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Mr. Chairman, Ranking Member Ehlers, Members of the Subcommittee. Good morning. I am Susan Traiman, Director of Education and Workforce Policy at Business Roundtable.

Thank you for inviting me to testify before you today on science, technology, engineering and mathematics (STEM) education and the recent report issued by the National Science Board, *A National Action Plan for Addressing the Critical Needs of the U.S. Science, Technology, Engineering, and Mathematics Education System*.

Business Roundtable is an association of chief executive officers of leading corporations with a combined workforce of more than 10 million employees and $4.5 trillion in annual revenues. The chief executives are committed to advocating public policies that foster vigorous economic growth; a dynamic global economy; and a well-trained and productive workforce essential for future competitiveness.

America's business executives are united in their concern about STEM education in the United States. They understand that STEM education is the critical underpinning of both national

economic competitiveness and individual success in the modern workplace. In 2005, Business Roundtable, together with fourteen other national business associations, created the Tapping America's Potential campaign, or TAP, with the goal of doubling the number of American science, technology, engineering and mathematics graduates with bachelor's degrees by 2015. Business Roundtable members believe that expanding the talent pool of Americans with a firm grounding in STEM disciplines is a critical element—perhaps the critical element—of the innovation agenda that the United States must pursue in order to remain competitive in the 21st Century. Several of our members served on the committee that issued the National Academies report, *Rising above the Gathering Storm,* and Norm Augustine, the committee's chairman, is a former chairman of Business Roundtable's Education Task Force.

Business Roundtable endorsed, and worked actively for the passage of, the vital STEM education legislation that originated with this Committee and which was enacted as part of the *America COMPETES Act*. The potential impact of this legislation depends on what happens to its appropriations this year and in future years.

In your invitation, you have asked me to comment on the National Science Board report. My remarks reflect the sentiments I am hearing from business leaders, as well as my experience working on these issues at the federal, state and local levels.

The National Science Board identifies two central challenges to STEM education in the United States: ensuring coherence in STEM learning and ensuring an adequate supply of well-prepared, highly effective STEM teachers. Both challenges have been the subject of countless reports and federal and state initiatives over the past twenty years. And both reflect the overall problems and dysfunctions with K-16 education in the United States as well as issues that are unique to STEM.

On Coherence and the recommendation to "Develop Nation STEM Content Guidelines": For CEOs of leading global companies, the idea of 50 different state-specific standards and assessments for what students need to know and be able to do in STEM is absurd. U.S. performance on international assessments such as the Trends in International Mathematics and Science Study (TIMSS) and the Program for International Student Assessment (PISA) makes it clear that the appropriate comparison for education performance is not between states, but between states and our international competitors. In this context, state-specific standards defy logic. But history and politics often create conditions where logic-defying outcomes prevail.

The National Science Board recommends creating new governance structures to achieve vertical and horizontal integration in STEM education. In an ideal world, the Board's recommendations might make sense, but I fear that they do not account for the history and the politics that got us where we are today.

We have been down this road before and our experience suggests that caution may be in order. When Business Roundtable first got involved in standards-based education reform in the early 1990s, CEOs focused at the state level, which is where the primary responsibility for education standards resides. CEOs identified nine essential components of a successful education system and either joined or created state business coalitions to advocate for systemic education policy reform. This marked two major shifts for business—first, a move away from the "adopt a school" approach toward changing the state education policies that affect all schools and students and second, a move away from single silver bullet solutions toward systemic reform with aligned policies based on high academic standards for all students. At the time, to the extent that states had standards, they tended to be minimum competency. While advocating for change at the state

level during the 1990s, Business Roundtable also endorsed proposals by both the Bush (I) and Clinton Administrations for voluntary national standards and tests. However, both the Bush and Clinton initiatives were resoundingly rejected.

The actual development of national standards started with math through a non-governmental initiative by the National Council of Teachers of Mathematics (NCTM) in 1989. Textbook companies quickly aligned their materials with the NCTM math standards, and the federal government funded other professional groups to develop national standards in their content areas. The quality of the standards produced by these national subject-matter groups varied widely. To reach consensus, authors added rather than subtracted standards and many were so voluminous that there would be no time left to teach other subjects. Meanwhile, states began to develop their own standards in core academic subjects, frequently adapting their work from the national documents. Similar to the national standards, the quality of states' standards was, and continues to be, inconsistent.

By the mid-1990s, criticism from across the political spectrum about the quality and content of the standards—both national and state—threatened to end standards-based reform. To rescue the movement, governors and business leaders created Achieve in 1996 to help states benchmark and improve their standards, as well as align them with assessments and accountability. It was clear at that juncture that state-level standards were the only politically viable approach, but business leaders hoped that comparisons of quality and identification of state and international exemplars by Achieve would help push states in a common direction.

