the higher education continuum. While we have not finalized these recommendations, three things seem to have emerged.

One thing is the need for government and industry to provide incentives to encourage universities to do more. The second is the indispensable role of committed leadership to drive change; and the third is the importance of community engagement to extend best practices in higher education.

Now we'll turn to some of the other speakers. It is helpful for members of Congress to hear from a national leader in higher education on what needs to be done. There is no better qualified person than Chancellor Marye Anne Fox from North Carolina State University. She is a distinguished scientist and a leading authority on science and technology policy in this country. Chancellor Fox will be followed by Professor Richard Tapia of Rice University. Professor Tapia is an imminent mathematician and recognized as a highly successful mentor.

Professor Tapia will be followed by Ms. Earnestine Baker of the Meyerhoff Program and Dr. Cinda-Sue Davis of the WISE Program. I now turn to Chancellor Fox.

Testimony of Marye Anne Fox, chancellor, North Carolina State University

FOX: Thank you, Dr. Pearson. Congresswoman Morella, thank you so much for your personal support for these activities and for the leadership you've shown on the science committee and with your fellow colleagues. It's a very, very important issue.

You know it's been over 50 years in which there's been an explicit compact between the research universities and the government of the United States that research universities would provide leadership in developing a workforce that is appropriate for the economic growth of this nation.

That is research universities have pledge to create knowledge, to provide innovative leaders for developing the frontiers of science, for leading economic recovery and for providing a workforce that can sustain and create jobs and wealth for the United States.

But over those 50 years, we've not had full participation as we've heard in the earlier discussions. If we go to K-12 to look at the roots for this difference in participation level, we're well aware of the digital divide which is a challenge. But to think of the digital divide as something that is related only to computer availability minimizes the real problem.

We need to have lab experiences at an early stage taught by competent researchers and teachers. We need to improve the learning environment in our schools, and we need to face that fact that a series of teachers who are poorly trained, both in the content as well as in the pedagogical methods, is going to essentially doom a student to failure and will certainly not give the aspiration and the confidence necessary to proceed in this kind of endeavor.

We also know that as we move to the undergraduate time and ask what needs to be accomplished to encourage those from these under-represented groups to stay in science and engineering, many of our students, of course, come to universities thinking they will major in these areas.

We recognize that the science standards that the National Academy of Science has suggested for K-12 education and the pedagogical techniques that would embrace them have not been extended to the undergraduate experience, and as a result, a kind of loss from the pipeline that Dr. Pearson just described occurs again and again and again.

We also know from educational research that there are well developed techniques which can encourage the success and the perseverance of students in science and engineering education and prominent among them are active participation in undergraduate research in a mentored program with graduate students, post doctoral fellows and research faculty to encourage them to participate in the discovery and the joy that is associated with real science and engineering.

We need models for success. We need to have people on the faculty who show very clearly what one can do in one's career to develop the administrative leadership in our research universities so that this pledge to the American people can be spelled out again and again.

So, as we look at the challenges that confront us in K-12, undergraduate, graduate education, I would recommend a number of things that we could increasingly focus upon. Industry, in particular, has been an effective partner in driving the research agenda in the United States.

Over the last two decades, the distribution of support for our R&D portfolio nationally has shifted from two-to-one federal to two-to-one industry, and it's only if we get industrial support in collaboration with federal support that we will be able to go forward together.

The corporate presence has been important as well, not only in providing financial support but also in fostering a culture of inclusiveness. Industry demands diversity because of just the reasons that we heard. We need to have a workforce that can provide the brilliant advances that will drive the economic recovery and growth. We need to create a culture of success in that participation and partnership and we need to do that by having industry participate in the instruction and in the oversight of our educational experiences.

So, I would suggest a number of things that specifically can be done. Given that we need a strong cadre of teachers who are competent and can provide educational leadership in K-12, I would suggest that we be able to provide support, that is tuition support, for anyone who is willing to pursue a career in defined fields in which there's a shortage of teachers in this nation.

That would be both at the undergraduate level and for those who wish to pursue lateral entry. Those costs could be borne as an expense from K-12 operations within a state or they could be in a scholarship in which there's a payback if the student doesn't stay in these particular fields.

I believe there's a need for scholarships in particular fields, both at the undergraduate and the graduate level and providing such scholarships would ensure that Americans would be limited only by their talent, not by the infrastructure support that is necessary for them to succeed in higher education.

I believe it would be useful if all research grants sponsored by the federal government could have a supplement that would encourage undergraduate research participation because in that way, according to educational research, we can both motivate and advance the frontiers of science.

I would suggest as well that tuition support be available for teachers as in-service learning because we know that science and technology don't stand still and they do not cease when a teacher leaves a university. That could be coupled with state supported incentives and it could be implemented by developing a national strategy for broadband Internet accessibility for this additional training.

I would suggest as well that in order to provide role models for our universities that if a competitive program were available for startup costs for under-represented groups who would participate on our faculties, that this would provide a major incentive for universities to do the right thing, to look broadly for those who are competent and are coming out of our tremendous graduate programs to put women and minorities into positions of leadership and faculty participation.

And finally, I believe that the federal government could encourage industry participation and partnership by encouraging industry to provide the full costs of research, that is to provide full and direct costs at the same level the federal government does, but in response ask the industries to demand performance, to verify that performance by critiques and critical assessments of progress that universities are making; and to do so, to make permanent the research tax credit, which would allow industries to participate actively in these ways.

I think by providing these additional means of support, things that are very parallel to what are now offered by some federal programs, we could address on a research basis the ingredients that are necessary for our students to succeed, for us to develop a workforce, and for us to recover quickly from this economic downturn. Thank you for letting me speak with you today.

MORELLA: Thank you, Chancellor Fox. Now, Mr. Tapia.

Testimony of Richard Tapia, professor, Rice University

TAPIA: Thank you. My topic is university program leadership, producing women and under-represented minorities in science and engineering programs at research universities. I've been very successful at Rice in the mathematical sciences. I thank you for the opportunity to share my life, to share my love, and to share some things that I have learned.

I'll start with Point 1, everything i.e. success or failure depends on leadership, strong, forceful, respected, effective leadership. The second point, administration from top to bottom must support the activity. This is absolutely necessary to promote buy-in at the faculty level. If the administration doesn't support, then the faculty has a way out, extremely important to have the administration support but they don't do the activity, they support it.

Success in promoting under-represented minorities and women in science, engineering and mathematics, requires a champion. The champion must be a respected member of the faculty. The champion will serve as an advocate. I serve as much as an advocate as I do mentor. The faculty champion should serve as advocate and mentor for students.

This is what I do on a daily basis. When a student gets into a situation, needs an advocate, needs to be represented either to another faculty member or two departments, I am there for them. It's difficult for this leadership to be given by a staff member or a non-faculty member of the administration. Faculty will say to this individual, you don't really know what it's like. You haven't been there.

The person who is the advocate and essentially the leader can say I have been there, in fact I've been there at all aspects of the game. The lead individual should be a woman or minority but doesn't have to be so. Many people have succeeded who were not under-represented minorities or women.

Positions of national leadership are produced in major research universities. If we want to produce minority leaders, then we must have minorities represented in these universities. This is essentially the message of Bowen and Bok in their book, "The Shape of the River."

We can't continue to have a two-tier or fragment our system. Minority-serving institutions do good jobs. They can be very, very good feeder schools and they do a very good job of mentoring and instilling love and passion but they can't do the entire job. They do a good job.

Ph.D. producing at minority-serving institutions will not produce the scientific leaders of the community or the professional organizations. The outreach activity is not rewarded at research universities. Often this activity will jeopardize the university career of a young faculty member.

We need a reform of the reward system. The reward system right now is very traditional, has not changed in years, and yet we're trying to change a system to take care of deficiencies that have been there. My recommendation, it is very important to reward individuals at the national level.

The Presidential Mentoring Awards, NSF Awards, these things are important. They're important not because we do these for recognition and reward but they add credibility to the activity. Every time I win an award, the president comes back and says, wow this must be something that is really of great value. It adds credibility. The first awarding of the Presidential Mentoring Award, it facilitated my life. It made my things much, much easier.

A couple other issues, so definitely reform of the reward system at universities has to be seriously looked at, and I ask government, national organizations to continue to add to the reward system.

On a personal note, I'm very concerned with the fact that diversity not mask under-representation. They are different issues. We can have an extremely diverse group and deal with extreme diversity as we are today in the hiring of university faculty, but it doesn't address those members of under-represented groups. It addresses more people who come from offshore. That's very diverse and I believe in it, but it doesn't address under-representation as I know it.

We must be careful of saying we solved the problems when we have foreign Hispanics versus domestic-raised Hispanics, an individual who comes from another country, gets a Ph.D. here and stays on the faculty. This individual does not understand the problems of the barrios, of the cities, does not understand the extra baggage that we as United States' raised minorities must carry and must deal with.

An acid test that I ask foreign-born Hispanics is to view the movie "Stand and Deliver" and tell me what it's about, and if they say I don't know what it's about, then I say you can't help. If you say I understand it completely, you can help. In Houston, Texas every K-12 teacher is required to view "Stand and Deliver" and articulate its message.

