2008 IEEE Aerospace Conference / Panel Session 14.06
"Developing the 21st Century Space Engineering Workforce"

Goddard Space Flight Center – Workforce Challenges and Retention Success Stories

March 2008

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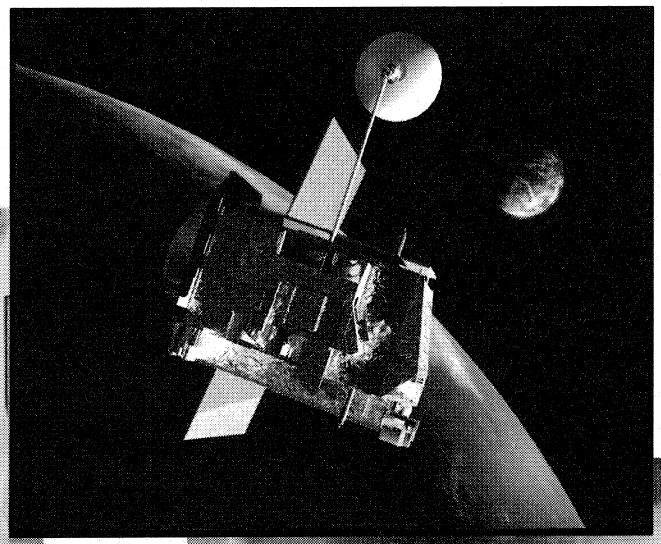
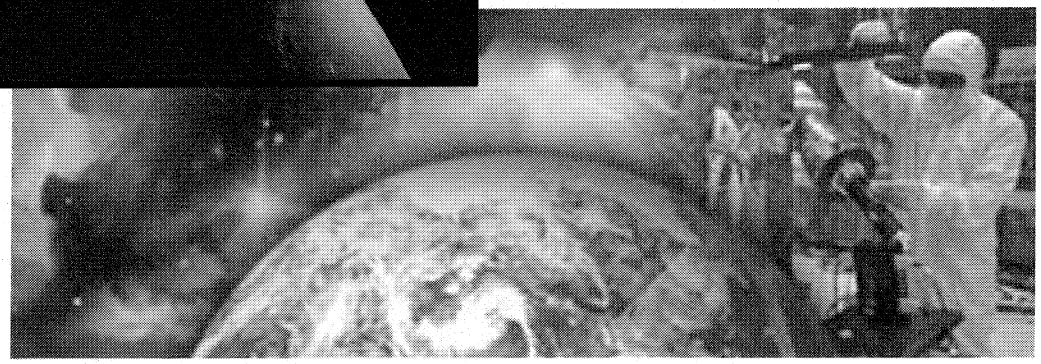




Background

- NASA is among federal agencies that are planning for the recruitment of the 21st century engineering workforce
- As an aerospace organization, NASA's Goddard Space Flight Center (GSFC), located in Greenbelt, Maryland, supports both Earth and Space science robotic (unmanned) missions.
- Civil Servant Population (Sept 2007, Greenbelt,MD): 3200 (1500 engineers), plus approximately 6000 contractors

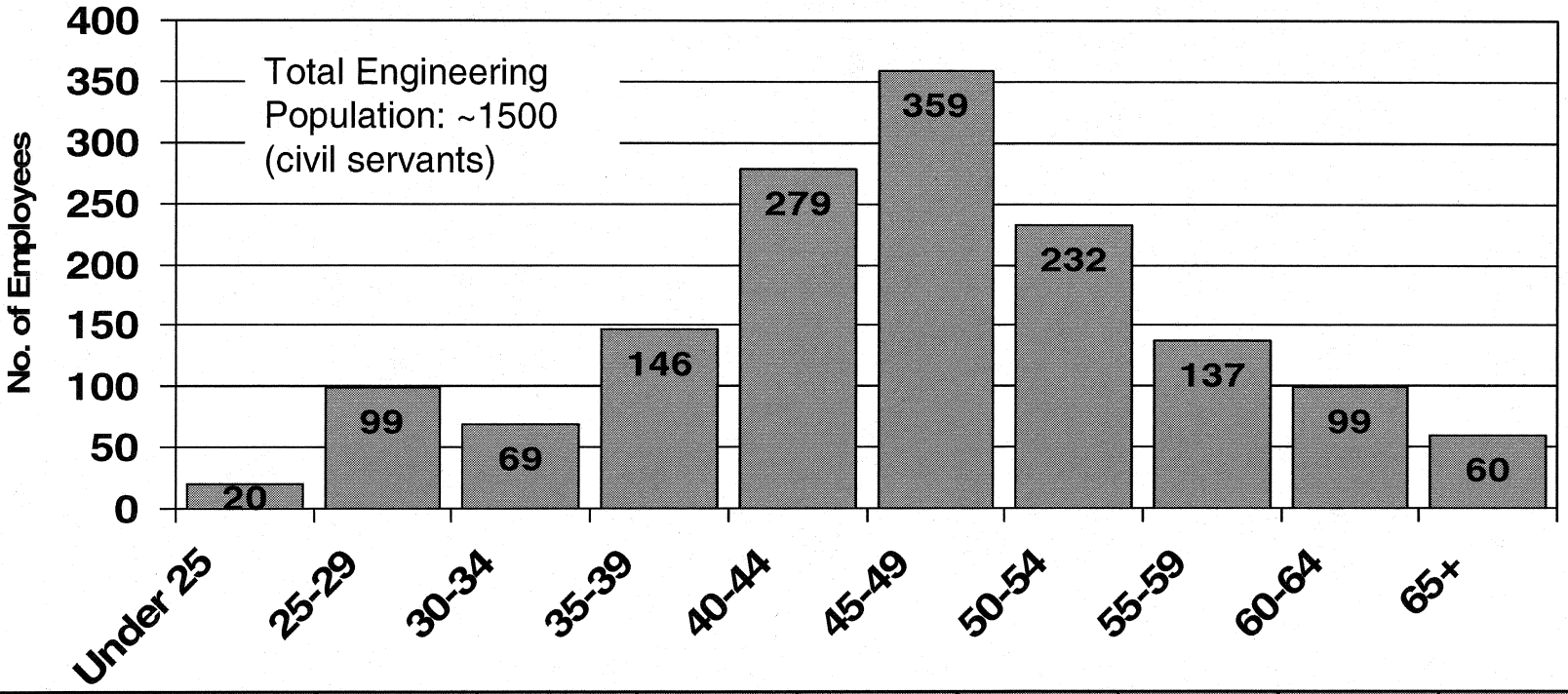
Organizational Challenges and the Next Generation

