

Technical Workforce Issues

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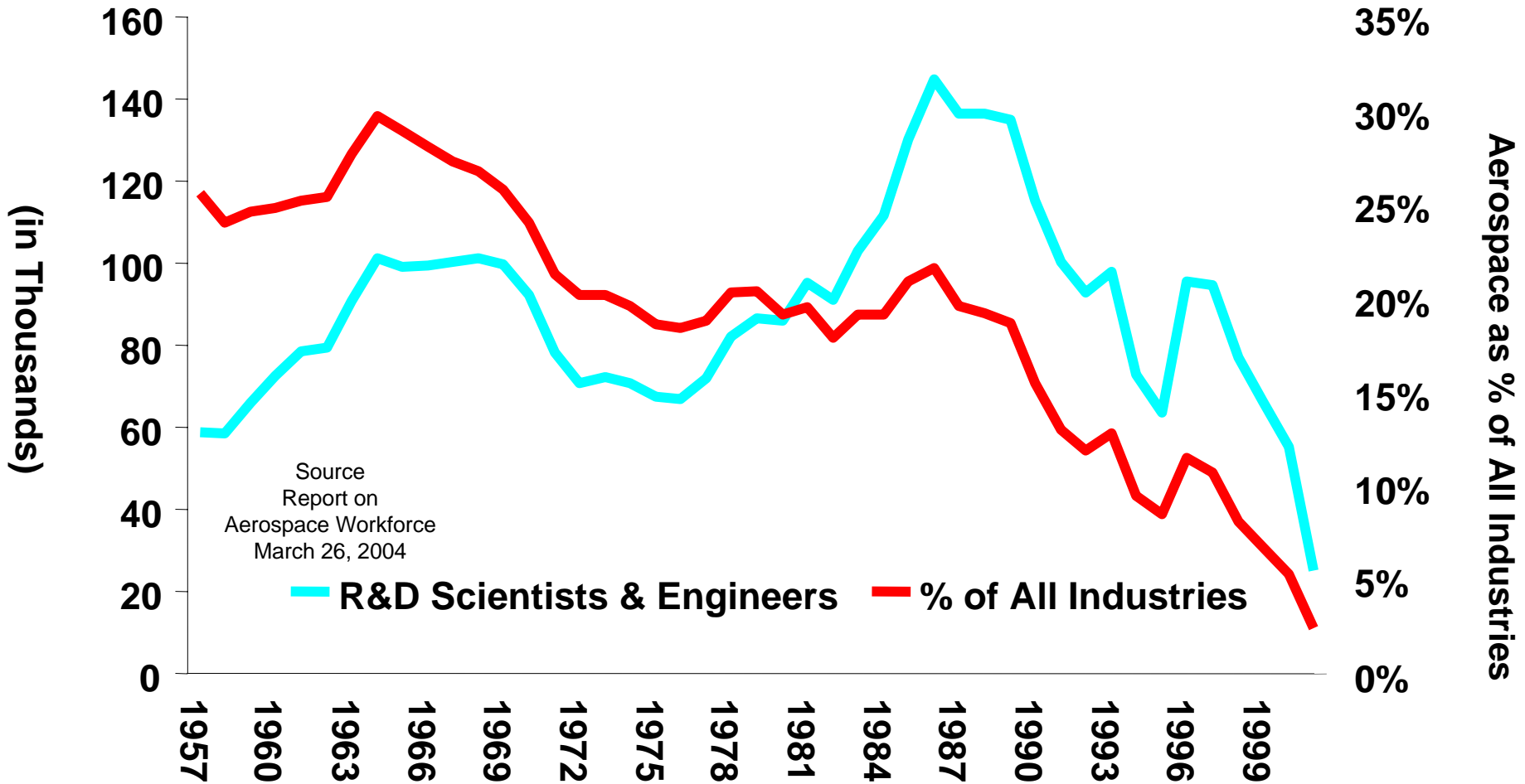
Northrop Grumman

Objectives

- Is there a workforce issue within Aerospace & Defense (A&D) Workforce?
 - Specifically looking at cleared or clearable Science, Technology, Engineering and Mathematics (STEM) professionals
- What are the demand drivers within that workforce?
- What is Industry doing about it?