You do not have to be a woman or minority to help. We need help from all. Retention is a critical issue. A non-supportive environment drives away women and minorities from science, engineering, mathematics at good universities. They migrate towards other majors.

We are losing the precious few that went through the system, the precious few who got through high school and went into these careers and then we drive them away. What a sin it is to lose a precious few and we also have to, of course, consider the ones that never got there, but to lose the ones that got to that point is perhaps a harsher sin than to not get the ones that could have been there.

The ones who are true to their career and probably would have a chance, why do we lose them? We lose them because an environment that is not friendly, environments that are not nurturing and supportive. The problem is biggest at the undergraduate level, second largest at the graduate level, faculty third. That's because of numbers, the sheer numbers game, not because of difficulty, the sheer numbers game.

Above all, we must give encouragement and guidance and practice tough love at all levels. We have to be proactive. We must nurture and mentor. Students must hear positive things from respected faculty, not just from the mothers. The faculty has to come in and say here is a success. You have been successful. Without that type of encouragement, we can't make it.

I deal with professional and personal issues on a daily basis and I deal with whatever else is left over. Thank you for this opportunity.

MORELLA: Thank you, Mr. Tapia. You really made us think about some of the elements you brought out and it's like Robert Frost with all of you. Robert Frost said when he defined a poem, you know it begins in delight and ends in wisdom, and at the end it tells me something I didn't know I knew. You know, you're kind of like not affirming, yes of course. I'm very pleased to have you with us, Ms. Davis, thank you.

*Testimony of Cinda-Sue Davis, director, Women in Science and Engineering
University of Michigan*

DAVIS: Good morning. The University of Michigan Women in Science and Engineering Residence Program, called the WISE-RP, is a living-learning community for 120 first year women and 33 sophomore or junior level women interested in science, mathematics, and engineering. The primary purpose of the WISE-RP is to provide academic and personal support to undergraduate women, including historically underrepresented minority women, by providing an academically and socially supportive community. The program is designed to enhance students' success in the classroom, assist them in finding friends and a niche on campus, and connect them with opportunities to explore their academic, career, and personal interests. The ultimate intent, of course, is to facilitate the retention of women in academic fields where in large part they still remain under-represented.

WISE-RP provides contiguous living arrangements in a mid-size coed residence hall of 500 students. The program offers participants formal and informal study groups; workshops on a number of academic- or career-oriented issues; reserved sections of first-year classes; and peer support, role models, and knowledge to negotiate the complex academic environment of a large research university. Most of all, WISE-RP women have an instant community with members who fully appreciate the demands and rigors of a science, mathematics, or engineering education. As one woman student told me, "If I want to study calculus on a Friday night, no one makes fun of me. If I want to party, I can go down a floor. It's my choice and everyone understands."

The WISE-RP was initially funded by a \$208,383 three-year grant from the Fund to Improve Post-Secondary Education from the Department of Education. The University Housing Division, College of Engineering, and Office of the Vice-President for Research now fund it, with an annual budget of \$80,000.

A 1995 National Science Foundation RAIRE grant provided funds for an extensive evaluation of the WISE-RP. There have been a number of interesting findings indicating that this program works in the way we designed it. For example, the WISE-RP has a very strong influence on the retention of science majors. Seventy-four percent of first year women who start off in our program actually graduate with a degree in science or mathematics compared to 49% of a matched female control group and 40% of a matched male control group.

Although many students in the science sample change from their original intended major, WISE-RP students are significantly more likely to switch to another science major compared to male and female controls. We also have some very recent data suggesting that the strong academic environment provided by the WISE-RP program staff is a significant positive predictor of women's academic confidence. This is very important since national research shows that lack of confidence is a major contributor for women leaving science or engineering.

The WISE-RP positively affects academic confidence, academic achievement, and retention in SEM fields. Our program and similar living-learning programs on other campuses may indeed be an important strategy to significantly increase the number of women in these fields. However, further research is needed to determine which aspects of the program are necessary, and whether the effects hold across all SEM fields and whether they apply to all groups of women. Thank you.

MORELLA: Thank you, that's quite a tremendous achievement in terms of the women who persevere through the course. Thank you. I'm very pleased to have Dr. Baker.

***Testimony of Earnestine Baker, Meyerhoff Scholarship Program
University of Maryland, Baltimore Campus***

BAKER: Good morning again, and thank you for this opportunity to present the Meyerhoff Scholarship Program, which was created at UMBC in 1988 with a substantial grant from the Robert and Jane Meyerhoff Foundation. The Meyerhoffs provided an initial \$500,000 gift for a program to address the lack of African American males in the science, mathematics, and engineering pipeline. Sixty nominations were received the first year and 19 male African American students became the first Meyerhoff Scholars. The following year, the program admitted women and the program now welcomes students of all backgrounds who have a commitment to the advancement of underrepresented minorities in the sciences, mathematics, computer science, and engineering.

The Meyerhoff Scholarship Program is designed to address the particular needs of African American students in science, mathematics, and engineering. Key components of the Program include: an in-depth screening process that seeks students genuinely committed to a postgraduate research-based degree and career; a comprehensive four-year scholarship package; a mandatory academic Summer Bridge program for incoming freshmen; study groups; community living and regular "Meyerhoff Family" Meetings; personalized advising and counseling; tutoring; summer research internships with companies, federal agencies, and other research universities; mentoring; faculty involvement; administrative involvement; family involvement; community service; and extensive program evaluation. The Program has grown to enroll 200 students, supported by \$1.3 million in federal and private funds and \$400,000 in University funds. Demand for the program far exceeds capacity and available funding, however, with 50 freshmen in 2002 selected from nearly 1700 applicants and nominations nationwide.

Eighty-eight percent of participants are pursuing post-graduate degrees, primarily doctorates in science, mathematics, and engineering or medical/ doctorate degrees, at institutions ranging from Harvard, Stanford, Berkeley, Yale, Duke, Johns Hopkins and Oxford. Other key outcomes include exceptional retention rates in science, mathematics, and engineering (96 percent) and a high overall grade point average (3.54/4.0).

This overwhelming evidence of success has contributed substantially to the Program's growth. Under the leadership of now-President Freeman Hrabowski, the Meyerhoff Scholarship Program makes it clear that it is indeed possible for colleges and universities to recruit and graduate large numbers of high-achieving minority students in the sciences, mathematics, and engineering and inspire them to pursue and attain advanced degrees at the nation's most prestigious and competitive graduate and professional schools.

Graduation Data – 1993-2002

MD/Ph.D degree completed

9 – Ph.D degrees completed

67- Masters completed

34 – Medical Degrees completed

148 Meyerhoff Scholars are currently enrolled in graduate and professional programs.

Since 1993, Meyerhoff Scholars have completed 29 publications; 3 scholars work appeared on the cover of the *Journal of Molecular Biology*.

MORELLA: That is a great record. You mentioned federal funding. Is there very much federal funding?

BAKER: We receive funding from NIH, the National Security Agency, NASA. We also receive funding from the National Institute of Environmental Health Sciences, so the program continues to appreciate the support they receive from federal agencies.

MORELLA: So that's a great display of kind of the partnership where there are the different agencies that would benefit from the work done by your students.

BAKER: Yes, right.

Higher Education Panel Discussion

MORELLA: This is a great panel, really terrific. Mention was made of even using the private sector to do some teaching. You know, I don't know that there necessarily is a correlation between ability to teach and expertise. I just wondered would you also have incorporated within that some programs where you kind of let them know about how to relate to students? How to get their incredible knowledge conveyed? Would any of you like to comment on that? Do you see that as part of the plan?

TAPIA: The prep program in San Antonio, Texas which has received a lot of awards and was started by Dr. Manuel Berriozabal, he started it using retired Air Force and Army officers to teach under-represented minority students in middle school and high school, extremely successful. The teaching was extremely successful using retired officers from the Air Force and the Army. The model has expanded but it uses different teaching now but that's how it started. It was very successful.

FOX: This is the kind of program I was referring to as lateral entry, that many people have a lifetime of experience, in-depth knowledge of content, but no exposure to pedagogical methods, and to be able to offer them the opportunity as part of in-service training, to come up and act as mentors for students has got to be very positive.

MORELLA: But the in-service training is what familiarizes them with this new context, so that the two do meet well. I think it was also interested the mention of our international students.

We have just found that across the board that when you're talking about advanced degrees, I know I found it in the computer security, which was an area I was involved in. We just didn't have the students that were U.S. students. They were international students who came here to get an education. Some might try to stay but others would leave and it says something, I think about a culture and that's exactly what you're trying to change. Anyone have any comments about that?

FOX: Well, nationwide the number of foreign students populating our engineering programs is increasingly large. In the past several decades, the retention rate of professionally trained engineers and scientists whose first degrees are earned in another country has been very high, but increasingly we see that there are more and more research opportunities in the countries that have been feeder schools to our graduate programs. China, Taiwan, India, Southeast Asia, Korea, all offer more opportunities and it's not nearly as straightforward that students who would have stayed and become part of our workforce are doing so.

MORELLA: We must be offering the education now.

FOX: We do.

MORELLA: I mean we must be excelling in the higher education. It's interesting because Berkeley talked about Japan and supercomputing. That's the same kind of thing you're finding too.

