Technical Workforce Issues

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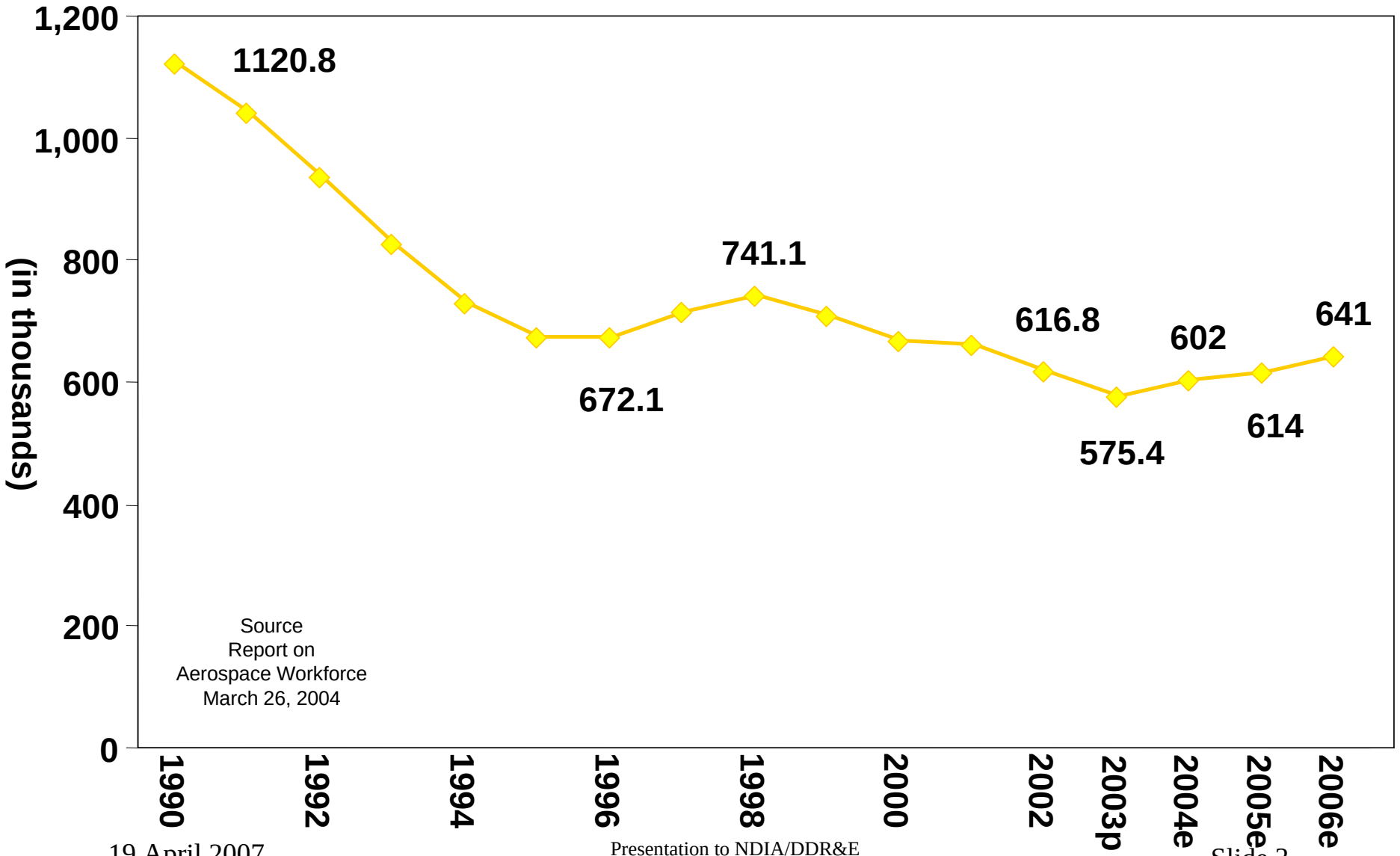
Objectives