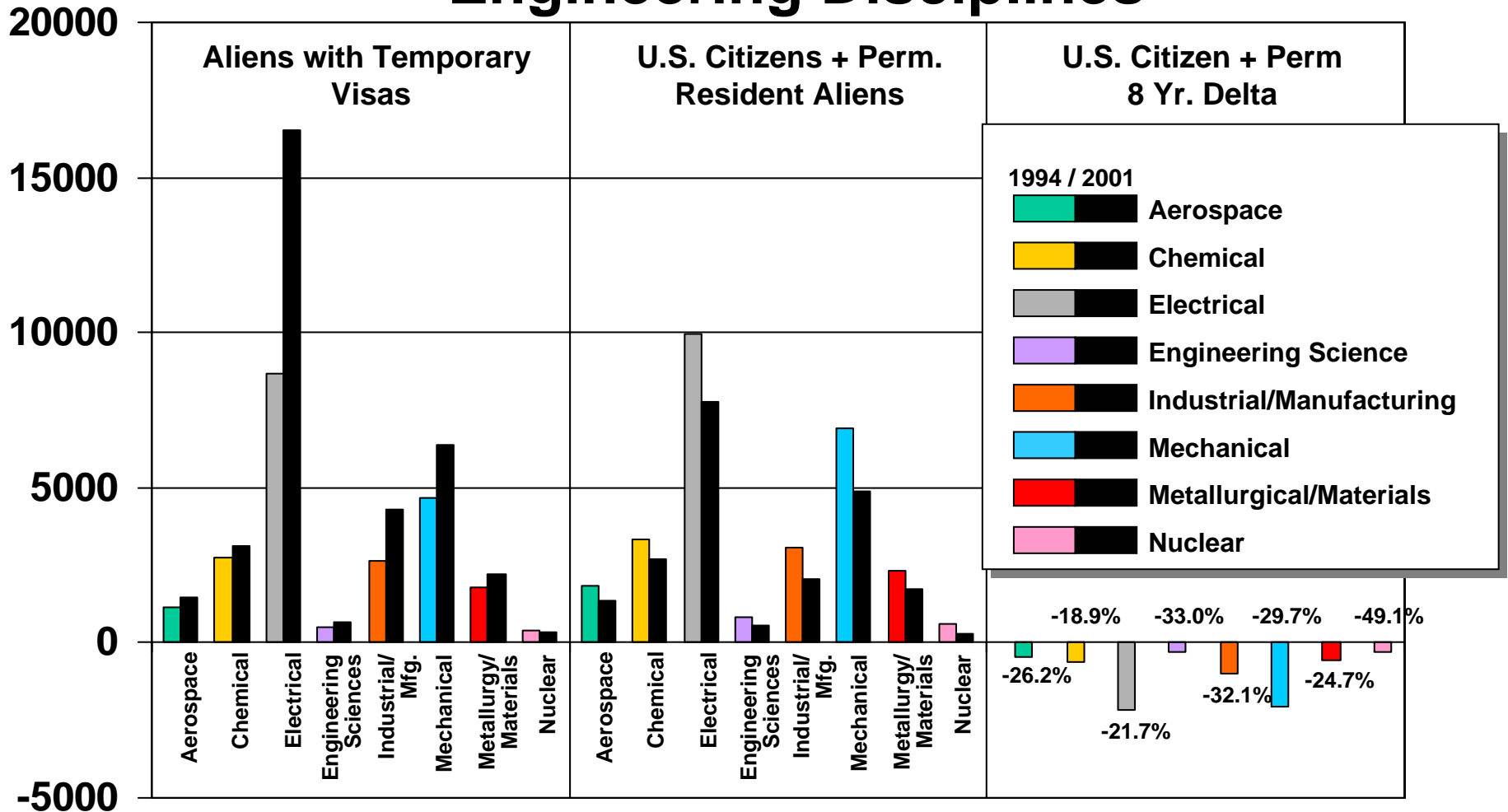
R&D Scientists & Engineers Employment in Aerospace and as Percentage of all Industries



U.S. University Trends in Defense-Related S&E Graduate Student Enrollment (1994-2001)