TAPIA: Our higher education is the envy of the scientific world. It's just that our higher education in science and engineering is going more and more to non-domestic students, which I'm not saying is a bad thing, but there's no doubt about it. Even, you know, white males enrollment is dropping. Domestic student enrollment is dropping. But we are the envy of the scientific world in graduate education. There's no doubt about that.

FOX: Even those students who return to their native countries do contribute significantly to national goals because we very often have friends in these countries who understand the United States and love the United States. So, our emphasis is not in decreasing the number of foreign-born students. It's to increase the number of American students participating as well.

PEARSON: One of the challenges, though, is as more and more of those students return home as is taking place in Asia now, we have a problem in this country if we are dependent on that particular labor source as a substitute for our domestic students. I think that's where the problem begins: we need to develop the talent that we have here rather than depending solely. I think most of us are reasonable insofar as we welcome people from all shores but at the same time we must meet our own particular needs and not just the workforce needs. There is the issue of democracy with which we have to deal.

MORELLA: Exactly. I can remember when we were doing with the Y2K scare. It's kind of history now but needing to have these workers to help us to update and change and many of them came from India, came from you know offshore, whatever, but many have been trained here too. Anybody have any questions for this panel? Anyone have any final comments?

FOX: I would have one comment if I might. I would like to draw your attention to the fact that the Government-University Industry Research Roundtable is having a workshop in November in which BEST will be a participant.

Dr. Shirley Jackson will also be presenting a white paper on these workforce issues, and the goal of that organization, which of course is part of the National Research Council through the National Academy of

Sciences, the National Academy of Engineering, and the Institute of Medicine, is to compile a number of these workforce issues into a single document and to act in parallel to what BEST is doing in following up on your very valuable commission. We'd welcome any participation about that and the details can be obtained at the National Academy.

MORELLA: Excellent. We'll make sure that we get the details. Thanks for calling it out. Mr. Yochelson.

YOCHELSON: May I just mention that the purpose of the BEST report will be to take the kinds of exemplars that were described here, the Meyerhoff and the Women in Science and Engineering at the University of Michigan, and to focus on the design principles that underpin their success and to seek to extend those principles elsewhere in the country.

We want to see those principles in as many parts of the country as we can and so the logic of this activity, Dr. Pearson began with a focus on the importance of exemplars and so when we can distill those critical elements, that will give us our ammunition, our insights to go elsewhere. And, of course, the perfect complement of that are the kinds of recommendations that were made by Chancellor Fox and by Professor Tapia. Thank you. I didn't want to extend beyond our time.

MORELLA: Excellent recommendations but I understand there was a question over here. Yes, Katherine Didion.

DIDION: (Off mike question).

TAPIA: Yes, I agree with what you're saying basically is extension of essentially the life after you graduate and on. With the students that I work with, we have extreme sessions on what will your life be as a faculty member? What will your life be as a professional in industry?

We have visitors come in and work with them and basically what I can say is the students that we produce, the women and the under-represented minorities are in such demand that they get many job offers and they tend to do very well.

But I agree with you that professional development, the life after graduation, and guidance on those issues is extremely important. We do some. I work a lot with young minority faculty, women, and minority faculty at Rice in terms of here's what it's going to take to get through the process and have been very successful on that. But I agree with you. Your point is well taken.

MORELLA: The questioner is the president of the American Women in Science group and has been very helpful as all of you have in establishing that commission to begin with.

I want to thank this panel very much, wonderful, wonderful comments, and I am going to now turn the chair over to Congresswoman Eddie Bernice Johnson for her panel. I hope to see you all later. Thank you very much.

“What’s Working in the Workforce” Panel

CHAIR JOHNSON: Good morning. The acoustics are not that great in this room, as you have discovered, so when questions are asked, if you'll come to one of the mikes here at the end of the table, it would be helpful for the reporter. I can hardly hear them so I know that she can't.

Let me thank you for being here this morning and I'd like to learn about this Blue Ribbon Panel on the workplace and I'm very much looking forward to hearing about successful programs in the workplace that address diversity and staffing issues.

I'll be very brief because we have a vote coming up in about 15 minutes, and hopefully we can move ahead. This is an environment where you got six things going on at the same time, and what I will do is go ahead and introduce the panel.

We have great experts, Dr. Dan Arvizu of the engineering firm of CH2M Hill, and he chairs the BEST Blue Ribbon Panel on the Workforce and runs his firm's energy business and serves on the board of the Hispanic Engineers Hall of Fame Committee.

Dr. Paula Rayman of the University of Massachusetts is a nationally-recognized scholar on issues of diversity and is currently heading up a major research project on this issue at the National Science Foundation.

And, Dr. Claibourne Smith is a chemist and recently retired vice president of DuPont. Have you found anything else to do? If not, we'll find something for you, and currently serves as the president of Delaware Foundation for Science and Math Education. We have about 15 minutes to bring us up to date and then we will entertain questions. Arvizu.

Testimony of Dan Arvizu, senior vice president, CH2M Hill

ARVIZU: Thank you. Well, good morning, Congresswoman Johnson and other distinguished guests. Let me first join the other panelists in thanking you and Congresswoman Morella for your leadership and your vision in encouraging real action here. This is an area that's critically important and it's important to bring it to the forefront of the national agenda.

It is both an honor and a pleasure to be here this morning and to be serving in the capacity of Chair of the BEST Workforce Panel. I can say without reservation that we have assembled on this Workforce Panel some of the nation's top talent, CEOs and senior executives, from industry, academe, and government with significant expertise on issues of workforce diversity. It is truly a delight to be part of this effort and to work with such distinguished and committed professionals. You will hear from one of our panel members, Dr. Clay Smith in a moment. I am also blessed to be working closely and under the leadership of John Yochelson, president of BEST. You cannot find a more dedicated, energetic, and capable director for an effort of this importance and magnitude. Likewise, I am blessed to have an excellent and accomplished colleague and teammate in Dr. Paula Rayman as our Workforce Panel expert who provides us with a grounding in fact and insights from the body of research in this area. Personally, I have great passion around this issue. I am an engineer, now for almost 30 years and I come from humble, but proud beginnings as the son of immigrant parents, the first in my family to go to college, and someone who has benefited greatly from the support of a number of key individuals and programs that provided me the opportunity to succeed.

In the short time I have with you I wish to report on the status of progress of the Workforce Panel. It is established we have a serious problem. The questions before us are, what can be done about it? and, who should do it? Our Panel's work addresses these questions from the perspective of the workplace. Let me start by stating the two core objectives of the Panel. Number one, we are to identify and distill the success factors and best practices that create a more inclusive workplace spanning the private sector, including industry and academe, as well as, government. This distillation will form the foundational asset base that can be accessed by BEST's proposed test-bed community programs as they get underway. Number two, we are to develop an action agenda that moves the country forward toward the adoption of these best practices. Although the work of the panel is not yet complete, I can report on some of our initial findings on success factors and provide some of our early thinking as we move into the recommendations phase of our work.

It is necessary to point out at the onset that our Workforce Panel views the challenge before us as dynamic, complex and closely inter-linked with the work of the Pre-K through 12 Panel and the Higher Education Panel. Where each of our panels is focused on one portion of the broader problem space, it is clear that any viable solution will need to be comprehensive and engage all stakeholders in complementary ways across the entire domain. To support working across these interfaces, each of the panels includes project integrators who are familiar with these linkages to help create bridges. One clear consensus point we are reaching is – we all must invest in the “feeder system” of our educational pipeline, albeit in different ways.

With regard to the workplace environment, there are several reports that examine workplace barriers. One noteworthy publication is the National Academies of Science and Engineering workshop on diversity in which I recently participated. In all of these reports many common themes emerge, and not surprisingly, our panel has very similar thoughts. In particular, we identified three primary topical areas of significant deficiencies. First, lack of management leadership and support systems. In this area, the panel concludes that lack of valuing diversity as a business imperative drives lack of commitment. This manifests itself in different, but equally impacting ways across the various types of the workplaces. Second, the panel concludes that the educational system is not only not producing sufficient well prepared next generation scientists and engineers in general, but also is not adequately serving the underrepresented groups in pursuing careers in science and engineering. Here we conclude that the changing context of the workplace and its implications on our educational system are not well understood and not well accommodated. Third, and perhaps most disturbing, there is a strong consensus among our panel members that there remain systemic biases in our workplace. I will stop short of asserting these to be outright discrimination, but note that perceptions and beliefs that diversity and excellence are in conflict with one another remain a significant barrier.

As we turn to the discussion on success factors, our panel has identified four primary areas that, if implemented, can enable success. First, and perhaps most important, is what we will call “transformational” leadership. Leaders who believe in and value diversity as a business imperative invest time and effort to change the future of their organizations. They drive this change deep into the culture and management of the organization and do not simply espouse it only in the top layer of management. To use a recent and relevant analogy, leaders who were quick to embrace the notion that environmental performance is not a tradeoff with a

financial bottom line, but in fact, synergistic with it, were able to ultimately demonstrate competitive advantage in the marketplace.