Shortly before President George W. Bush was inaugurated in January 2001, he invited a group of Business Roundtable CEOs to a meeting where he told them that his first initiative would be

federal education legislation and asked for their support. Business Roundtable helped lead the business community's involvement in shaping and passing the *No Child Left Behind Act* (NCLB). One of the most controversial parts of the bill required all states to participate in the National Assessment of Educational Progress (NAEP). Business leaders understood that NAEP was necessary to provide a common metric that enabled comparisons between states because NCLB accountability was based on states' own standards and tests. During the debate, Members of Congress were assured that NCLB would not lead to national standards and tests. Republicans, in particular, sought that clarification because they viewed national tests as a Clinton idea, forgetting that the first proposals for national testing and federal funding for the development of national standards in core academic subjects happened under the leadership of President George Herbert Walker Bush and then Secretary of Education Lamar Alexander. So NCLB as originally passed reinforced the role of each state to develop its own standards and assessments, as well as its own definition of proficiency and cut score for proficiency on its own test.

Just last week, a new analysis of where 26 states set the proficiency bar by Northwest Evaluation Associates and the Thomas B. Fordham Foundation revealed wide variations between passing scores in reading and math across the states. That math should be easier in one state than another is bizarre in a global economy.

Although it continues to be absurd in our international economy for states to have different standards in reading and mathematics, the business community is not currently promoting the development of voluntary national standards and assessments as part of the reauthorization of NCLB. To put it simply, we do not believe that federal involvement at this juncture would be helpful in moving a process that is gaining ground at the state level. Working with Achieve, nine

states are collaborating on the development of a common end-of-course test for Algebra 2. Thirty states are working to align their requirements for high school graduation with the expectations of higher education and the workplace. For now, the best approach is to include incentives in the reauthorization of No Child Left Behind for states to raise and align their standards and assessments so that students graduate from high school ready for postsecondary education and the 21st century workforce, and then backward map those standards for each grade so that they are vertically aligned.

It is important for the U.S. to get to "national content guidelines" or "voluntary national standards" or whatever euphemism is "politically correct" for national standards. However, I believe that a federally-initiated effort under the purview of a National Council for STEM Education is likely to be counterproductive, at this point, in light of the history and politics that continue to surround this issue. It also is likely to produce guidance that has not realistically addressed the tradeoffs in establishing priorities for what students need to know and be able to do that will be essential for schools that also need time to teach history, English, foreign languages, the arts and other important content.

You have specifically asked for my view on the recommendation to establish a STEM education council. Business Roundtable does not have a position on this matter but, for myself, I am skeptical. Someone once said that collaboration is an unnatural act between non-consenting adults. People also tend to be willing to collaborate if it is with the other person's money. I am all for more coordination and collaboration between federal agencies with responsibility for STEM education but it is difficult to enforce meaningful collaboration without budget authority. I am not convinced that a new layer of coordination with no real authority will improve the situation. Also,

many of the worthwhile recommended activities could be accomplished within the existing mission of agencies.

On STEM teachers: Business Roundtable couldn't agree more that the critical bottleneck in U.S. STEM education is the inadequate supply of well-qualified and highly prepared STEM teachers. That is why our member CEOs were so enthusiastic about the STEM education legislation moved by this Committee and enacted as part of the *America COMPETES Act* – because it focused on producing more well-qualified STEM teachers. One of the best features of the legislation is its emphasis on expanding programs that have a demonstrated record of success, such as the Robert Noyce Scholarship program, the Mathematics and Science Partnership program, and the Science, Technology, Engineering and Mathematics Talent Expansion Program (STEP), also known as the "tech talent" program at NSF. Time and again—in fact since the post-Sputnik years—we learn over and over that well-intentioned STEM initiatives fail because of inadequate attention to high-quality teacher preparation and professional development. From *No Child Left Behind* to the *Higher Education Act* to the *America COMPETES Act*, we need to build on lessons learned about what will produce results.

Nearly every one of the National Science Board's recommended actions for increasing the number of well-qualified STEM teachers and improving the quality of STEM teacher preparation have been endorsed by Business Roundtable and the national business organizations that are partners in the TAP coalition. The July 2005 TAP report makes specific recommendations that are very similar to those of the National Science Board, including:

- Promoting market- and performance-based compensation and incentive packages to attract and retain effective STEM teachers;

- Creating professional development and technical assistance to fill gaps in teachers' content knowledge; and
- Establishing incentives for colleges and universities to strengthen preparation programs for prospective STEM teachers.

In conclusion, Business Roundtable is on the same page as the National Science Board in terms of the depth and urgency of the problem with regard to STEM education in the United States. Like the Board, Business Roundtable believes the highest priority for STEM education policy should be recruiting, training and retaining many more well-qualified STEM teachers.

I would like to take this opportunity to thank Dr. Steven Beering and the members of the National Science Board for their important efforts on behalf of U.S. STEM education. Business Roundtable looks forward to working with the Board to strengthen U.S. STEM education and support NSF's STEM education programs.

Mr. Chairman, Ranking Member Ehlers and Members of the Subcommittee, thank you for the opportunity to testify today.