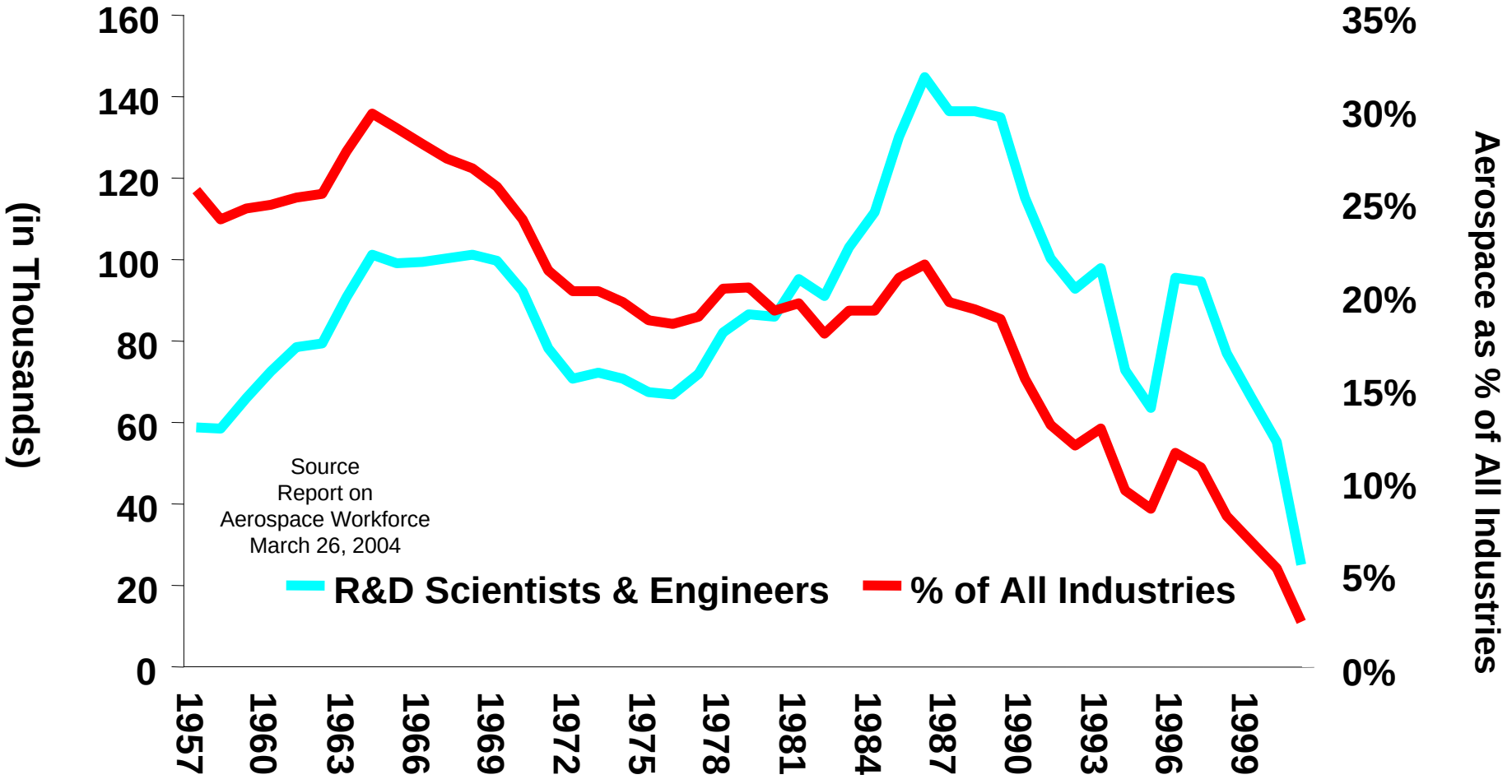
- Is there a workforce issue within Aerospace & Defense (A&D) Workforce?
  - Specifically looking at cleared or clearable Science, Technology, Engineering and Mathematics (STEM) professionals
- What are the demand drivers within that workforce?
- What is Industry doing about it?