Likewise, we assert that diversity should be thought of as a core value that underpins an institution along with integrity, safety, quality, and sustainability. It must be part of everything we do! Second, a commitment to skills development that translates diversity into enhanced performance is also an important success factor. Diversity does not automatically equate to enhanced performance. It takes development of special skills – especially communication and management skills – to draw upon the talent and creativity of all groups. The panel will identify what those skills are and show how they can be embedded in an organization. Third, the development of enabling programs and policies to encourage and support a diverse workplace is extremely important. Representative programs and policies include mentoring, affinity groups, and tailored workplace policies. Finally, there is a strong consensus in our panel that personal and institutional accountability are necessary conditions for success. Demonstrated and measured value can only be quantified through direct accounting of progress which starts with appropriately set goals and a relevant set of metrics.

In summary, our panel recognizes the exceptional difficulty of the challenge. Still, we are emphatic that the status quo will not provide an acceptable future. We are committed to be part of changing the status quo and will be providing a set of actionable recommendations as part of our report, that I urge you in advance, to carefully consider.

My colleague and teammate, Dr. Paula Rayman will brief you in more depth about the changing context of the workplace that will inform our recommendation about how to address the needed change.

Testimony of Paula Rayman, professor, University of Massachusetts

RAYMAN: Thank you, Dan. I would like to thank Representative Johnson and Representative Morella for their presence and support of this important work that we are undertaking together and for the opportunity to provide this report of the current status of the BEST Blue Ribbon Workforce Panel.

My name is Paula Rayman and I am the panel expert leader for the BEST Blue Ribbon Workforce panel. I am professor of economics and social development at the University of Massachusetts and past director of the Radcliffe Public Policy Institute of Harvard University. I have worked extensively on issues related to work organization, labor and public policy with specific interests in women in the science, engineering and technology arenas.

To build upon the rationale for diversity presented by my honored colleagues Dan Arvizu, and Dr. Shirley Jackson I will address the crisis we are facing in our nation's science and technology workplaces. We face a work world in the midst of an enormous change. Nothing is the same as it was 50 years ago or even 20 years ago. And more dramatic changes are anticipated over the coming decades. We face a crisis on three dimensions:

1. Where will the new science jobs be?
2. Who will fill the jobs?
3. How the work will get done or, what is the changing nature of work?

Where Will The Jobs Be?

According to the US Department of Labor, four out of five of the fastest growing occupations in our community today will be in the science and technology fields:

1. Computer Engineering
2. Computer Support Specialists
3. Systems Analysts
4. Database Administrators

The fifth fastest growing occupational area, medical assistants, can also be counted as in the science arena.

Despite the current economic downturn that we are in, it is anticipated that over 2 million jobs in science and engineering will be created by the end of the next decade. All of these employment opportunities will require a skill set that is strong in math, science and technology. Currently these are areas in which American students have fallen behind compared to international students, and areas which are showing declining graduation rates in the bachelor's, master's and Ph.D. levels overall.

Who Will Do the Jobs?

Considering the changes in our projected population, tomorrow's workforce will be a dramatically different face than today's workforce. The demographics of the workforce are anticipated to be undergoing extensive changes over the next few decades as identified by Dr. Shirley Jackson in *The Quiet Crisis*. By 2050 as the next generation emerges, it is expected that:

1. Today's minorities will be tomorrow's majority,
2. One quarter of all Americans will be Hispanic,
3. Over 60 percent of women will be working outside the home full-time, even if they have children under one year of age,
4. The older population will double, which includes an increasing proportion of people with disabilities.

It is important to note that while we compete for science and technology workers within the context of a global economy, the diversity of our own nation's labor force provides a comparative advantage. Diversity is a key building block of economic competitiveness and scientific discovery and innovation.

How Will Work Get Done? / Changing Nature of Work

In addition to the change in skill sets, and demographics, the nature of work itself is undergoing significant transformation brought about by the changing business climate and technological advances. These changes include:

1. Companies organized so labor is a variable, not a fixed cost,
2. A workforce built on the premise of teams that can be easily assembled and disassembled,
3. A nimble workforce whereby workers hopscotch from job to job, even career to career, carrying their set of skills and abilities on their backs and desperately needing new policies in portability in health insurance, pension plans and other benefits.

As an example of this new fluid economic order, a recent NSF sponsored survey of the software and Internet industry* which showed that 80 percent of the workforce switching between independent and traditional employment during the last three years. Additionally students graduating today expect to have four

to seven different careers during their life spans. This is quite different from the workforce that I joined or of the past where long-term loyalty was the traditional expectation for both the employer and the employee.

Facing the Future: The Call to Change Business as Usual

While these changes have occurred in the context of the workforce in the last few decades it is critical to note that “who” does science and engineering has changed very little. The view of who makes a “good scientist” has remained much the same and is still depicted as a white male in a lab coat. This image correctly reflects the reality of today’s scientific and technology workforce: currently 76.4 percent male and 81.8 percent white. The future demographics of our nation will require that the current reality change if America is to remain technologically competitive and meet the increasing demand for a skilled workforce. While there have been numerous programs and policies in place in the last three decades, relatively little progress for underrepresented groups, women and minorities, has occurred in science, engineering and technology in all areas of the workforce: industry, government and academia. The work culture in the sciences remains rooted in systems which are detrimental to the advancement of women and minorities. In terms of an equity equation we have fallen behind.

The projected growth in science and technical jobs cannot be met without an aggressive workforce development strategy which captures the talents of all Americans. Out-of-the-box thinking and a futuristic vision for the development of this workforce are required. Such creativity already exists. There are several models of success which can be replicated and I invite my esteemed colleague Clay Smith to tell us about some of these successful models.

** This National Science Foundation study is a research partnership of the University of Massachusetts Lowell and the Massachusetts Software and Internet Council.*

Testimony of Claibourne Smith, president, Delaware Foundation for Science and Math Education

SMITH: Good morning. I'd like to thank Representative Johnson and Representative Morella for the opportunity to share what is working in the workforce as we built our engineering and science talent. My colleagues, Dan Arvizu and Paula Rayman, have described the challenge and I will put that challenge into some context using my 35 years experience with the DuPont Company in various assignments such as research, marketing management, sales, and education and in my role as vice president of technology and professional development.

DuPont and most of our industry leaders recognize that in order to address the bottom line of our customers and our stockholders, we have to focus on people, - that's where it all begins and ends with employees, customers, educators, and suppliers to name a few. DuPont recognized long ago that to be a strong global competitor in the next century, we would have to hire, develop and manage a diverse workforce and then maximize the benefits of that diversity for the company's competitive advantage.

I believe business/industry/government and the great educational institutions of this country must take the lead in defining the strategies necessary to maintain our leadership position in the world. We will look to our academic partners to help us deal with this business and national imperative. We must have a well-stocked pipeline of highly educated, diverse people. Institutions of higher learning across the country play a vital role for all of us. Business/industry, government, and higher education will continue to look to each other for the answers which ultimately must come from our collective efforts, that is, working together.

Internal Efforts

From the intense discussions of our workforce panel, we are entertaining a two-pronged agenda to:

1. Drive change within organizations and
2. To drive change externally among industry, academe, and government as employers to promote a diverse workforce.

Let's look at an example that comes to mind which illustrates an approach utilized by my former colleagues at DuPont. We established a set of principles that are still effective in increasing our company's diversity internally. These principles are:

1. Leadership must come from the top echelons of the organization. Managers must "walk the talk." An institution must have highly visible, fully involved, visionary leaders in order to make valuing diversity efforts a success.
2. Accountability for personal and organizational behavior must exist. A system must be in place to motivate behavior change and that means diversity performance must be linked to compensation and advancement.
3. Valuing diversity must be perceived as a critical part to the success of the organization i.e., a business imperative.
4. Education around this issue must not only raise awareness, but more importantly, develop skills needed to work in and manage a multicultural organization.
5. Finally, effective mentoring programs for women and underrepresented minorities must be developed and implemented.

I believe these 5 principles apply whether one is trying to promote valuing diversity within schools, universities, government labs, a small business or a multinational corporation. Economic business cycles, competitive driven restructuring or globalization notwithstanding, the business sector cannot move away from the reality that having a strong, well trained, diverse workforce is one of the major keys to business success.

Another example we can build on is the success of selected businesses if the CEOs and other business leaders share their experiences and know-how with others who are just starting out or are not yet engaged in a major way. A situation that comes to mind is an example of John Pepper, CEO of Proctor and Gamble, visiting his counterpart at Microsoft and sharing his company's experiences promoting workforce diversity.

Imagine this kind of process where successful companies and their leaders share their experiences with their key suppliers and customers. A well-planned coalition of business leaders organized by industry or business sectors could use their natural contacts and interfaces to bring best practices and key learning to vastly expanded groups of businesses. Thank you for your attention this morning.

JOHNSON: I have one question that I would like to ask. In much of the research, it indicates that most, especially in the field of engineering, that women, females will go into the profession and leave because of a hostile environment. Some leave because they want to start a family. Is that still very prevalent in the workplace?

SMITH: The experience that we've had is that unless a workplace is thought through carefully in terms of whether it is nurturing and supportive, you will find individuals who have objectives that include

family and other qualities of life looking elsewhere, and I think most companies have found that the quality of work and quality of life are things that really have to be worked on and planned very carefully.

