

Under-Represented Minorities in STEM: Degrees and Faculty Representation

Lisa M. Frehill
Executive Director

STEM

n Science

n Technology

n Engineering

n Mathematics

n Life sciences

n Physical sciences

n Geosciences

n Interdisciplinary or other sciences

n Engineering

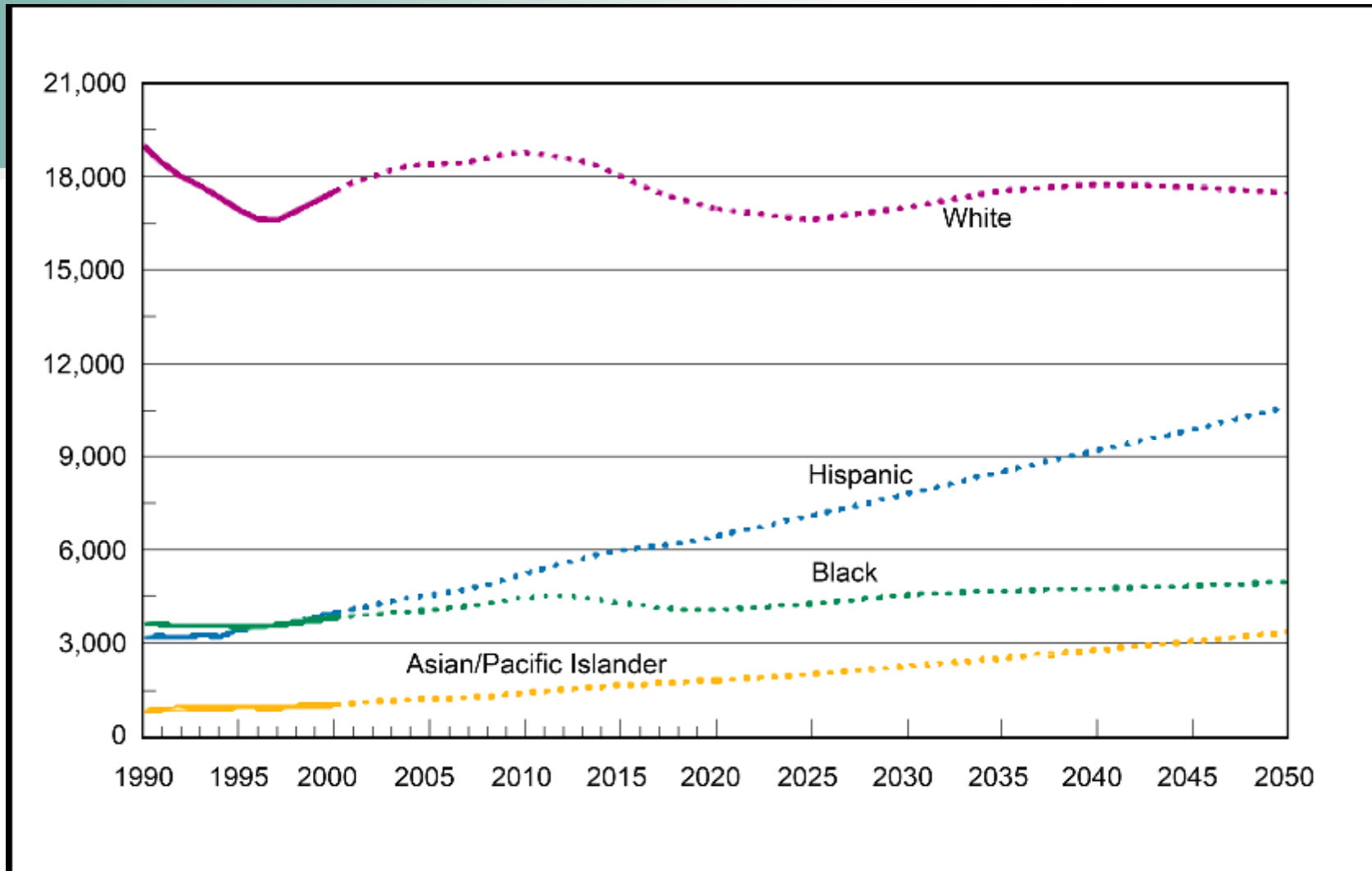
n Social sciences

n Psychology

n Engineering technology

n Science technology

Student Population Projected to be 50% URMS by 2050 U.S. Population 18-24 Years Old, by Race/Ethnicity: July 1990-99 & Projections to 2050



Source: National Science Foundation, *Women, Minorities and Persons with Disabilities in Science and Engineering*, 2004.