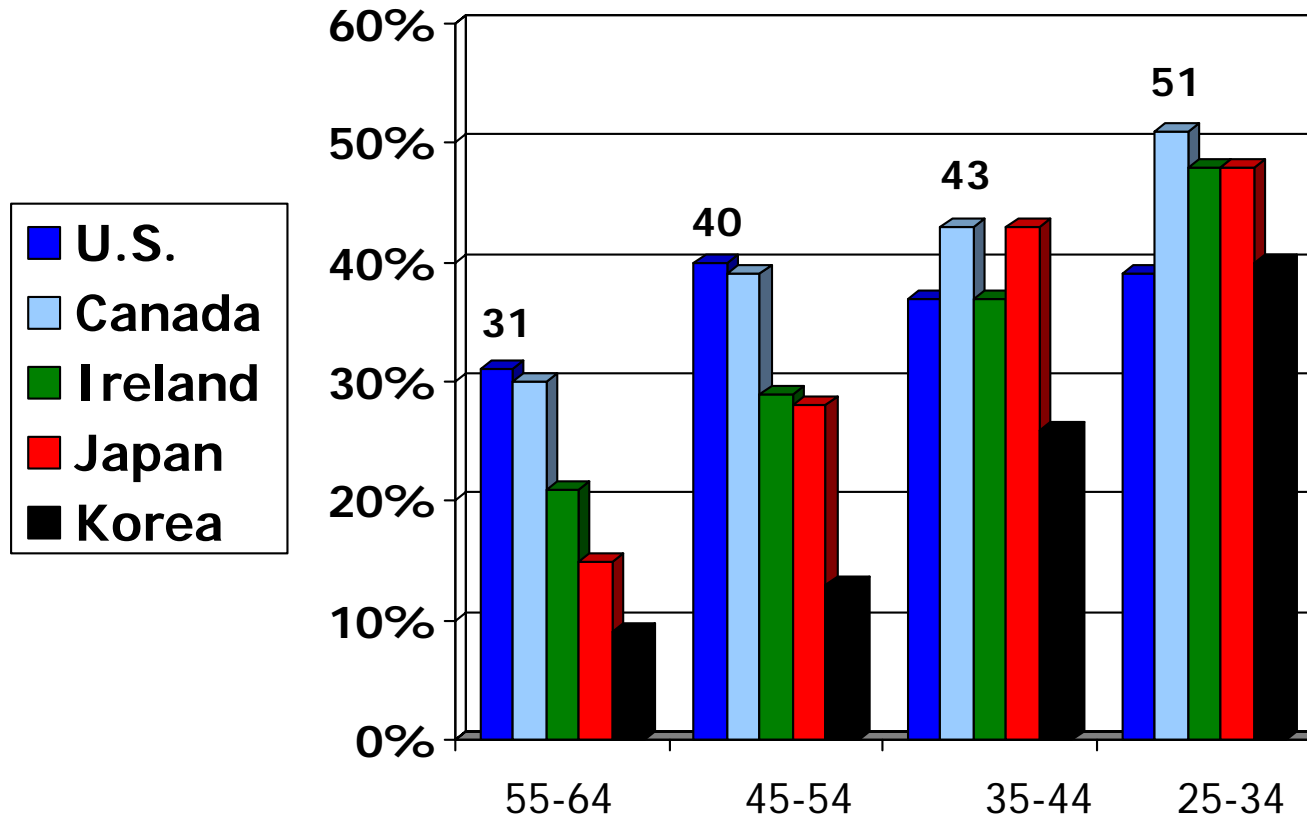
*Source: National Science Foundation – Graduate Students and Post Doctorates in Science and Engineering: Fall 2001