And, I can say that there are a lot of large companies who are making very great strides and particularly those who have women in higher positions and companies who set policy and help establish the culture.

Workforce Panel Discussion

RAYMAN: Can I add, thank you. I think that is an excellent question and it raises actually something I think that is a story of hope and that is years ago it was really just women who were raising the issues about can you work and have a life and can you really forge ahead and have a career?

In a study that I headed called "Life's Work," for the first time we had equal numbers of young men were coming into firms and asking the same question, and so forging ahead here, we have a new coalition of young men and young women who together want to be able to say yes, you can work and have a life, and I think Clay is right, that some of the larger companies have already taken this up and particularly those large engineering firms.

I think one of the great challenges that we have is that most of our workers in America are still working in small businesses and they have had less opportunity to forge ahead on this, and this is where government comes in, the kind of paid family leave that we just saw passed in California, I think is ringing the bell for the future for our country as a whole because this covers both men and women workers.

It's going to be systemic. It's going to cover everybody, all workers, and the only way that people in small businesses are going to be able to afford this is if we have national programs that are like this. So, I really appreciate very much your question.

CHAIR JOHNSON: Thank you very much. One final question and I'll go to the audience, or maybe I'll go to the audience first and then I'll frame it in my mind. Are there questions? Yes. Would you come up? And if there are others that want to approach that would be fine. You can start up now.

WILLIAMS: Valerie Williams, RAND Corporation. One of the things I was struck by in the higher education discussion was the tremendous attrition between freshmen entering into science careers and in those finally ending up with advanced degrees.

I believe the number that Willie Pearson demonstrated was 12 percent minority men start off with interest as a freshman in science and three percent with advanced degrees in science, and I think the number for minority women was similar to that.

So, I wonder in terms of industry, what sorts of strategies are being tried or effective in placing more incentives for higher education institutions to have some responsibility for changing that system from one that might be sort of punitive in terms of the incentives for faculty and administration, for mentoring and getting students involved in science, to something that's much more reward oriented?

Because I think that's a critical place where there's a tremendous loss of students, and it seems that someone should be able to put pressure on those institutions to bring about a change.

ARVIZU: There are a number of programs that primarily large institutions will adopt. In fact, I was a product of one of those with AT&T Bell Labs a number of years ago.

Recognizing that there wasn't enough advanced degreed people coming out of the universities, they instituted programs where they would go to the university and actually select students for scholarship, provide the schools' matching scholarship grants that they could use for other people to do other things to increase the production of under-represented women and minorities in specifically advanced degrees in engineering.

It's obviously very costly to do that and so those programs are limited in some cases. That's been 20-plus years ago now that those programs that were instituted. There are similar programs today but it's still a very difficult task because there's just not enough production.

So, there is recognition of the issue. It's unfortunately difficult to do large-scale changes without a pipeline. I think now the recognition is we're got to start cultivating at the lower levels, starting in high school and before in order to get people into that pipeline so that you can have the opportunity to encourage them farther on.

SMITH: One of the things that I think was very important for us at DuPont is that we provided large support to higher ed through a number of grants and other programs. And, one of the things that we did was to conduct a survey of those institutions that were serving minority and women undergraduates and ask them to give us a retention rate for their students who entered into those programs.

And, we published that internally and together with NACME, and one of the things that we did which let them know that we were looking at these kinds of performances and ultimately the implication is that they would impact the way we proceed in the future with those institutions.

WILLIAMS: Just one more question. What about community colleges because they graduate a lot of under-represented groups? Are there partnerships with community colleges as well?

SMITH: Oh, they're absolutely key for the simple reason that, we'll use DuPont as an example, 75 percent of our workforce does not have technical backgrounds and we rely very heavily on the skills at the operation and other levels for non-degreed workers, and our technical and community college are essential for

strengthening that workforce and we must, in fact, work with them carefully as partners to ensure that we have that workforce for the future.

WILLIAMS: Thank you.

CHAIR JOHNSON: Thank you.

JAMES: Hello, my name is Kathryn James and I have three degrees from MIT in electrical engineering and 27 years of work experience on government programs, including as a government civil servant, as a not-for-profit think tank technical staff member, and as a contractor. I've been unemployed over nine months I don't know if I'm ever going to be able to work again.

My question to the panel is, have you looked at the impact of the H1-B Program on diversity from American-born workers in government contractors and the fact that in many cases the H1-B Program is discouraging minorities and women from either staying in the field or from entering the field.

What I have experienced from Asian workers from overseas is that they are definitely, they come from cultures that are biased against minorities and women. They associate with themselves. They help their own people stay employed and choose their own people for employment over minorities and women who are American-born, and I would like to know if you have looked at that issue.

RAYMAN: I think you raise one of the important and complex issues confronting all of us that are serious about the importance of investing in our own domestic workforce. We know that we exist in a global economy, as I said in my remarks, and no doubt we have to find a way of balancing global labor markets and the fact and the realities of being part of the global labor force, and at the same time understanding that this is not an either/or equation.

I think that all of us on our panel, on this Blue Ribbon Panel, understand that investing in the diversity of our own domestic labor force is critical for the maintenance of our democracy, for the maintenance of our economic competitiveness, and for the maintenance of bringing under-represented groups in, in a way that we haven't been able to do.

Something else that your remarks note, and I do think it's important that we wrestle with this, is that there are competing cultures in our educational systems and in our workplaces.

And one of the things I know that I was a part of when I was the head of the Radcliffe Public Policy Institute at Harvard, is that we actually had training programs for our TAs, teaching assistants, to help numbers of people from foreign countries who came in from very different cultures to understand the importance of equity and democracy and how to deal with diverse populations if they were going to be TA-ing classes in the sciences and engineering.

So, I really think your point is a good one and I think we're just learning how to deal with that within our institutions, so that we really can promote diversity that is true and real. So, thank you for your question.

JAMES: I have one more question. Regarding the gender issue, I think to view the lack of advancement of women in science and technology as linked to family issues, the "mommy track," is really unfair to the large number of childless women, like myself, who have been consistently denied equal opportunity and who have even suffered sexual harassment throughout our careers.

Many of us have dedicated the best of our energies and the best of our skills to succeeding in science and technology and have not had commensurate opportunities. I recently applied for a position at Defense Information Systems Agency and found they only have three women electronics engineers at GS-12 and above.

In this day and age, how can government keep discriminating against women in science and technology and expect engineering to do any better? I guess my question is for childless women who are dedicating themselves to the same degree that men are, why aren't we getting the same opportunities?

CHAIR JOHNSON: I guess I should comment on that. Actually, I think in the government the career is considered to be more successful when there won't be too many breaks in service, even though this is never voiced, and the government can not compete with the private sector in what they pay employees.

I know that we are very restrained here and we have a difficult time competing with the private sector. We always know that when we get someone that's really good that their stay will be limited because the various representatives that come in get to know the staff. They know who is good and who stands out. The next thing you know they got a job making three times as much as you can pay them.

I guess a part of my response will include a question that I had in mind earlier and was trying to see how to frame it so it wouldn't sound negative. I'm from an area that has hired more H1-B visa people than any other part of the country in the Dallas-Fort Worth area and now that we are at the end of the big wave of dotcoms, we have a lot of people that don't have jobs.

We've been questioned by some of the private sector as to why these people can't go into classrooms and teach since they have the skills that we are trying to get our young people to get and I want to get some

reaction to that. Most of them are not certified teachers but probably do have skill, and we have such a shortage of prepared teachers for this area.

JAMES: The problem with that is you can't earn as a teacher what you would earn in industry. If you walk into teaching and earn \$30,000 or \$40,000 a year and you've been earning \$80,000 before in industry, how are you going to cope with that standard of living and many of the people who are unemployed right now are middle-aged people who have financial obligations where they can't take that kind of cut in salary. Now granted, \$30,000 or \$40,000 a year is better than zero, but that's not what they want to be doing.

CHAIR JOHNSON: Yes.

SMITH: The point you are raising, Representative Johnson, is a good one and one that is obvious to those of us who have worked very much in the Pre K-12 arena and recognize that there is a critical shortage of certified math and science teachers, and how do we work in a multiple track way to try to remedy that situation?

The point is that most of our systems recognize that bringing people into the classroom to teach require a broad spectrum of understanding of childhood behaviors and what have you, and one of the things we've done in Delaware is to put together an ultimate track program that is specifically designed to, in fact, mentor and train people who have not had that classroom background or classroom experience, so that they are successful.

And, we've had something like an 85 percent success rate for people who come with degrees in other areas than in education and move into the classroom and perform in an outstanding fashion, and I think these are some of the kind of programs that can be replicated around the country so that we don't lose the opportunity to take advantage of those talented folks out there who have the skills but not yet had the pedagogy to deal with the classroom, and we can do that and I think there are programs that we ought to hold up and use as exemplars in this area.

CHAIR JOHNSON: Thank you very much. Are there other questions? Other comments? Well, let me thank this outstanding panel and we'll hope that you keep us informed as to what we might be able to do on the federal end of it and even with the National Science Foundation to see if we can't bring up our responsibility toward the area from the federal and the government public sector in order to be in partnership with the private sector and with our educational institutions because we know that we have to address the issue.