"Aerospace" Employment



R&D Scientists & Engineers Employment

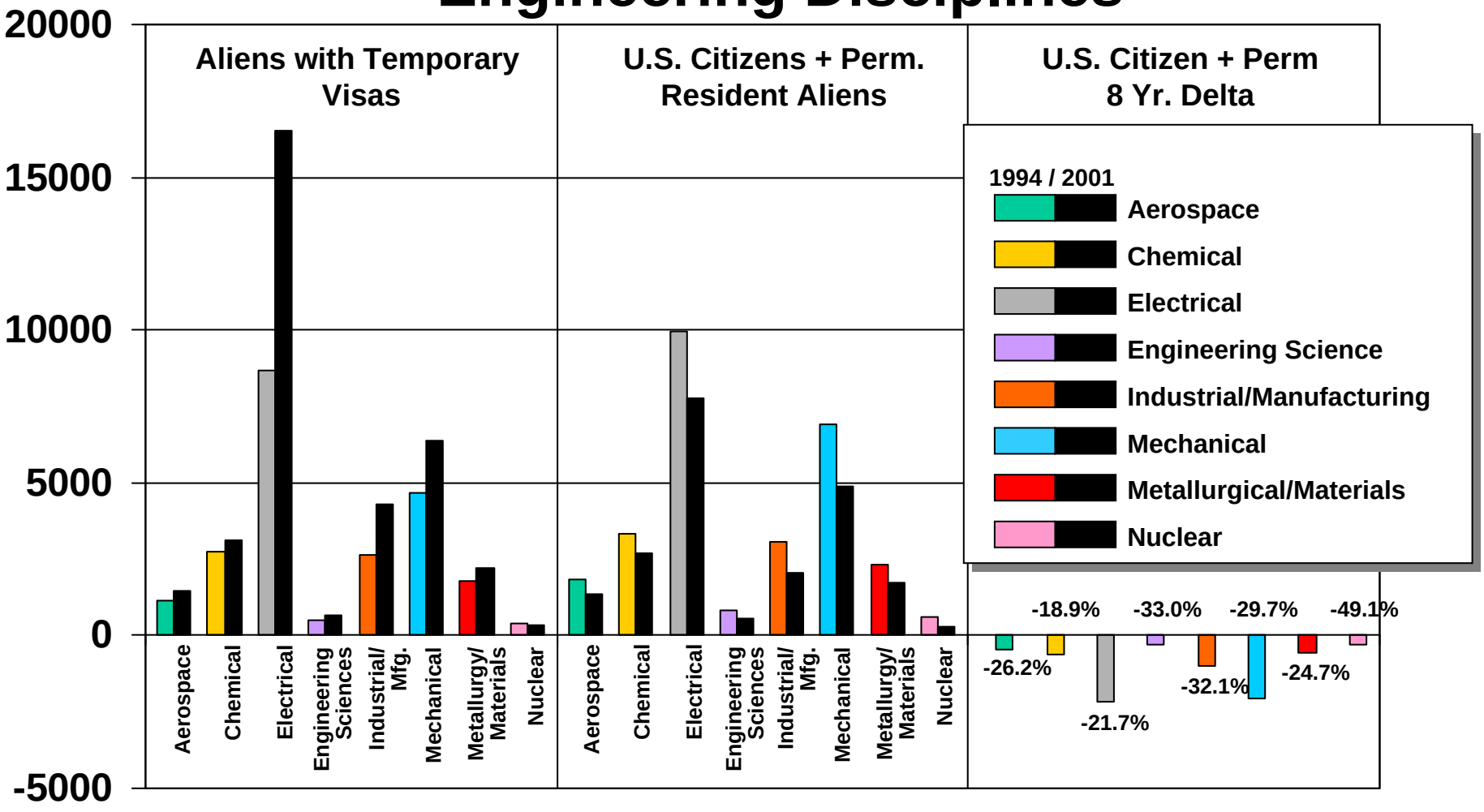
in Aerospace and as Percentage of all Industries