Engineering Disciplines



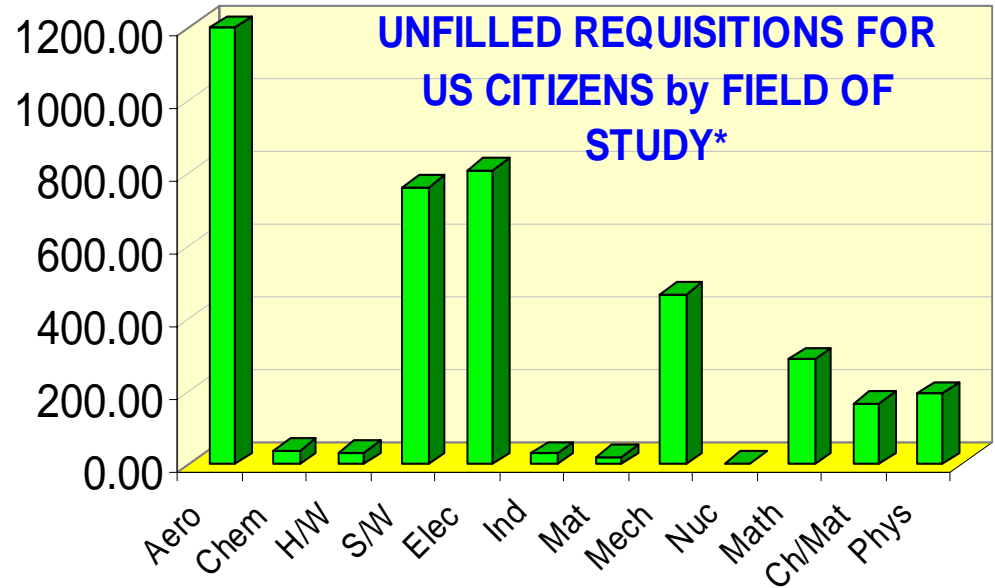
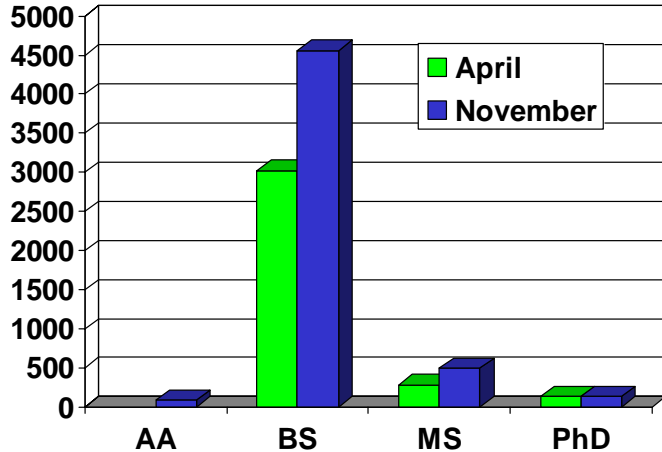
Percentage of population with a postsecondary credential

Losing Our Edge?



2004 Surveys

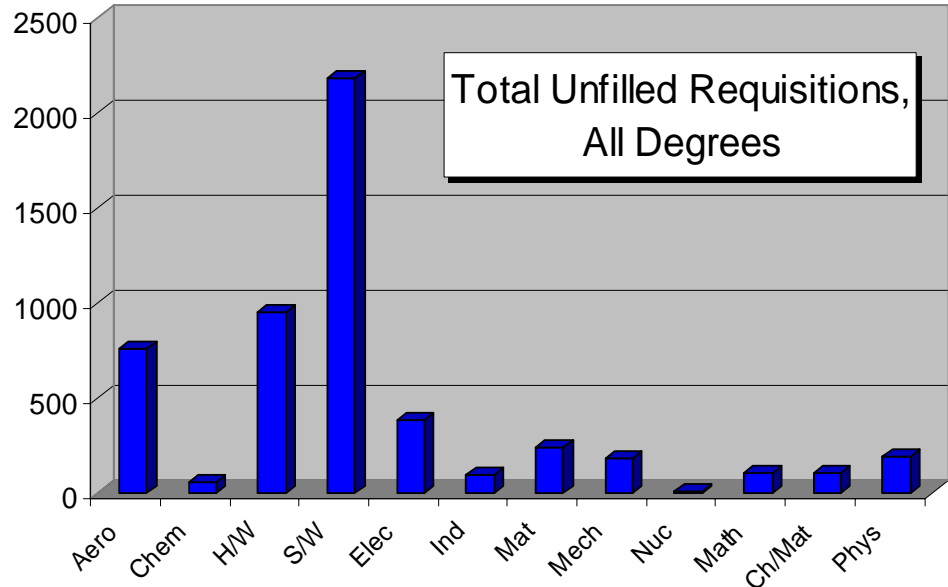
Unfilled, Funded Requisitions By Degree Level