CPST. . . Your workforce data source.

<http://www.cpst.org>

The U.S. STEM Workforce

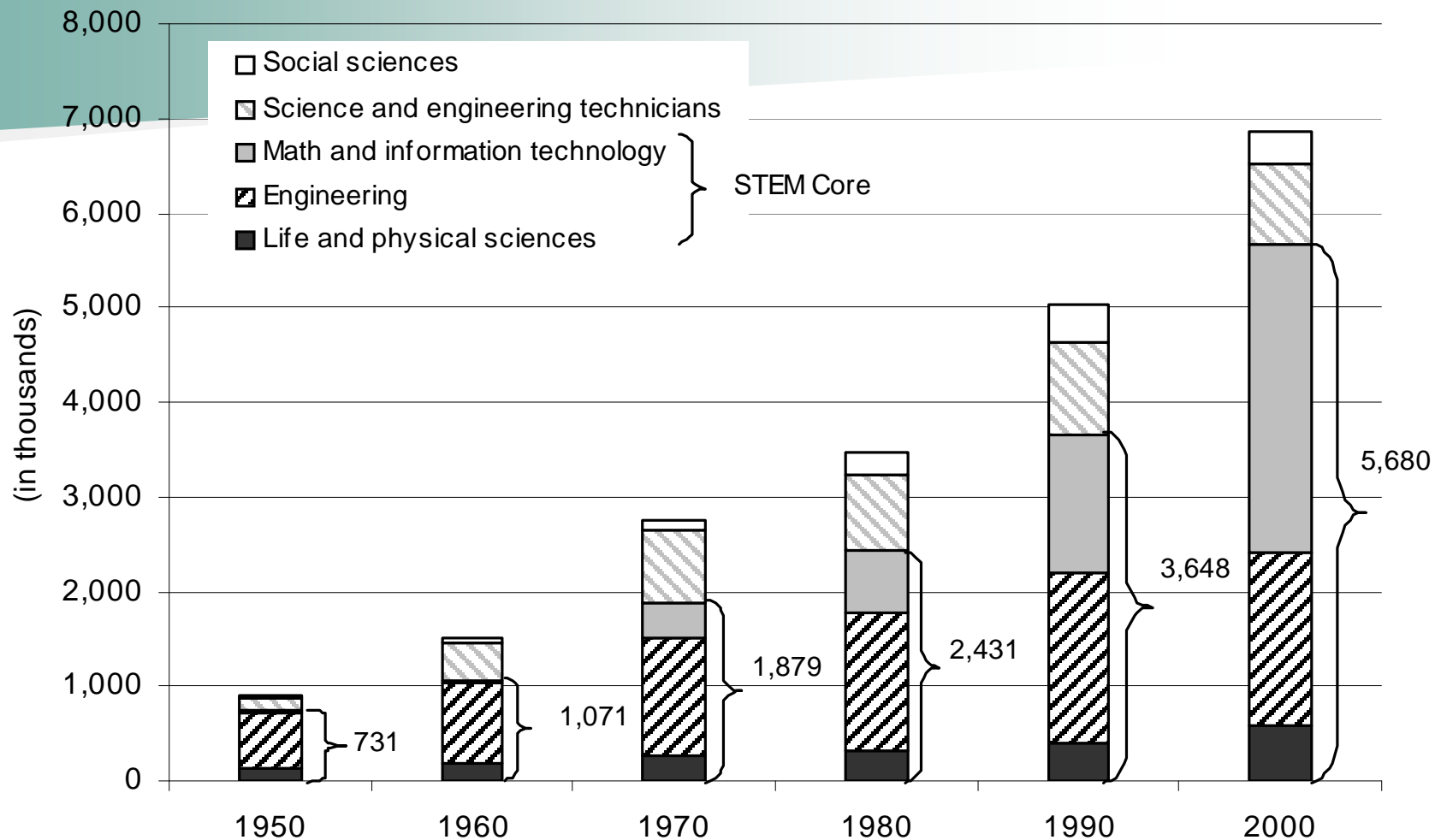
Findings from the STEM Workforce Data Project