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

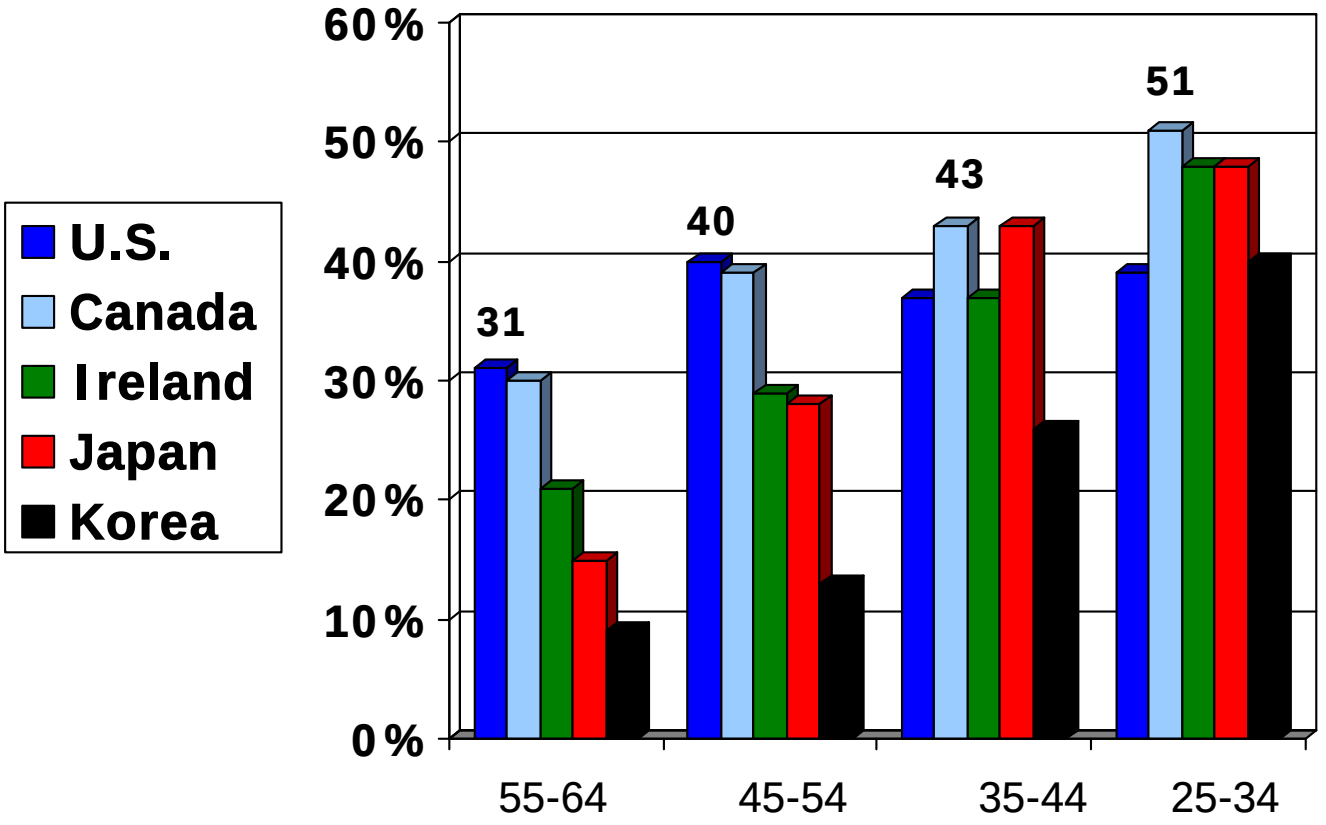
***Source: National Science Foundation – Graduate Students and Post Doctorates in Science and Engineering: Fall 2001**