These are the professions that will carry our economy, that will cause us to remain competitive with the rest of the world, and I really do have some sincere concerns. But I really do feel that my concerns as well as yours can be satisfied when we get a good partnership and know exactly how to approach the people and how we attract and maintain well-qualified teachers.

What's Working in Pre-K-12 Education Panel

Testimony of Shirley Malcom, head, Education Directorate American Association for the Advancement of Science

CHAIR JOHNSON: How do we impact higher education, our K-12 as well, to make sure that we are producing the professionals that we need to make sure that we guide our young people in the right direction? We're challenged but I think that working together we can solve it. Thank you very much. The K-12 panel. Good morning. I'm delighted to be here with you and know that you're involved in the areas of which we have great concern. Dr. Shirley Malcom who is from Washington via Brazil with I guess AAAS?

MALCOM: Yes.

CHAIR JOHNSON: And Dr. Garcia from Arizona State who has worked with a number of students in programs to include and to reach minority students. And Dr. Alson, with Evanston, Illinois. Now it has created a network of schools where they can relate to each other for improvement and contact.

We're delighted you're here. You have probably the most basic and important aspect to address, the beginning that sets the infrastructure for the rest of the careers. So, I'm very delighted that you're here and I look forward to listening to you. And, Dr. Malcom came in from Brazil and will be returning to Brazil, I understand.

MALCOM: Thank you very much, Congresswoman Johnson. I want to begin by thanking you and Congresswoman Morella for your unflinching devotion to this issue and for your leadership. It's very much appreciated by those of us who are out here in the field.

I want to acknowledge my co-chair, Al Berkeley, who was here earlier on the first panel. Together we take on this effort for Pre K-12. And Gene Garcia, who works with us in terms of keeping us straight regarding the research and, of course, Allan Alson who always reminds us what the real world looks like. I think that it's useful to have individuals who can keep us honest. And of course, John Yochelson for his leadership and the staff of the BEST initiative – for this we're very appreciative.

There are a number of panel members from our group who are in the audience, and we appreciate their presence. There's a certain irony in leaving Brazil and coming to Washington and feeling as though you're part of the same conversation because there, at an international conference on science and mathematics education, we began to deal with a lot of the same issues that we are wrestling with here.

And I think that maybe I should begin by saying that the rest of the world is not waiting for us to get our act together. They are absolutely determined that they're going to look at the issues and build their human resources base so that they can be competitive, and I think that we have to – keep that in mind as we are doing our work.

When President Bush and the nation's governors met in Charlottesville in 1989, they established ambitious national education goals. These goals were affirmed and expanded upon by the Congress of the United States. The goals included that we would raise achievement levels in all academic fields and, even more ambitiously, that we would be first in the world in mathematics and science achievement by the year 2000, the end of the century, the end of the millennium, looking forward into a new century and a new millennium.

When in 1995, the results were announced from the Third International Mathematics and Science Study (TIMSS), there was good news and bad news about science and mathematics achievement of U.S. students when compared with the performance of students from other countries in the world.

The results of TIMSS showed U.S. fourth grade students comparing quite favorably in their performance on tests of science, both scoring far above average and among the top tier of countries. Performance by fourth graders in mathematics was about at the average compared with other countries involved in TIMSS.

When fourth grade students were tested in eighth grade in 1999, performance had fallen to the average levels in science and slipped in mathematics as well. The performance of 12th graders in science and mathematics was near the bottom. This under-performance by U.S. students was true even for our brightest and best performing students, such as those taking advanced placement courses in physics.

Within the overall story of the weak performance in science and mathematics by U.S. fourth, eighth, and 12th grade students on TIMSS, are sub-stories that bear our attention. If we look at the National Assessment of Educational Progress, for example, we see that girls' scores in science compared okay with those of boys at the fourth grade level, but they fall far below those of boys at each successive level of testing.

Performance differences in mathematics, thankfully, were small and statistically insignificant. The gap between the national assessment performance of white students, on the one hand, and that of African-

American and Latino students on the other hand, has narrowed but it remains large, and for some groups has actually increased.

This under performance by under-represented minority students is related to many things, including unequal access to quality teachers and inadequate resources; disproportionate presence of the students in schools which lack learning resources and inadequate instructional facilities; and the availability of fewer AP courses in science and mathematics in the schools attended by these students.

For all groups, issues often relate to smaller numbers of women, minorities, and persons with disabilities in the science, technology, engineering, and mathematics workforce resulting in fewer role models available to such students, lower expectations for students and decreased likelihood of involvement in science and mathematics activities beyond the formal education or beyond school.

Students with disabilities may need access to specialized assistive technology or pedagogical strategies to support their successful study in science and mathematics areas.

To develop interest and promote opportunity to participate in science, technology, engineering, and mathematical fields, students must come to the pursuit of higher education with at least: solid and rigorous course work in science and mathematics; opportunities outside of school to foster this interest and appreciation for these fields and the way that study in these fields is undertaken; and information on possible careers in science, technology, engineering and mathematics, and belief by themselves and the significant adults in their lives that they can successfully pursue study and careers in these fields.

The current structures provide neither equal chances nor a level playing field, and it is these circumstances that we must remedy if we are to maximally utilize the talents of all of our young people.

These must include:

- Vigorous support for systemic reform efforts to improve the quality of the curriculum, teaching and support within our schools, with assurance that opportunities for study of science and mathematics will be extended to all students.
- Specific interventions that allow students to explore STEM fields, such as through summer camps, research apprenticeships, after school science clubs, museum activities and media-reinforced learning opportunities.
- Outreach to parents and communities to help them organize activities at home and in the community to support science, technology, engineering, and mathematics aspirations, to build demand for school reform, and to increase community-based opportunities for learning beyond school.

A complex set of interventions and support is needed to change the current picture. BEST is learning from the work that has gone before, the interventions, the information on effective schools, and the research.

Sharing what we learn will present the greatest likelihood that we can multiply effective efforts to levels commensurate with the size of the challenges we face to build a scientific, technical, engineering and mathematical workforce for America's future.

CHAIR JOHNSON: Thank you.

Testimony of Eugene Garcia, professor, Arizona State University

GARCIA: Buenos días. You've heard "thank you" in English. Let me say mil gracias in Español.

CHAIR JOHNSON: Muy bien. Gracias.

GARCIA: Clearly, in this endeavor, we know the pathway to science and technology of the future begins in the Pre K-12 sector, if not earlier. So our efforts at BEST are to look very carefully at the beginning pathway or the beginning steps into science, technology and mathematics.

Our students depend heavily on the public school system and other alternatives to move forward to those futures that we believe should be available to all children in this country. BEST has a particular way in which we are striving to open the doors to the world of science, technology and mathematics for all children.

First, the membership of BEST feels that we need to understand what is now working for students in this arena -- particularly with our target populations in mind. Therefore, you've heard this phrase before -- "We want to know what works?". How is BEST approaching this? What works particularly well in this domain of importance around the country?

BEST is attending to the strict notion that we need to understand empirically "what works". We need to have good research-based information, solid evidence, and clear knowledge about which programs make a difference for whom, how they make a difference, and what are the actual results. The reason we are so attached to this notion of having solid evidence for what works is that if anyone needs to move forward and invest resources, whether they be in the public or in the private sector, we must be able to inform them as to whether their investments will pay off. It is only fair to those individuals who implement programs or systemic efforts to change systems in response to this need, to assure them that all children will be served by their interventions and/or changes. Thus, we need the absolute superior evidence. Therefore, BEST, in lending the text to the context that Shirley has presented, needs to understand in this area of urgency, what BEST programs, and what BEST systemic changes really do work.

In doing all this, we have cast the net quite broadly over the Pre K-12 sector to identify a set of existing initiatives, efforts, programs, systemic changes. We have done so in an effort to generate what we will define as a "consumer guide". This guide will allow individuals who are in the position to make decisions about what programs or initiatives should take place to do so intelligently and informatively. The guide will identify the design principles behind the efforts to make changes for students, their families, and their communities. It will assure that those design principles are clear and that those efforts are understood empirically and conceptually.

The guide will make clear whether or not these initiatives or these efforts are realistic fiscally and otherwise. There is no need to try to implement change if we do not have the appropriate data that allows us to determine whether it will work in a particular locale or for the particular students being served in that locale.

The guide will indicate whether or not these programs can be scaled up. Do they just work for a few students or do they work for many? And, what does it take to move ahead with regard to scaling up?

The guide will identify not only the strength of a program but its flaws. Where, within the programs, are areas where these efforts or systemic changes provide problematic challenges? BEST thinks it is an important concept to include.

The guide will identify where the entry points are, and how these beginnings actually take place. We are also interested in a consumer guide that addresses all these issues with regard to a broad set of audiences. Clearly, it will appeal to individuals in policy-making roles, people like yourselves, but we want it to reach others at state levels and local levels. You all know that education in this country is divided into those domains. We believe this guide, packed with such important information, must address those audiences.

The guide must also address the private sector, foundation sector and individuals who want to make investments in this arena. These folks need to know what works and they need to know how it works and they need to know how well it works. We must make this information available to the students as well and their families -- the ultimate consumers of information related to what works for them.