Issue/Challenge	
• Age demographics indicate 78% of engineering population is age 40 and over	• Recruiting/finding a supply of new hires to meet the demand over the next two decades.

• In 2000, implementation of Full-Cost Accounting/Full-Cost Management (FCA/FCM)
  • Compels project managers to request/acquire the "best of the best"
  • Must reduce Enterprise-level overhead to increase competitiveness
	• If project managers want "best of the best", the challenge becomes
	  • Providing OJT for junior employees on "real" projects
	  • Building bench-depth for specificdisciplines
	  • Creating/implementing succession plans
	• Dwindling resources for training, mentoring, recruitment, product development

• Ensuring that next generation of engineers are trained in specific subject areas to collaborate in "global workplace"	• Current grads lack expertise in
	  • Handling/managing finances, schedules and risk (full-cost, Earned-Value Management)
	  • ITAR/Export, legal and contract challenges
	  • Managing multi-disciplined, broadly disbursed teams of engineers & scientists

Aging Population - GSFC Engineers By Age Group On Board as of 9/14/07



Under 25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
1.3%	6.6%	4.6%	9.7%	18.6%	23.9%	15.5%	9.1%	6.6%	4.0%
8%					39%				
13%					49%				
22%					55%				
41%					59%				

NASA employees must be U.S. citizens – From which sources will government organizations hire engineering graduates over the next twenty years ?