(funded by Alfred P. Sloan Foundation grants to CPST
2004-2008)

Growth of the U.S. STEM Workforce

(Source: Lowell (2006) CPST STEM Workforce Data Project White paper #1)

Exhibit 1. STEM Workforce, 1950-2000 (in thousands)



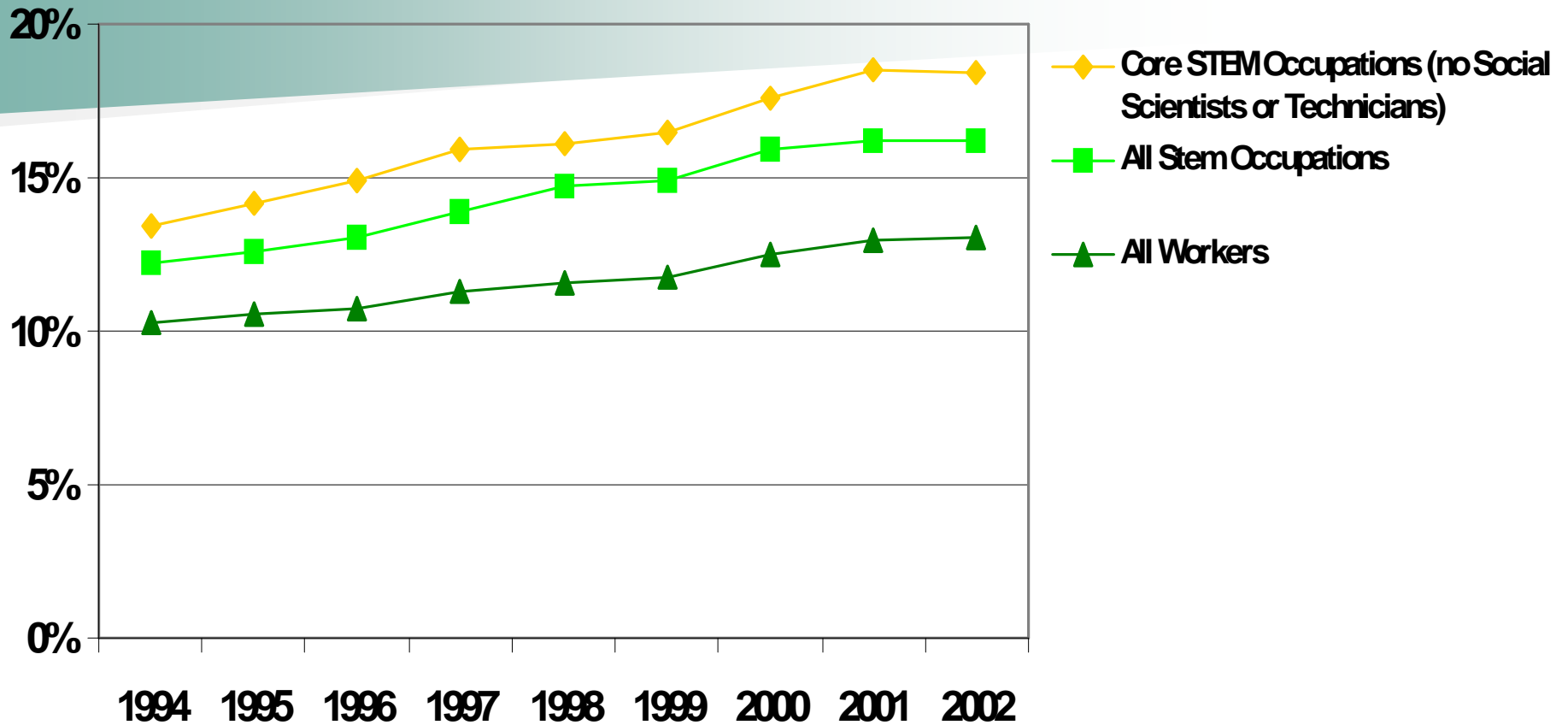
STEM Core = Engineering, life and physical scientists, and math and information technology.