Note: includes only data from respondents to NDIA/AIA Survey

No extrapolation taken to total population

No normalization of data between surveys except question consistency



Defense Industry Perspective



Quick-Look Presentation
August 31, 2004



Report on
Aerospace Workforce
March 26, 2004

21 June 2007

- **Industry Demand Data**
 - Survey responses highly indicative of a high demand/low supply market place with future negative trends for US Citizens
- **Workforce Demand Thematic**
 - Perfect Storm Analogy is real – not just anecdotal
 - Focused on cleared and clearable engineers
- **Employment Considerations**
 - Priming the pump is only first step – effective utilization and retention are critical!
- Immediately reverse the decline in scientifically and technologically trained US workforce...
- America's breakdown of intellectual and industrial capacity threatens national security and our capability to continue as a world leader
- Substantive, long-term US Gov. investment in STEM education and training at the undergraduate and graduate levels

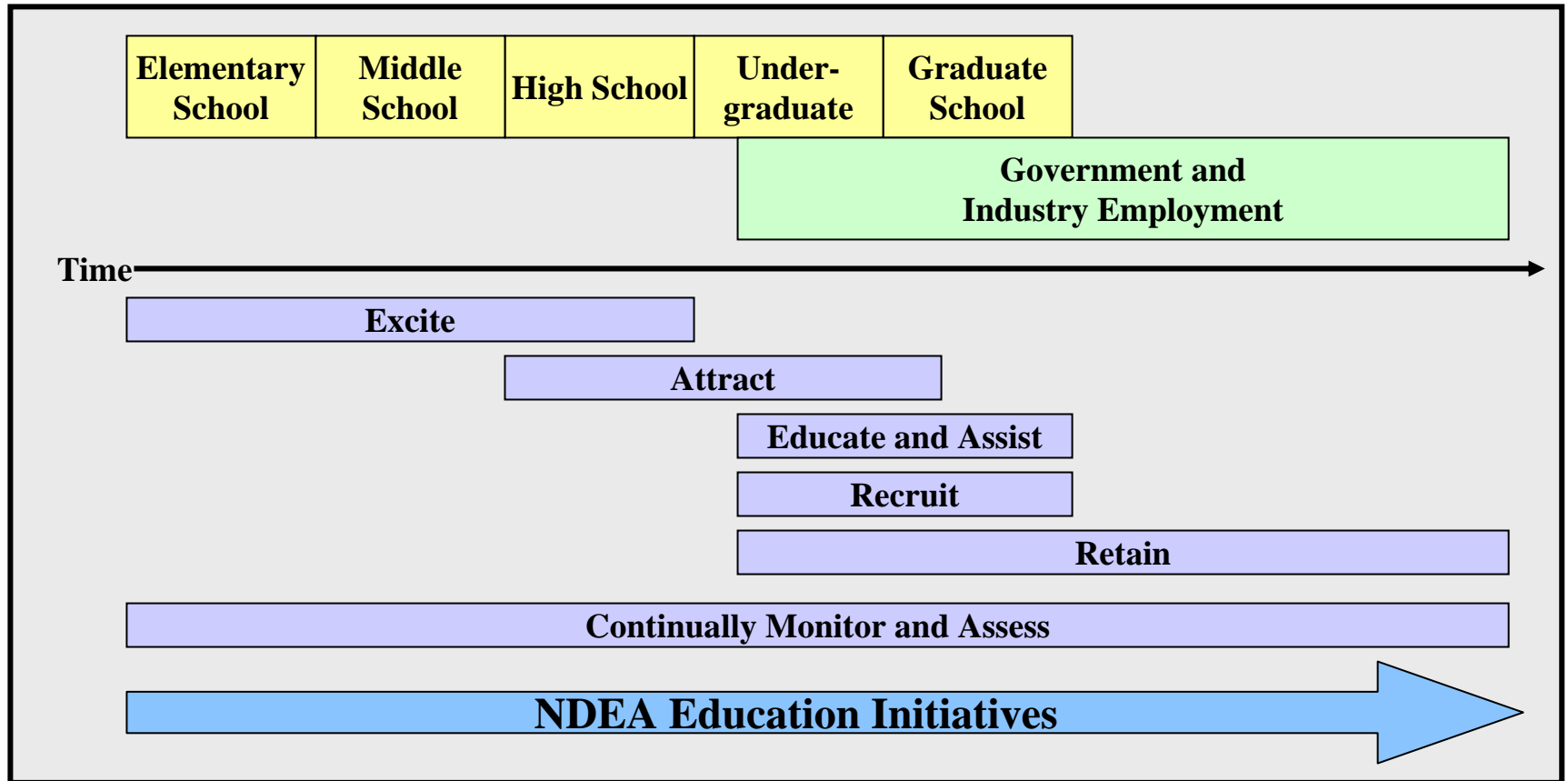
What Are We Doing About It?