Engineering Disciplines

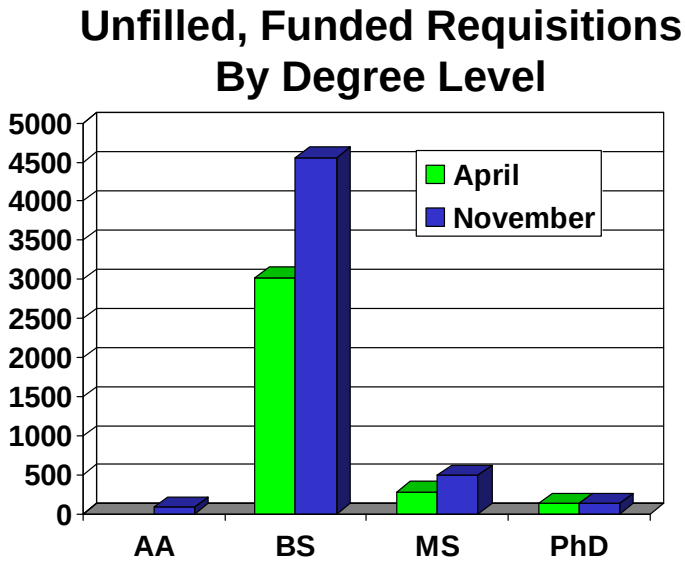


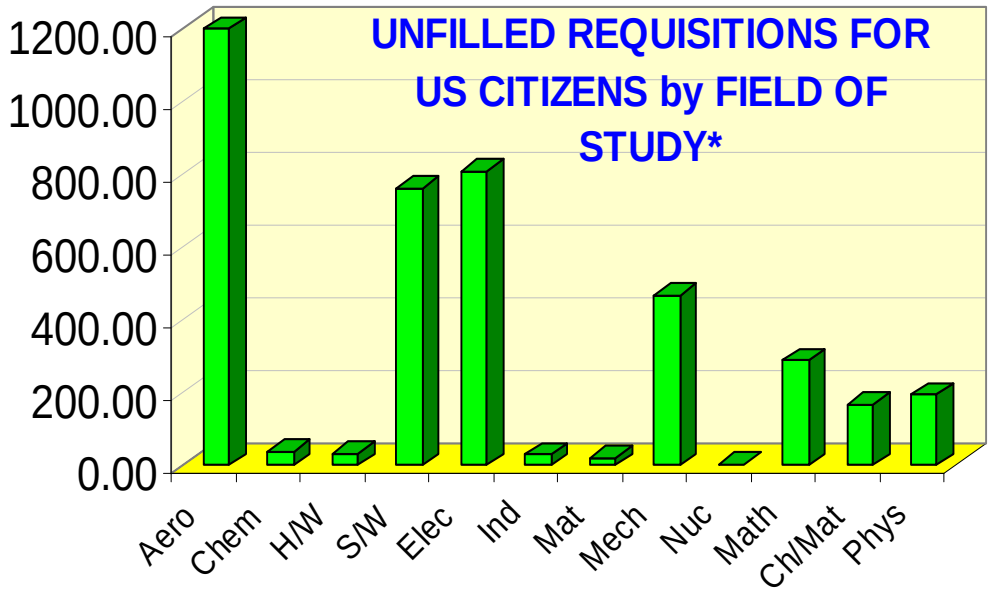
Percentage of population with a postsecondary credential

Losing Our Edge?



2004 Surveys

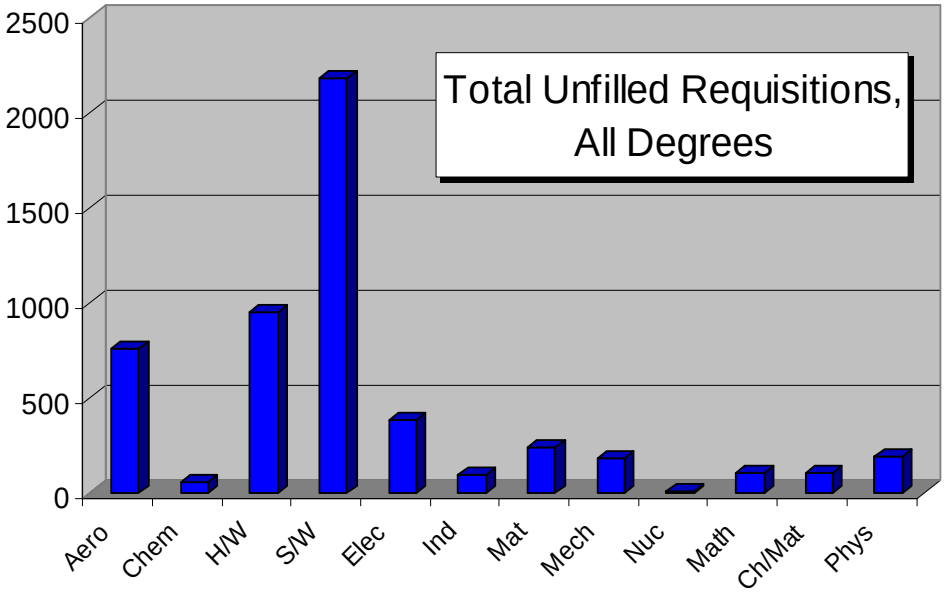




Note: includes only data from respondents to NDIA/AIA Survey

No extrapolation taken to total population

No normalization of data between surveys except question consistency



Defense Industry Perspective

NATIONAL DEFENSE INDUSTRIAL ASSOCIATION
STRENGTH THROUGH INDUSTRY & TECHNOLOGY

Quick-Look Presentation
August 31, 2004

AEROSPACE INDUSTRIES ASSOCIATION

Report on
Aerospace Workforce
March 26, 2004

- 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!

