

**National Academies Hearing:
"IT R&D Ecosystem"**
April 19, 2007
Boston, MA

Workforce and Social Issues
Daryl E. Chubin
 Center for Advancing Science & Engineering Capacity, American Association for the Advancement of Science

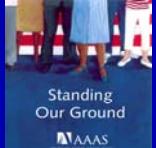
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Relevance of Chubin/AAAS Capacity Center

- Director: Capacity Center established August 2004 as a science & engineering consulting service with 3-year, \$400K grant from Sloan Foundation to AAAS (www.aaascapacity.org)
- Co-author: AAAS-NACME report, *Standing Our Ground* (2004, www.aaas.org/standingourground), on making U.S. S&E more inclusive by removing barriers (legal precedent), affirming opportunity (access, support), & documenting trends (disaggregated)
- PI: Portfolio assessment of Alliances supported by NSF/ CISE Broadening Participation in Computing (2005 →)



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Population Cross-sections

Underrepresented Minorities (URMs) and non-URMs as a Percent of...

Population	URMs	Non-URMs	All Others
The K-12 School-Age Population *	0.355170598	0.632292913	0.013
All Undergraduate Students	0.253415585	0.72535237	0.02132045
STEM Bachelor's Degree Recipients	0.164478282	0.740950112	0.094571606
All Graduate Students	0.166701053	0.708983557	0.12431539
STEM PhD Recipients	0.7925785	0.514138915	0.4279353

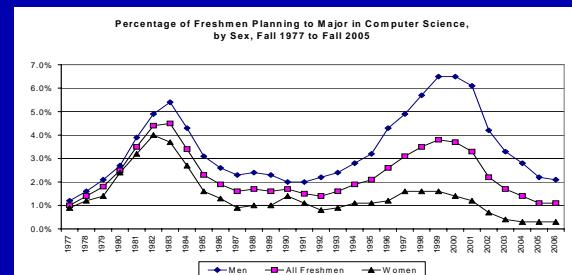
Note: 'All Others' includes non-U.S. citizens and U.S. citizens and permanent residents of other or unknown races/ethnicities. Data for the K-12 population were not available by citizenship, so non-U.S. citizens are included in all percentages. The 'All Other' category for the K-12 population only includes those of other or unknown races/ethnicities. Source: CPST, *Professional Women and Minorities*, 16th edition, November 2006

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Computer Science as Intended College Major

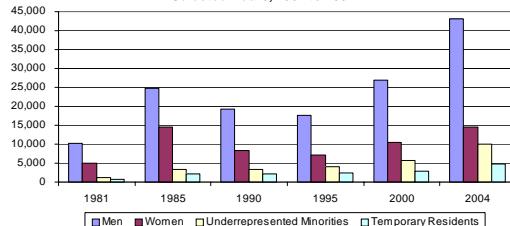
Percentage of Freshmen Planning to Major in Computer Science, by Sex, Fall 1977 to Fall 2005



Source: CPST, data derived from UCLA Higher Education Research Institute, *The American Freshman: National Norms for Fall 1977 to Fall 2006*

Undergraduate Computer Sciences (CS) Pool

Chart 1.2: Bachelor's Degrees Awarded in the Computer Sciences by Sex, Race/Ethnicity and Citizenship, Selected Years, 1981 to 2004



Source: CPST, data derived from National Science Foundation, WebCASPAR Database

Institutional Producers of CS Pool

Top Producers of Computer Science/Information Technology (CS/IT) Bachelor's Degrees, 2004

	Total	Male	Female	% Female
University of Phoenix	2,552	1,833	719	28.2
The American College in Atlanta	1,060	789	271	25.6
DeVry Institute of Tech (Oakbrook Terr, IL)	1,005	700	305	30.3
Strayer College	993	614	379	38.2
DeVry Institute of Tech (City of Industry, CA)	858	669	189	22.0
University of Maryland University College	548	347	201	36.7
University of Maryland Baltimore County	450	336	144	30.0
DeVry Institute of Tech (Decatur, GA)	482	289	193	41.8
University of Maryland University College Park	443	330	113	25.5
University of California-Irvine	388	294	94	24.2
University of Texas at Austin	367	309	58	15.8
Rochester Institute of Technology	366	324	42	11.5
DeVry Institute of Tech (Kansas City, MO)	353	279	74	21.0
Rutgers the State Univ of NJ New Brunswick	340	249	91	26.8
Drexel University	337	265	72	21.4
Georgia Institute of Technology, Main Campus	329	290	39	11.9
Pennsylvania State U, Main Campus	326	257	69	21.2
DeVry Institute of Tech (Phoenix, AZ)	324	242	82	25.3
DeVry Institute of Technology (NJ)	322	255	67	20.8
Purdue University, Main Campus	321	282	39	12.1

Source: CPST, data derived from National Science Foundation, WebCASPAR Database

Nontraditional Pathways, Populations, & Institutions

This 2005 study examines the role of nontraditional educational pathways in preparing women and underrepresented minorities for the IT workforce. It was sparked by the finding that the nation's top producer of BS degrees in IT/CS was Strayer University, a for-profit institution with many campuses in the Washington, DC, area.