Given the overall goals of BEST, we have come to look at the individuals in who make a difference in the lives of the kids in the Pre K-12 sector. They are the individuals who create and organize the environment for instruction in math, science and technology: the teacher. BEST has begun an endeavor to take a look at what it takes to recruit, to prepare, to sustain, and to enhance the professional activities of those teachers in our schools.

In conclusion, I have attempted to describe briefly what BEST is doing in hopes of informing those individuals in the Pre K-12 sector who need state-of-the-art information in these times of urgency. The work of BEST is significant and timely and we appreciate your participation and support. Let me turn to the real field and a colleague who comes from the K-12 sector.

Testimony of Allan Alson, superintendent, Evanston Township High School

ALSON: Good morning. Thank you, Congresswomen Morella and Congresswoman Johnson for this opportunity to offer reflections and suggestions regarding the work of BEST, and the critical issue of the existing gap between research and practice in education.

The BEST panel has been capably served by the support of leadership of John Yochelson and his staff. Shirley Malcom, Gene Garcia, and Alfred Berkeley have helped us probe deeply into this very important set of issues.

I am in my eleventh year as superintendent of Evanston Township High School in Evanston, Illinois. This large comprehensive high school with a national reputation for excellence has 3200 students and is quite diverse – racially, socio-economically and linguistically. Student achievement, despite impressive gains, continues to reveal racial and class achievement disparities. Yet, we have made significant strides, for example, in boosting female and minority enrollment in Calculus and Advanced Placement Science courses. I would gladly elaborate upon our strategies at a future time.

A little over three years ago I founded an organization known as the Minority Student Achievement Network. We are 15 urban-suburban districts devoted to discovering, developing and implementing strategies to eliminate the racial achievement gap. Our strategies include conferences where we learn directly from students and teachers, and research where teachers are directly engaged in studies with university professors. For example, the Network has received a grant from the National Science Foundation to study the barriers to high achievement in mathematics for students of color.

My professional experience has revealed the extensive gap in education between research and practice. Quite frankly, it is the rare exception when districts or schools are able to successfully bridge that gap. Practitioners generally receive very little training in the interpretation or use of research findings. In fact, research methodology that meets the highest standards of reliability and validity are quite often written in language that is unfamiliar to the teacher or administrator. Our worlds usually do not overlap sufficiently for us to make timely use of significant findings. Simply put, while it would be far preferable to examine our practice from the vantage of current research, the barriers of time, language and politics often interfere.

I will illustrate with an example from my district. Five years ago we adopted the AVID (Advancement Via Individual Determination) Program at Evanston Township High School. Rightly or wrongly, we made our decision by listening to a highly esteemed researcher, Uri Treisman, from the University of Texas and the AVID founder, Mary Catherine Swanson. We then visited two high schools where the program had been in place for a number of years. These *data sets*, we decided, enabled us to expend tens of thousands of dollars and bring this endeavor to our school. Four years later 100% of our first AVID class went on to four-year colleges or universities. As much as maybe it should have, what mattered to us was not any local or national methodologically sound study, but the word and experience of trusted colleagues in the field as well as researchers known for advocating particular goals.

One way to transcend these difficulties of bringing research to bear more directly in schools and classrooms is to engage teachers as partners with researchers. Done well the result will enhance practitioners' understanding of their work and motivate them to cast a more inquiring eye on their practice. Teachers and administrators should have a voice in forming the research questions derived from the lives of children and educators.

For example, the Minority Student Achievement Network has two projects that do just that. One, the previously referenced NSF project, has teachers collecting data and reviewing literature to determine barriers to high achievement in mathematics for students of color. They then, with researchers, will employ and evaluate instructional strategies intended to overcome these barriers. The second project trains teachers in particular routines around learning expectations and trust relationships. Teachers and students themselves are part of the process of evaluating their impact of these instructional strategies on achievement. The point is that teachers feel invested in this work and will likely use the results to alter practice in an almost immediate fashion.

The BEST Panel recommendations to produce a research consumer guide and build teacher capacity to use research offer powerful possibilities. It will be important to then create the explicit linchpins that link these two ideas. Researchers can and should play a strong role in assisting practitioners to learn more about the contents and use of the programs that will be in the consumer guide. While practitioners will no doubt be excited about many of the programs, they will need technical design support to put them in place in their schools. The BEST Panel recommendations offer a real and distinct opportunity to help bridge the research-practice gap and yield higher K-12 achievement in math, science and technology for women, minorities and the disabled. Thank you.

MORELLA: I want to thank the panelists and, Dr. Malcom, did I hear that you came in from Brazil and that you are leaving tonight?

DR. MALCOM: And going back.

MORELLA: To go to a conference. That's absolutely incredible, talk about remarkable commitment that we should all try to emulate. So, thank you all very much, and I appreciate Dr. Garcia, Dr. Alson for your being here and for your wonderful comments.

I assume, and you probably mentioned this early in your testimony, something I alluded to earlier and that is the Glenn Commission on which I serve, which had to do with the TIMSS report, Third International Math and Science Report showing how poorly we did, and I notice you had, you know, some charts on that.

So I hope that some of those recommendations about particularly recognizing teachers and setting up academies and doing some of that to bring in the very best to be there, to be the inspiration for these young people along the way.

And then, mention was made, I know your background, Mr. Garcia is bilingual education. It wasn't very long ago that at the NIH we were able to assemble some of the researchers whom had dealt with teaching children of different languages and they particularly dwelt on the Hispanic population because in my district we have the largest number of ESL programs in the state, probably ranking pretty high in the nation too.

They were the researchers who had grants, who were reporting back on some of their findings about what the best techniques are. So, you know, your job is even greater to take those youngsters who don't have the ability with the English language because of their background and also to inspire them to go into science, engineering, and technology. And so, I appreciate that.

I don't know whether anybody had any questions to ask. When you hear that sign, that means that there are probably 15 minutes for us to go and vote. Anybody in the audience who does? I just think that your role in Pre K-12 is so critical. We all have those stories that we hear, success stories, and sometimes the sad stories of youngsters that just didn't have the initiatives in front of them with the support network.

And, sometimes I think more important than what we believe in is who believes in us, and I'm sure that this is a major part of the work you do too, to develop those people who care, show it, and bring out the ability and the sparkle in it.

So, if we have no questions, then I thank you very much from the bottom of my heart. I hope you have a good train ...

MALCOM: Plane ride.

MORELLA: Yes, plane ride that is not delayed and all of that and thank you again for being here. Why don't we assemble the third, yes. Coming forward is again Dr. Anne Petersen. I remind the audience, senior vice president for programs at the Kellogg Foundation and another one of our very prominent board members.

And Petersen, is going to be followed by Deborah Wince-Smith, a member of the board but she's also the new president of the Council on Competitiveness and she's the first woman to serve as U.S. Assistant Secretary of Commerce for Technology and she is widely known for her expertise in one of the core areas of the council's competence and that is regional innovation.

Because I have now ten minutes to go vote, could I ask you each to make it like maybe two minutes each. That's terribly hard to do. You'll know the kind of schedule that we go through constantly. Dr. Petersen, thank you.

Testimony of Anne Petersen, senior vice president, Kellogg Foundation

PETERSEN: Thank you for this opportunity to speak with you on a topic about which I am most passionate -- not only because I am a scientist but also because I have seen individuals, families, and communities transformed by opportunity that for some, has been unavailable. The opportunity to gain an education and pursue a career in engineering or the sciences is still precious in our society. Today, more than ever, we must support the interests in science and technology for all with talent and energy, and especially those who have been underrepresented.

Shirley's Jackson's paper eloquently spells out the crisis confronting us. The problem of underrepresentation in science, engineering, and technology derives from complex factors. Similarly, the solutions must bring all forces in society to redress the problem. No sector can solve it alone. We at the Kellogg Foundation have found that much can be addressed at the community level where we have our best chance to access and engage the resources needed to overcome the barriers faced by women, underrepresented minorities, and persons with disabilities -- and to propel those individuals into the new economy with skills that expand discovery, enhance technology, and improve human service.

I'm here today as a scientist who is senior vice president for programs of the W.K. Kellogg Foundation. In this role I've witnessed the kind of creative and energetic work that can open doors of opportunity for all -- girls and boys, African Americans, Hispanics, and Native Americans, and those who are physically challenged.

Engagement -- real engagement -- in which institutions of higher education and communities form lasting relationships that influence, shape, and promote success in both spheres is rare. More often we see evidence of unilateral outreach from colleges and universities, rather than partnerships based on true mutual benefit, mutual respect, and mutual accountability.

Across the country, the Kellogg Foundation has catalyzed and participated in thousands of community-based projects that have provided lessons about what works best. These are the lessons from which BEST will build. The lessons for effective community programs include:

- Community ownership
- Targeted foci
- Rigorous selection processes include community readiness
- Achieving early results by harvest low-hanging fruit to achieve early results that maintain motivation of participants and
- Having patience with the way communities work and honoring the pace of change.

Allow me to tell you about our work in El Paso, Texas. It began over a decade ago when the Kellogg Foundation called for proposals to demonstrate community capacity to solve local health problems. The University of Texas at El Paso was one of 13 institutions selected to move forward with their proposal.

