Space Policy and Architecture Conference
Space Industrial Base Panel

Edward Swallow
Chair, NDIA Space Division &
Chair, Industry Study on Critical Workforce Issues,
supporting Dr. Ron Sega, Director of Defense Research
and Engineering
Industry Study Members

- Broad range of companies participating in study analysis
  - 14 Companies represented on panels
- Broader range of companies providing data and anecdotal evidence
  - 30 of 1130 NDIA member companies responded to survey – Representative sample

**Name** | **Company**
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Wes Clark, MajGen.(ret) | SAIC
Bob Buchanan | SAIC
William Ayen | UCCS
Gayle White | CSC
Sue Woida | AF/ret
Chris Andrews | BAH
George Ullrich | SAIC
Steve Kimmel | AlionSci
Harvey Dahljelm | ITT
Phil Ramos | P. Int'l
Dee Goodwyn | AlionSci
G. Douglass, MajGen.(ret) | UT
Michael Stewart | Kodak
Dale Ramezani | Boeing
Dave Broden | ATK

**Study Chair**
Ed Swallow

**NDIA Coordinator**
Dr. Supriya Banerjee
SAIC

**GOVERNMENT LIAISON**

**TECHNICAL LEAD**
Alan Dunham
Northrop Grumman

**QUANTITATIVE**
Dr. Bob Buchanan
SAIC

**QUALITATIVE**
Karl Arunski
Raytheon
Tom Gannon
Lockheed Martin

**PREVIOUS ANALYSIS**
MGEN (ret.) "Mitch"
Mitchell
Arrowhead

**PROPOSED ACTIONS**
John Williams
Booz Allen Hamilton
U.S. University Trends in Defense-Engineering Disciplines
Graduate Student Enrollment (1994-2001)

Table III

Aliens with Temporary Visas

U.S. Citizens + Perm. Resident Aliens

U.S. Citizen 8 Yr. Delta

1994 / 2001
- Aerospace
- Chemical
- Electrical
- Engineering Science
- Industrial/Manufacturing
- Mechanical
- Metallurgical/Materials
- Nuclear

NSF Data

Table III
Overwhelming consensus

Thousands of unfilled science & engineering positions for US citizens

Getting worse

*NDIA Quick Look Survey
   - Small random sample
   - Spring 2004 data only

UNFILLED REQUISITIONS FOR US CITIZENS by FIELD OF STUDY*

UNFILLED REQUISITIONS for US CITIZEN SCIENCE & ENGINEERING SPECIALISTS by DEGREE*
Demand Drivers

- 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
  - “Space Transformation” ????

- Weather prediction – Perfect Storm\(^1\) 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

- Need to ensure the internal S&E capability to maintain technological advantage for next/follow-on generation operational capabilities

\(^1\) From Speech “The Perfect Storm” presented by Dr. Shirley Ann Jackson, Ph.D., President, Rensselaer Polytechnic Institute, to the National Society of Black Engineers, Dallas, Texas, Wednesday, March 17, 2004
NDEA 2006 recommendations reflect a strategy which sets preconditions for an adequate S&E workforce pipeline based upon providing S&E-related educational opportunities.
Recommendations

Overall solution(s) are complex and multifaceted:
- Better use of existing workforce
  - Retraining, mentoring, work/life balance, increase diversity, etc.
- Financial support for knowledge transfer
- Increased government support for R&D – robust and balanced 6.1 through 6.4 program

On supply side, DoD/USG must recognize that the market itself is not sufficient to ensure the ready supply of technologically trained workers
- We must constantly be aware of current attitudes and propensity towards engineering by measuring youth attitudes
  - Allow us to counter negatives; reinforce positives
  - Military equivalent is Youth Attitude Tracking Survey
- To attract and retain sufficient engineers, we must adopt some aspects of the military recruiting model
  - We cannot count on a volunteer force, but rather a recruited force
  - Recruited in the sense that the concept of becoming an engineer is introduced at an early age, reinforced by compelling media and mentorship, and properly incentivized by educational scholarships
  - Necessary to counter other social messages

This will require a national effort to fund, monitor and influence on a sustained basis
- Should be a part of NDEA 2006
How Can Industry Help?

- Take a “systems view” of the problem
- Support NDEA 2006
  - Link to elementary, middle and secondary education
    - Excite, Attract, Stimulate
  - Strengthen partnerships with universities and other academics—joint activity in key technologies
    - Nanotechnology initiatives seem to be working
- NDIA work with DOD to establish technology excellence awards
- Integrate efforts across government and industry to recruit and retain high value S&T workers
  - Continuing industry association involvement
  - Expand corporate and industry association educational outreach programs
- Identify ways to focus IRAD development across industry within competitive limits
  - Make the dollars we have go farther
  - Increase emphasis on Industrial Base Issues