Source: U.S. Census microdata. See "Note on Data."

CPST. . . Your workforce data source.

<http://www.cpst.org>

Foreign Born in the U.S. Workforce, 1994 to 2002



Source: CPST, data derived from tabulations of MORG/CPS microdata.

STEM Workforce Data Project, Report #4

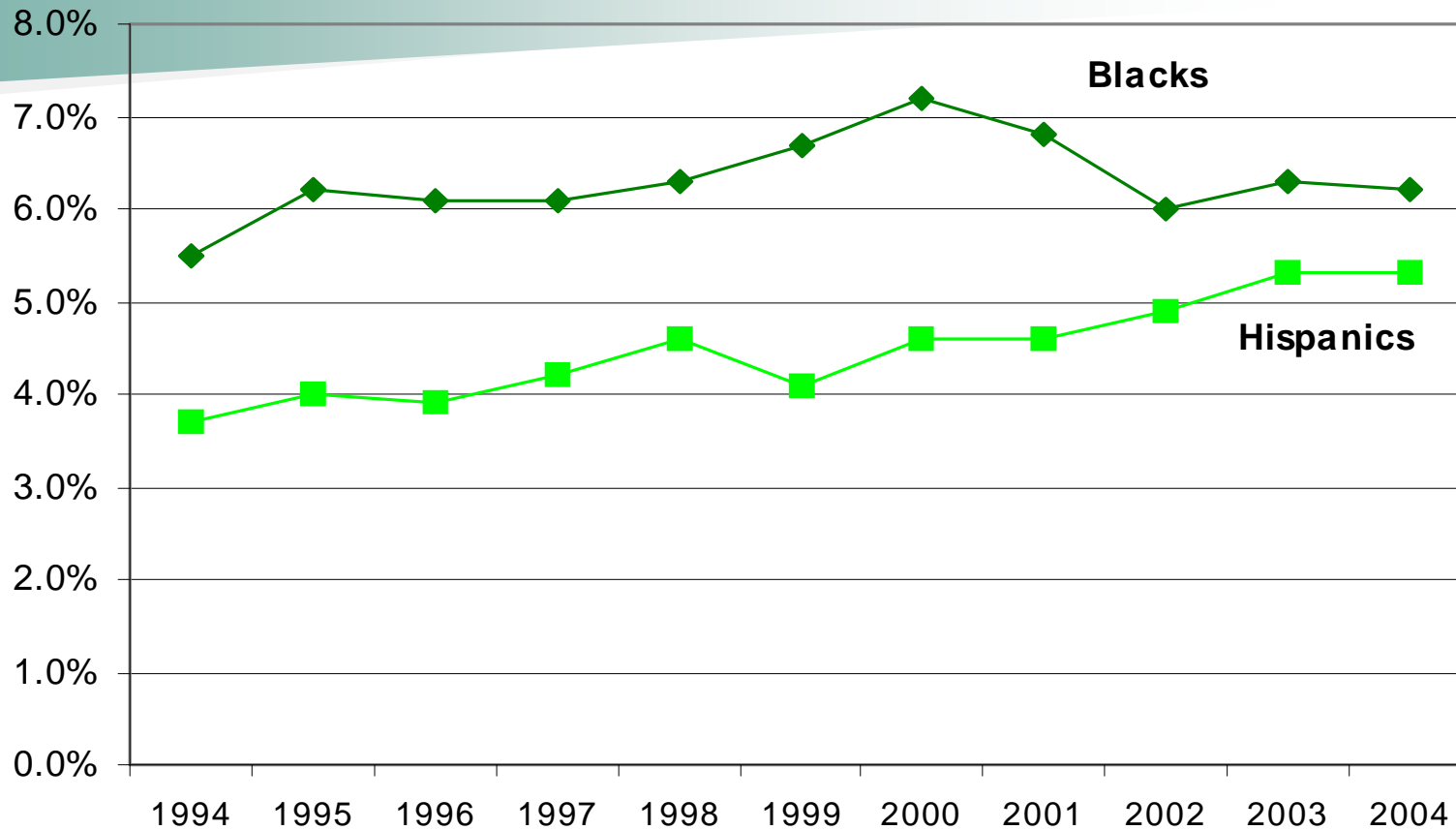
CPST. . . Your workforce data source.