When we began work in the border towns -- colonies -- surrounding El Paso, 86 percent of the student population in the region qualified for the federal free or reduced lunch program. Total household income was less than half what it was in the city. Only 65 percent of the heads of households were employed. Underlying the poverty is the fact that many were recent immigrants from Mexico and only 30 percent of the population spoke functional English.

Poverty, compounded by a lack of basic services such as sewage and water treatment created problems in the Lower Valley that were more typical of a third-world country than a developed nation.

Fast-forward to 2002. There are now four clinics operated through a partnership among the University of Texas at El Paso, Texas Tech Health Sciences Center-El Paso, and El Paso County. These primary-care clinics that provide training for health professions education students, while addressing the health care needs of the region's medically underserved areas in El Paso's lower valley. Nearly 20,000 patients were served by these four clinics in the past year and today more than 130 health education students, residents, and nurse practitioner graduate students participate in multidisciplinary education based at the four clinics.

The Clinics' enthusiastic medical director is Dr. Arturo Antonio Islas, who is also a faculty member at Texas Tech University. Dr. Islas is a young man who grew up in El Paso. He was educated at both of the partnering universities and is the product of their community engagement that began a decade ago. As a result of the university-community partnership, there are other professionals and scientists coming up through the pipeline, familiar with the community and speaking the language of its residents, and ready to serve their communities as skilled scientists, engineers, and other professionals.

As you see, when we funded the University of Texas-El Paso's proposal to improve quality of life in its community, we were embracing much more than a project to build health clinics.

In fact, health care became the point of entry for a four-pronged campaign for community engagement that included:

- Education
- Community development
- Research and evaluation
- Resource development

The first campaign focus – education – will illustrate how this community-based process works. Starting with the need for quality health care, representatives from the institutions of higher education, health care consumers, and agency representatives focused on the need for health care professionals to work in the clinics. Health Care, of course, requires scientifically trained professionals, which caused the team to look at the availability and quality of science courses and degree programs at all levels in the community. Their interests resulted in curricula and teaching approaches that are community based and problem focused. The students became engaged because they could see how much it matters.

I met Dr. Islas on a recent site visit to El Paso to celebrate a decade of success of the partnership that propelled him into his career. Had it not been for the opportunities embedded right within his own community, he would not have had the encouragement and support needed to become a medical doctor. Dr. Islas is proud of his roots and excited about his future; he takes great pleasure in mentoring others coming along.

Unfortunately, the story of El Paso with its engaged universities is not yet a common one. There are other examples – Hartford and Trinity College as well as the many colleges and universities working with communities and their schools in our ENLACE initiative. But we have seen enough to know that it can work when communities and institutions of higher education commit to working together to attract young people into the scientific and technological fields needed by the community's industries. That's why I am confident that BEST's intent to focus on communities will bear fruit.

Communities are the right place to locate BEST's action program – it's where young people grow and learn; where adults can mentor, support, and nurture learning and the importance of science and technology. People in communities have a vested interest in public and private action that affect their lives.

BEST brings to community efforts:

- National benchmarks of best-in-class and exceptionally promising programs;
- Insights into the implementation and costs of scaling best practices;
- Knowledge of barriers to success and of lessons learned from failure; and
- Expertise of nationally recognized practitioners, policy makers, and researchers

Realistically, BEST must focus on translating and applying these results to six to ten communities – communities that reflect a geographic distribution that mirrors the nation's ethnic complexity, a varying demographic mix, and diverse industry sectors and patterns of growth. Community partners selected by BEST will have a full set of educational institutions able to develop a science, engineering, and technology workforce. From these communities will come real gains that will capture attention and imagination, and will have the power to be replicated in communities across the country.

Community engagement is no substitute for national leadership and a national agenda. Rather, it is the natural extension of such leadership. To capture a quote from "Land of Plenty," the Congressional report (issued in July 2000 by the Congressional Commission on the Advancement of Women and Minorities in Science, Engineering and Technology Development):

"If, on the other hand, the United States continues failing to prepare its citizens from all population groups for participation in the new, technology-driven economy, our nation will risk losing its economic and intellectual preeminence."

It's time to move beyond study and discussion to a national agenda that enables every community to be an active force in taking us where we need to go. BEST can help our nation move in that forward direction. Thank you.

MORELLA: Excellent, good. Congratulations. Dr. Wince-Smith.

Testimony of Deborah Wince-Smith, president, Council on Competitiveness

WINCE-SMITH: Thank you, Congresswoman Morella and thank you Congresswoman Johnson for your leadership in BEST. It is a pleasure to be here and share the Council's role in BEST and our work to ensure U.S. competitiveness.

In 1986 the United States was facing one of its most dire economic challenges since the end of World War II: the country slid from being the world's largest creditor to its largest debtor; its position as a global leader in technology and innovation was declining; and American industries were losing market share to international competitors. This prompted two-dozen industrial, university, and labor leaders to establish the Council on Competitiveness, a forum for elevating U.S. competitiveness to the forefront of the national policy agenda.

John Young, founder of the Council on Competitiveness and former president and CEO of Hewlett Packard Company, stated: "The basic goal that we established in founding the Council remains the right one: to unite the nation around an agenda that will raise the living standards of ALL (emphasis added) Americans by improving the ability of U.S. companies and workers to compete in world markets." Nearly two decades later, the Council's mission remains compelling and relevant with ever evolving challenges to U.S. competitiveness.

We know that long-term U.S. productivity growth and a subsequent rising standard of living depends on our ability to increase U.S. innovative capacity. This top tier policy issue was the focus of two national innovation summits hosted by Council that convened the nation's top business, government, academic and labor leaders. A key impediment to increasing innovation is our workforce, which comes as no surprise to anyone in this room.

In the Council report *Going Global*, we found that companies with the ability to manufacture and sell anywhere in the world were investing where they found the best and most abundant talent pools. Scientists and engineers, in particular, are the linchpins of our innovation capacity, which drives productivity and justifies higher wages. The Department of Labor projects that new jobs requiring science, engineering and technical talent will increase by 51 percent between 1998 and 2008 – a rate of growth roughly four times higher than average job growth.

Yet, even as demand for science and engineering talent grows, the number of science and technology degrees at the undergraduate and graduate degrees has remained flat or declined in every field outside the life sciences. Boosting the national talent pool in science and engineering requires that the S&E workforce mirror the population at large; we must be able to engage more women and minorities in math and science to sustain our innovation economy.

The Council has acted on its commitment to raise the standard of living by initiating programs that encourage excellence in math and science and diversity in the science and technology pipelines – namely getsmarter.org and BEST.

Getsmarter.org is an interactive website to increase students' interest and literacy in science, mathematics, and technology and provide resources for their parents and teachers. The site includes MSTV (Math and Science Television), a feature that shows high school students how relevant math and science are to their daily lives. Al Berkeley, who spoke to you earlier, led this effort along with the University of California president, Richard Atkinson.

The launch of BEST was another natural extension of the Council's work. We are thrilled with the progress of BEST and remain actively engaged through my membership on the board of directors and exploration of future projects.

The Council continues to work hard in identifying economic impediments and enablers at the national, regional and local levels through: benchmarking; supporting national and regional innovation; maintaining competitiveness while increasing security; educating Congressional staff on cutting edge science and technology issues; and establishing dialogues between Council members and their international counterparts

There are great opportunities for collaboration between BEST and the Council's new National Center for Regional Innovation and Competitiveness designed to provide communities the analytical tools and policy roadmaps to develop comprehensive strategies to build their innovation capacity.

The Council has established a partnership with the National Governors Association to foster state economic strength and competitiveness in global markets in two overarching areas: improving awareness of the conditions necessary to promote innovation and, from it, economic prosperity; and creating the tools and techniques that states can use to spur innovation and its growth throughout state and regional economies.

And let me just share with you that one of the first areas that we're moving forward aggressively with is what we're calling the Pittsburgh/Northeast Ohio regional corridor where the National Inventors Hall of Fame and the National Adventure Center are located in Akron, Ohio. We are looking forward to working with BEST in building the diversity challenge for K-12 education into the National Network of Camp Adventures.

In summary, what you have heard today - the policy, the challenge, and what the Council is going to do in collaboration with BEST - is to do real action oriented work at the community level so that this will be embedded into everything that occurs through our partnership with the Council's new National Center for Regional Innovation and Competitiveness and influential organizations such as the National Governors Association. Thank you very much.

MORELLA: Thank you. That's a perfect way actually to end as you talk about reaching out in the partnerships and community engagement. I just think this has been absolutely fabulous. We've had so many meetings going on throughout Congress that I hope you understand if you don't have people coming in and the fact that we must leave because I've got four votes now coming up consecutively.

But I congratulate all of you for the work that you've done and look forward to hearing the final results. Please know the entire nation and our international community will profit from what you are doing right here. Mr. Yochelson, do you want to take over now for final comments?

MR. YOCHELSON: I only thank you on behalf of all of us for your leadership. Thank you.

MORELLA: Thank you again.

(Whereupon, the above-entitled matter was concluded at 11:16 a.m.)

Building Engineering and Science Talent

401 B Street, Suite 2200

San Diego, CA 92101

619-237-8822

www.bestworkforce.org