Preparing Women and Minorities for the IT Workforce
The Role of Nontraditional Educational Pathways

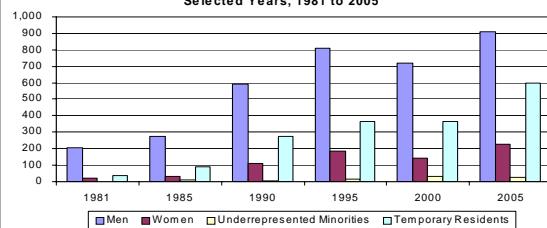
CPST AAAS

Workforce Issues Beyond the Baccalaureate

- Certificates
- Two-year degrees
- US citizenship
- Security clearance

Composition of Doctorate CS Pool

Chart 1.7: Doctorates Awarded in the Computer Sciences by Sex, Race/Ethnicity and Citizenship, Selected Years, 1981 to 2005



Source: CPST, data derived from National Science Foundation, WebCASPAR Database

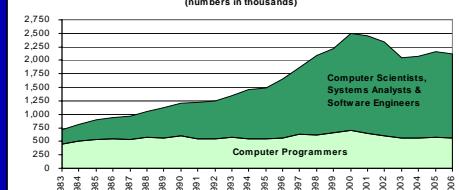
Academic Employment of Foreign-born PhD Holders (in %)*

- Computer Sciences 44
- Engineering 40
- Mathematics 33
- Physical Sciences 25
- Life Sciences 22

*Source: NSB, *Science and Engineering Indicators 2006*, ch. 5

Workforce: Growth in Core IT Professions

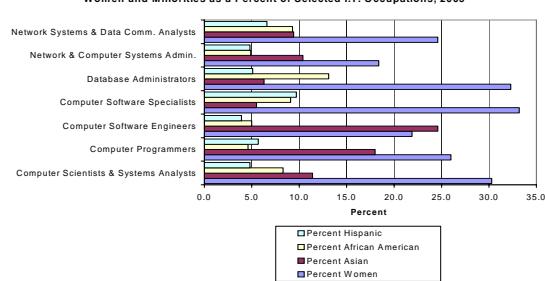
Chart 1.3: Employment in Core IT Professions, 1983 to 2006 (numbers in thousands)



Note: Due to major changes in the SOC (Standard Occupational Classification) in 2003, numbers in 2003 to present may not be directly comparable to earlier figures.
Source: CPST, data derived from annual estimates from the U.S. Bureau of Labor Statistics, based on data from the Current Population Survey

Composition of IT Occupations

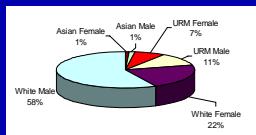
Women and Minorities as a Percent of Selected I.T. Occupations, 2005



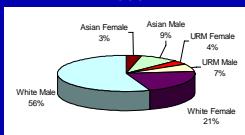
Source: CPST, data derived from U.S. Bureau of Labor Statistics, Current Population Survey, Annual Averages

Gender and Ethnicity of IT Occupations

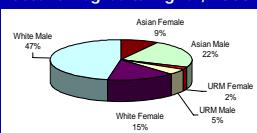
Associate's Degree Holders,
October 2006



Bachelor's Degree Holders,
2003



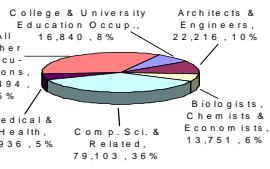
Master's Degree & Higher, 2003



Source: CPST analysis of National Science Foundation, SESTAT data system, 2003 (weighted analyses) and Census Bureau's Current Population Survey, October 2006 accessed via the Data Ferret (weighted analyses).

H-1Bs in the Workforce

Occupations of 2003 H-1B Visa Beneficiaries, Continuing and Initial Employment



Source: CPST, data derived from U.S. Department of Homeland Security, Office of Immigration Statistics, Characteristics of Specialty Occupation Workers (H-1B): Fiscal Year 2003

Select Chubin Writings Relevant to the IT R&D Ecosystem

- "The New Backlash on Campus," *College and University Journal*, v. 81, 2006, pp. 67-70 (with S.M. Malcom).
- "Minding the Student Client," *Inside Higher Ed*, Feb. 2006 www.insidehighered.com/views/2006/02/13/chubin
- "Gender and STEM Disciplines: Beyond the Barriers," *AAC&U On Campus with Women*, vol. 34, October 2005, www.aacu.org/occw/volume34_4/feature.cfm?section=2 (with S.M. Malcom and E.L. Babco).
- "Diversifying the Engineering Workforce," *Journal of Engineering Education*, vol. 94, January 2005, pp. 73-86 (with G.S. May and E. Babco) www.asee.org/about/publications/jee/upload/SamplePages_73-86.pdf

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