(And what can you do?)

Recent DoD Activities

- SMART/National Defense Education Act (NDEA) Phase I
 - Funded at \$4M for FY06, \$14M for FY07 and \$40M for FY08
 - Phase I program details in active coordination
- Future actions
 - Establish mechanism to refine critical skills & disciplines needs
 - Improve reporting of ongoing programs
 - Track Science, Mathematics, and Engineering (SME) participants
- Establish Industry organization for enduring response
 - AIA Industrial Base and Workforce Committee
 - NDIA National Security Science and Technology Workforce Division

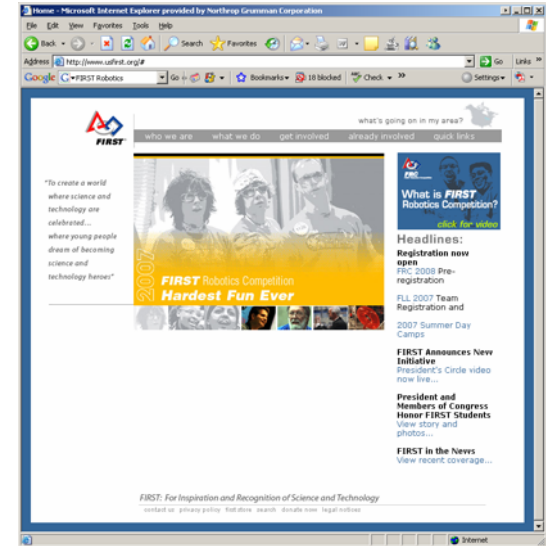
Notional NDEA 2006 Strategy



NDEA 2006 recommendations reflect a strategy which sets preconditions for an adequate S&E workforce pipeline based upon providing S&E-related educational opportunities

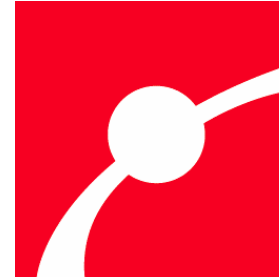
FIRST Robotics

- For Inspiration and Recognition of Science and Technology (FIRST)
- FIRST Robotics Competition (FRC) is a unique varsity sport of the mind designed to help high-school-aged young people discover how interesting and rewarding the life of engineers and technology can be.
- The FIRST Robotics Competition challenges teams of young people and their mentors to solve a common problem in a six-week timeframe using a standard "kit of parts" and a common set of rules.
- Teams build robots from the parts and enter them in competitions
- What is unique about the FRC program?
 - It is a sport where the participants play with the pros and learn from them
 - Designing and building a robot is a fascinating real-world professional experience
 - Competing on stage brings participants as much excitement and adrenaline rush as conventional varsity tournaments
 - The game rules are a surprise every year



Other Initiatives (Cont'd)

- National Center for Technological Literacy
 - <http://www.mos.org/nctl/index.html>
 - NCTL's goal is to integrate engineering as a new discipline in schools nationwide and to inspire the next generation of engineers and innovators.
- ASEE K12 Engineering Center
 - <http://www.engineeringk12.org/>
 - This Center seeks to gather in one place the most effective engineering education resources available to the K-12 community.