<http://www.cpst.org>

Minorities in the STEM Workforce

(Source: Ellis (2005) CPST STEM Workforce Data Project, Report #3)

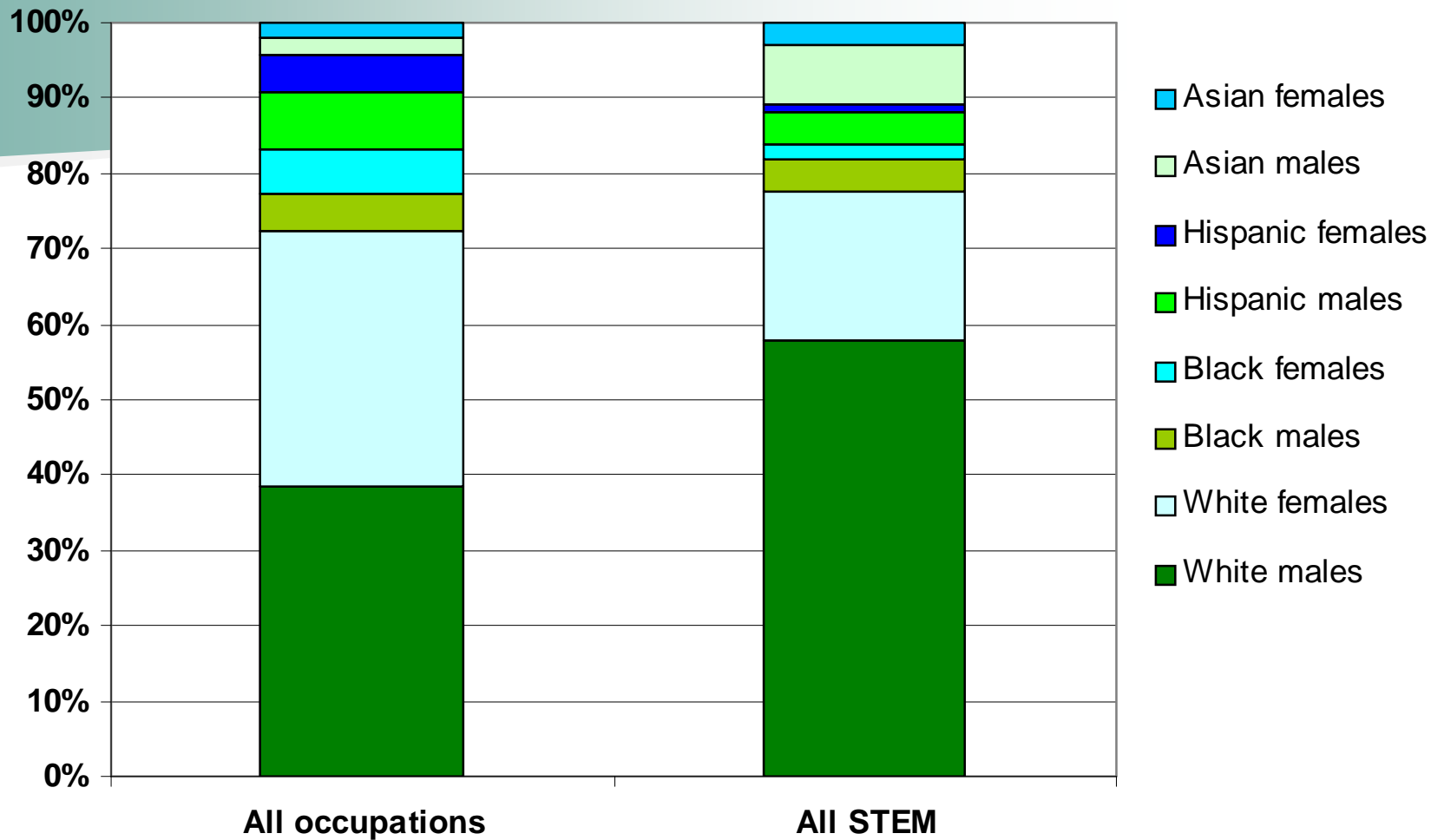
Blacks and Hispanics as a Percentage of the STEM Workforce, 1994 to 2004



Source: CPST, data derived from Bureau of Labor Statistics, *Current Population Survey*.