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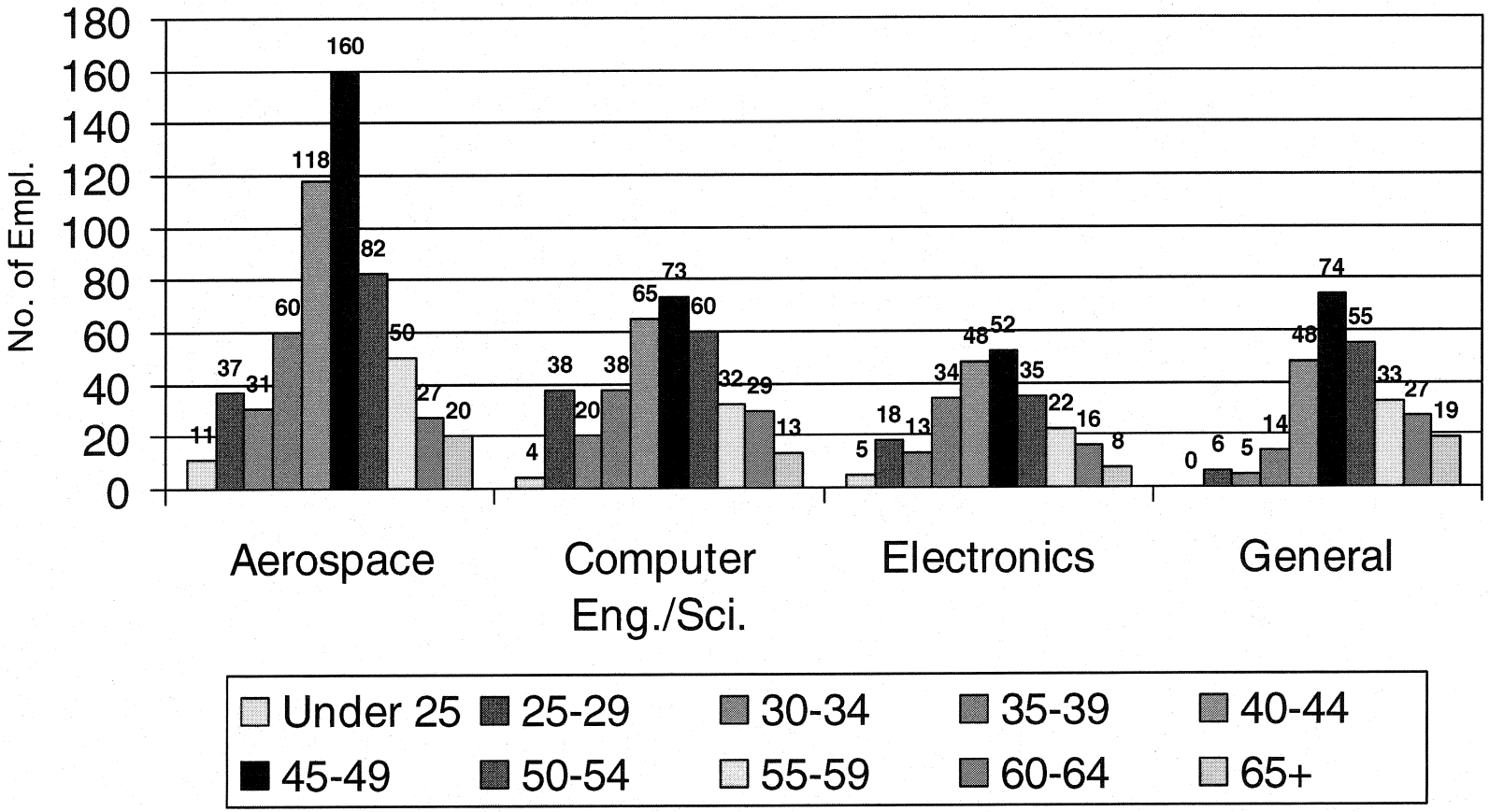

Can colleges produce/graduate enough engineers in needed disciplines to satisfy both government and commercial organizations over the next 20 years?
Will the steps taken to hire within declining discipline groups over the next 10 years be enough ?
Is your organization capturing the knowledge of senior employees before they retire?

Inspiring the Next Generation - Programs at NASA for High School and College Students

- Over 50 Summer Internship programs for college and high school students (Science, engineering/robotics, CanSat, Sounding Rocket Program) (see education.gsfc.nasa.gov)

- Cooperative Education Program – Multi-Year internship program for college students with 30 or more credits
  - Provides tuition assistance
  - Job offer at graduation

- New hires
  - Professional Intern Program (PIP) – assigned hands-on projects to new hires
    - 2 levels
    - Promotion upon successful completion of each level (level 1 ~25%, level 2 ~10%)
  - Leadership programs for junior employees – Foundations of Influence, Relationships, Success and Teamwork (FIRST). GS 11-12 civil servants with at least 2 years of experience with NASA
  - College tuition assistance, part-time graduate study programs (full-salary, time to attend to studies during work hours)

Are these programs adequately funded in your organization?
Will there be funding in the future for these programs?

Employee Retention - Success Stories

- Employees listed below have been successful from a NASA and personal perspective. All have outstanding technical skills, communication skills, organizational/multi-tasking skills, and the ability to work with a team

Employee	Education	Internships	Actives In College Contributing To Success	NASA Development Programs
Vuong L.	Penn. State Univ., 2005, Computer Engineering	Intel, Lutron Electronics, Impact Technologies	Coursework in leadership, communication, business/economics in engineering	Professional Intern Program (Level I & II)
Ezinne O.	Rensselaer Polytechnic Institute, 2004, Computer Science	MIT Lincoln Labs & MIT Haystack Observatory	Class Council activities which involved leadership and communication skills to help run and plan events for entire Class of 2004.	Professional Intern Program (Level I & II), Eng. Mentoring Program, FIRST (agency-wide executive leadership program)
John S.	Univ. of MD., 2001, Computer Science	Bethlehem Steel Univ. of Md., Robotics Lab	Supporting a Post-Doc at Univ. of Md. Robotics Lab	Professional Intern Program (Level I & II)

Summary

NASA is not unique in preparing the 21st Century Engineering Workforce

- Aging workforce
- Inspiring the "next generation" is one of NASA's goals – Education and Outreach Programs must be funded and maintained
  - In January 2003, NASA announced that it is starting a new Educator Astronaut Program.
  - Inspiring the Next Generation: Student Experiments and Educational Activities on the International Space Station (2000)
- Retaining the "Superstars" will be a challenge due to a competitive job market (see dol.gov - Dept of Labor)