National Center for Technological Literacy®

Museum of Science, Boston



Potential NDIA Initiatives

- Option 1: National STEM Career Day
 - Synopsis: Most high schools in the US hold some form of Career Day. NDIA can mobilize large numbers of volunteers, armed with “bullet point” background papers and other presentation material, focused on National Security Careers with an emphasis on Science, Technology, Engineering and Mathematics.
 - Costs: Low – Development and Distribution of presentation materials, advertising, mobilization through chapters, divisions and National Defense Magazine, national coordinator to target high schools not yet visited.
 - Means to offset costs: in-kind donations and sponsorships by member companies
- Option 2: Academic Olympics
 - Synopsis: Leverage Botball, FIRST Robotics, Team America Rocketry Challenge and add other events into a national competition. Would have to team with several other associations, primary “verticals” (IEEE, ASME, AIAA, AIA) to sponsor specific events. NDIA would provide link to National Security, engage DOD, DOE and others to provide high level visibility and government sponsorship.
 - Costs: High – probably a full time dedicated organizing group with large volunteer force. Means to offset costs: government seed investment, separate endowment possible. Entry fees, sponsorships, potential partnership with TV (Discovery Channel?)

Potential NDIA Initiatives (Cont'd)

- **Option 3: Expand on Discover E program**
 - Synopsis: Discover E is an Engineering curriculum that is developed and distributed for presentation by volunteers during “National Engineers Week” (last week in February). It is focused primarily on engineering in the late elementary and early secondary schools and involves an engineer being a “teach for a day.” We could expand to all STEM disciplines and create “National Security Career Week” and provide a broader curriculum and mobilize volunteers to teach.
 - Costs: Medium – expanded curriculum development, national coordination, program materials
 - Means to offset costs: sponsorship opportunities, advertising in materials, leverage “vertical” associations to develop curricula.
- **Option 4: Promote Project Lead The Way or US FIRST**
 - Synopsis: Project Lead the Way is focused on developing and sponsoring well qualified Science and Math teachers in the late elementary and middle schools. They have a fully developed curriculum and are now in 1500 schools, with a goal of 5,000 by 2010. NDIA could simply endorse the program, sponsor several schools, promote sponsorship among member companies, provide financial support to PLTW headquarters, provide PLTW exposure in National Defense Magazine or any combination thereof.
 - Costs: none to substantial
 - Means to offset costs: corporate sponsorships and donations. Costs only incurred above NDIA National Commitment level after sponsor/donation identified.
- **Many More – Do you have any ideas?**

National Security Science and Technology Workforce Division

- Provide a forum for effective interaction between government, industry, academia and the public at large for the strengthening of the national security Science, Technology Engineering and Mathematics (STEM) workforce,
- Overall objectives
 - Increasing NDIA's participation in exciting and attracting K-12 students into STEM careers
 - Maximizing cooperation between federal departments, agencies and industry on STEM workforce development initiatives
 - Supporting the development of integrated policies around the STEM workforce
 - Establishing partnerships to collect and disseminate information and coordinate resources to build a robust STEM workforce of the future.

Focus Areas for the NSSTWD

- **Focus Area / Objective 1**: Gather industry support for activities and initiatives that excite and attract young people (K-12) in pursuing STEM careers in the national security industry.
- **Focus Area / Objective 2**: Provide industry wide support to government STEM initiatives, such as the Interagency Aerospace Workforce Revitalization Task Force, the DSB Study on Nuclear Deterrence Skills Task Force and the Department of Energy led National Security Community Workforce “Stoplight” project.
- **Focus Area / Objective 3**: Produce a Defense Industrial Base Workforce Workshop by the end of calendar year 2007
- **Focus Area / Objective 4**: Engage and support the US Congress STEM caucus in evaluating and supporting legislation to improve STEM education and workforce development

Conclusions

- The Perfect Storm is upon us
 - Low supply of clearable, highly skilled workers, engineers and scientists is real
 - Retirements resulting in loss of institutional memory and effective mentors
- Solutions require a broad range of action
 - K-12
 - Vocational and Technical colleges
 - Higher Education
 - Government
 - Industry
- Full spectrum response required
 - Excite
 - Attract
 - Recruit
 - Train
 - Retain
- You can engage and make a difference!