STEM Workforce Composition vs. All Occupations, 2003

(Report #3: Minorities in the STEM Workforce)



Source: Bureau of Labor Statistics (annualized merged data from monthly Current Population Surveys).

Degree Data

Ø Associates

Ø Bachelor's

Ø Master's

Ø Doctoral

Ø 1985 & 2006

STEM

n Science

n Technology

n Engineering

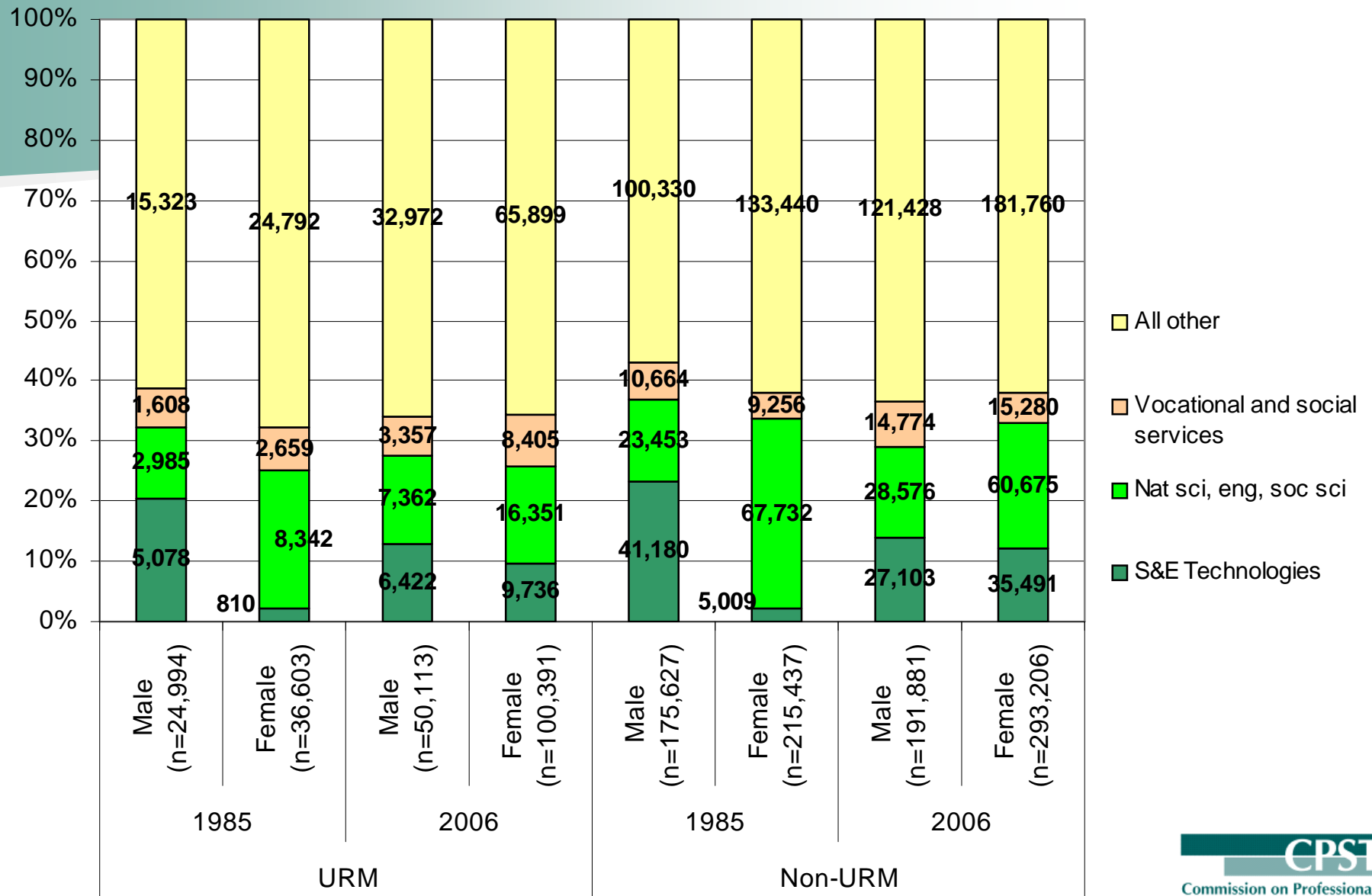
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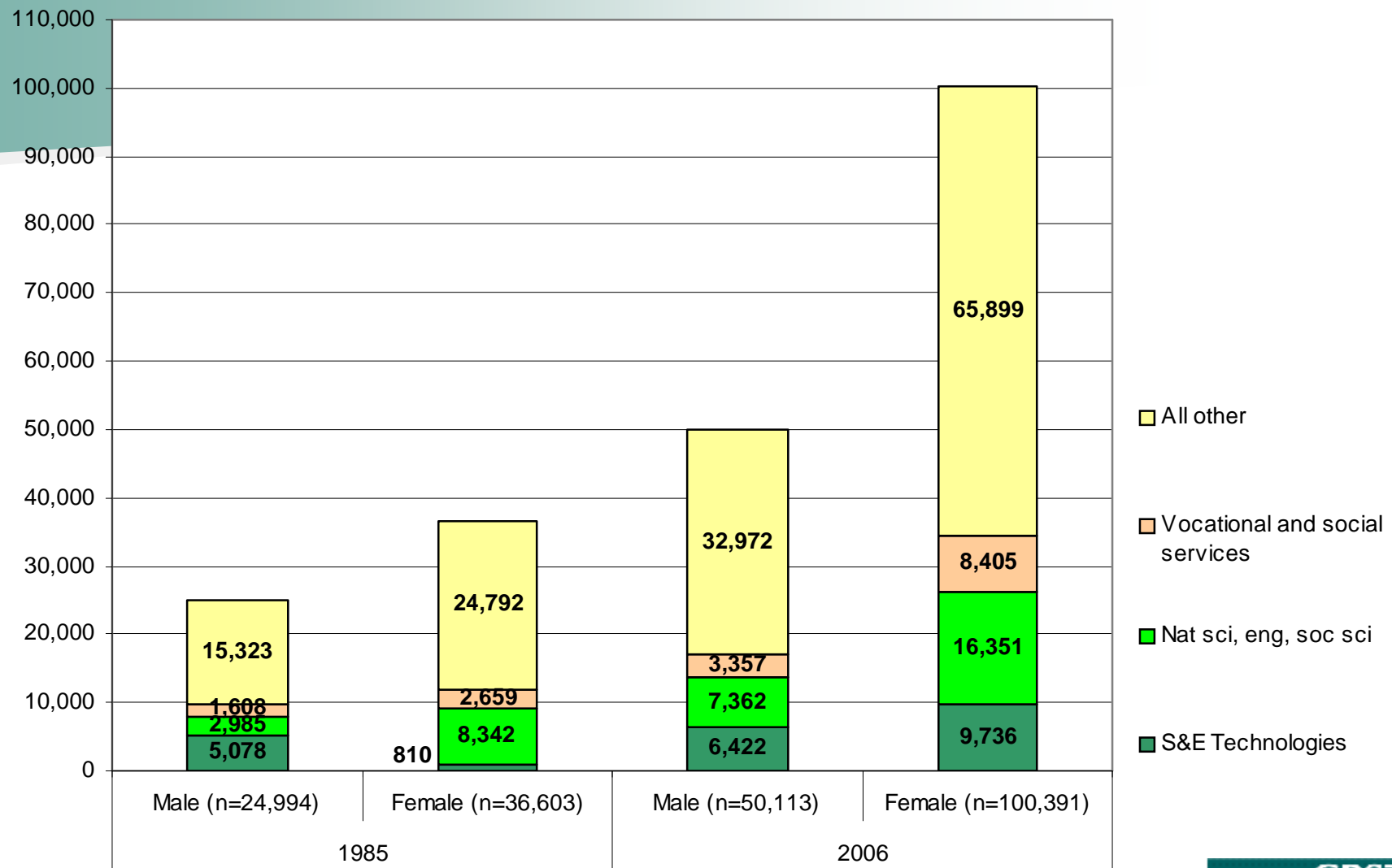
Associates Degrees Awarded in 1985 and 2006 by Field, URM Status, and Gender (U.S. Citizens and Permanent Residents only)