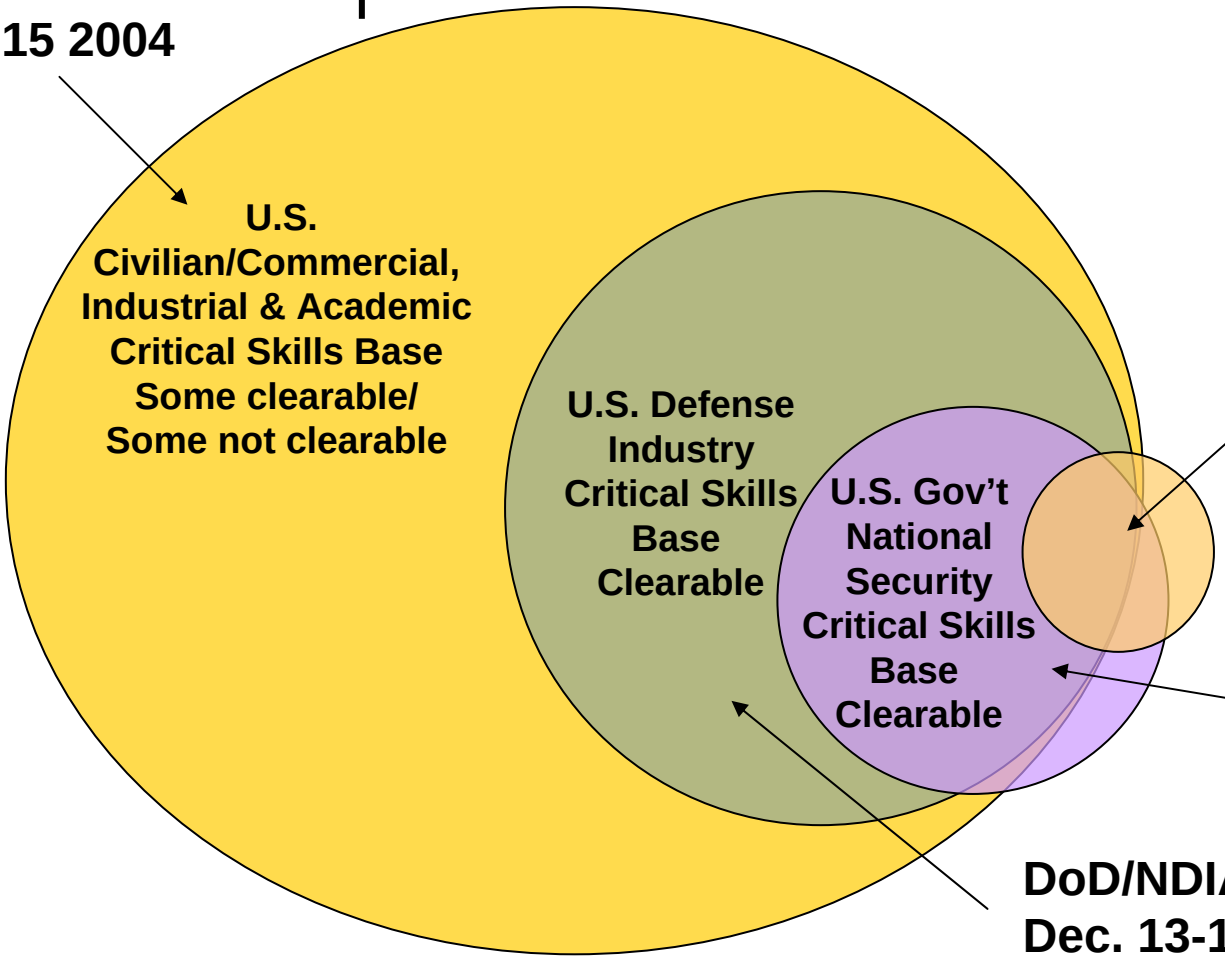
- Immediately reverse the decline in scientifically and technologically trained US workforce…
- America's breakdown of intellectual and industrial capacity threatens national security and our capability to continue as a world leader
- Substantive, long-term US Gov. investment in STEM education and training at the undergraduate and graduate levels

Initial DoD Critical Skills Focus

Proposed SMART/NDEA Phase 1 Relative to Other U.S. Sectors

National Innovation Initiative Summit Dec, 15 2004

Increasing uniqueness of U.S. Defense-related Critical Skills Base



Focus of proposed SMART/NDEA Phase I: Shape future DoD Critical Skills Base (Clearable)

Committee on Homeland & National Security Mtg Oct. 14, 2005

DoD/NDIA/AIA Workshop Dec. 13-14, 2004

Workforce Demand Thematics

- SEE – Significant Emotional Event (or Significant Technological Event) for change in demand is mismatched with supply
  - Sputnik – NDEA 58
  - Invention of the integrated circuit – Led by DARPA investments
  - Personal (Distributed) Computing explosion -- System integration capabilities drawn from DOD experience
  - Internet -- ARPANET

- Weather prediction – Perfect Storm appears to be forming from unprecedented conjunction of trends
    - Retirement of the post-Sputnik generation
    - Decline in clearance-eligible S&E workforce
    - Diminishing U.S. technological dominance due to globalization of R&D

There is no assurance that we can maintain our technological advantage for next/follow-on generation operational capabilities

Demand Model Considerations

- Industry “follows the money” and “mirrors” the government
- Not clear what will and can be expected of industry versus what will be done in the government (SoS work, lab demise, etc)
  - Industry’s strategic planning window is about 8-20 quarters
    - DoD planning is 5-10-20 years (firm 1-2, less firm 3-10)
    - Academia basic research focused
  - Industry IR&D commitment currently near-term focused
    - Risk reduction vice innovation
  - Government may have unrealistic expectations that industry will pick up what the government is shedding
  - Technology application skills are not the same as tech base R&D
- Flexibility to deal with:
  - Technology trends/surprises
  - Doctrinal and vision changes
  - Uncertain budgets/commitments and changing procurement cycles

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

NDEA Initiatives Matched to the Strategy

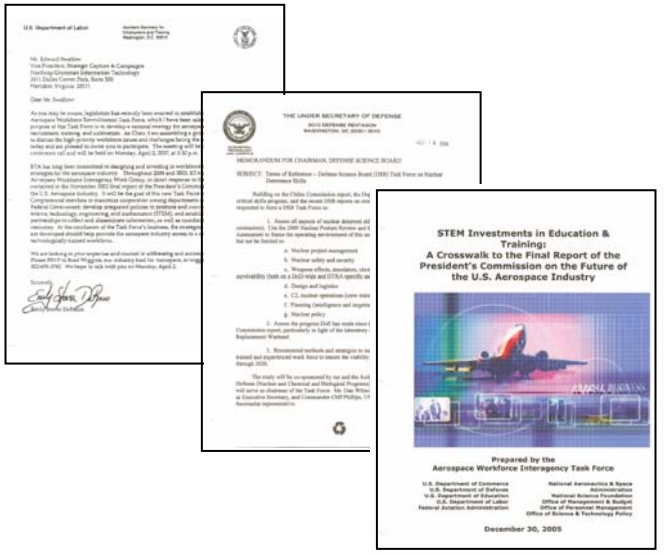
Supply			Demand	
K-12	High School & Undergraduate	Undergraduate & Graduate	Undergraduate & Graduate	Postgraduate
Excite	Attract	Educate (& Assist)	Recruit	Retain (& Continue to Educate)
Student Enrichment Programs (STARBASE, grades 5-8)	Secondary School Research Exposure and Experiences	National Defense Undergraduate Scholarship Program	Defense Undergraduate Internship Program	Joint Capabilities Focused Postdoctoral Fellowships Program
Modeling and Simulation Based Math Curriculum	College Freshman Science Experience Curriculum Development	Practice-Oriented Masters Degree Program	Defense Graduate Internship Program	Defense S&E Reserve Corps Program
Engineering Our Digital Future Curriculum	Undergraduate Research Program	Encourage Establishment of Graduate Systems Engineering Degree Pgms	Graduate Research Traineeship Program	Service Graduate School (NPG and AFIT) Degree Expansion
Materials World Modules Curriculum		Regular (biennial) Critical S&E Skills Supply vs Demand Assessment (ID Educational Shortfalls)	National Defense S&E Graduate Fellowships Program	Systems Engineering Education with Industry (Experience Development)
Teacher Summer Fellowships Program			Systems Engineering Graduate Fellowships at Product Centers	
Teacher Summer Recurring Education Program				
Government Outreach Programs (Ex: Boy/Girl Scouts)				

Legend: DDR&E Initiative; NDIA Initiative

Other Initiatives

- Project Lead The Way
  - http://www.pltw.org/index.html
  - PLTW works with schools to implement an instructional program to prepare students to be successful in post secondary engineering and engineering technology programs

- Interagency Aerospace Workforce Revitalization Task Force
- Stem Investment Programs across government and Industry



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 polices 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!