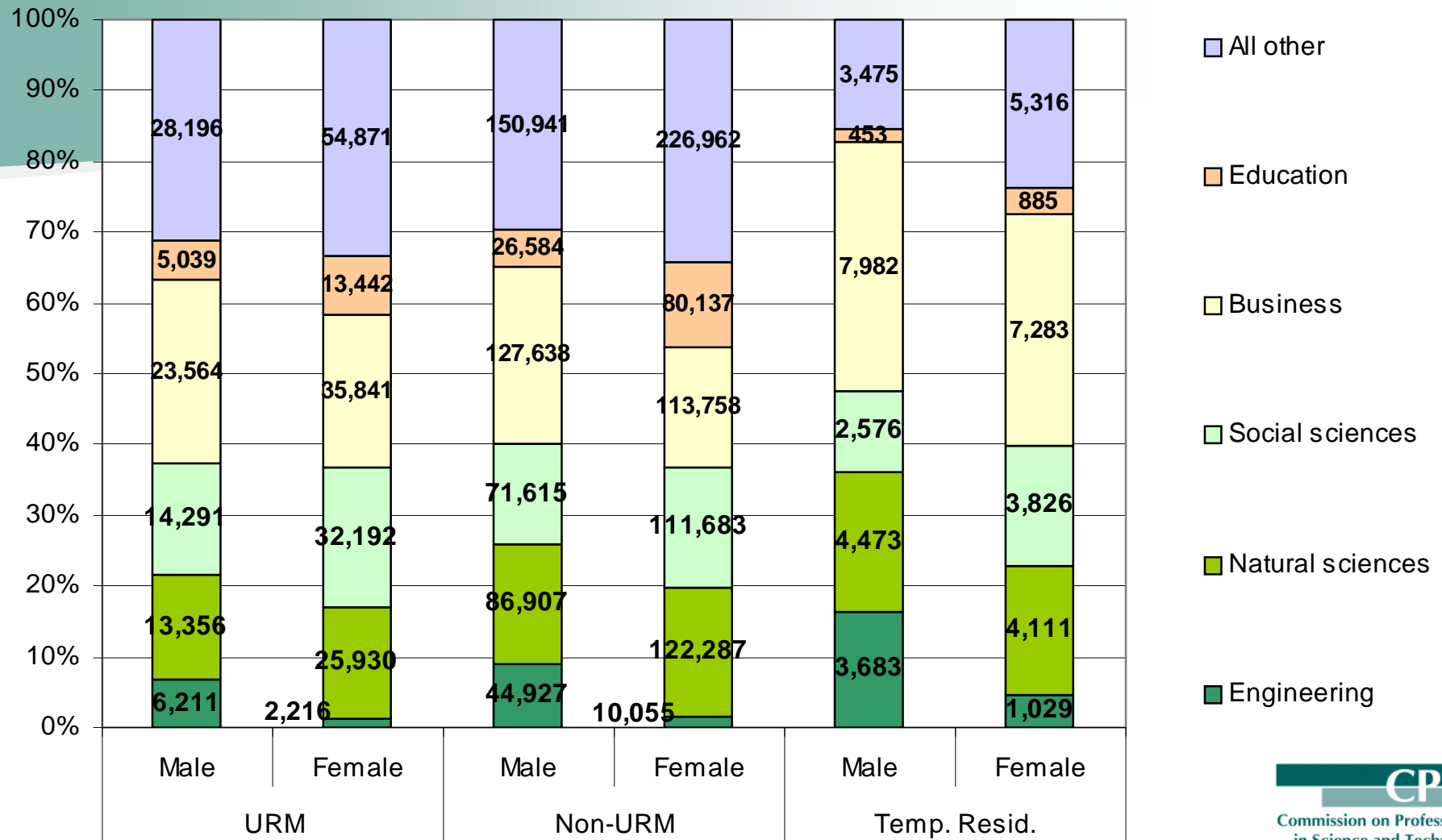
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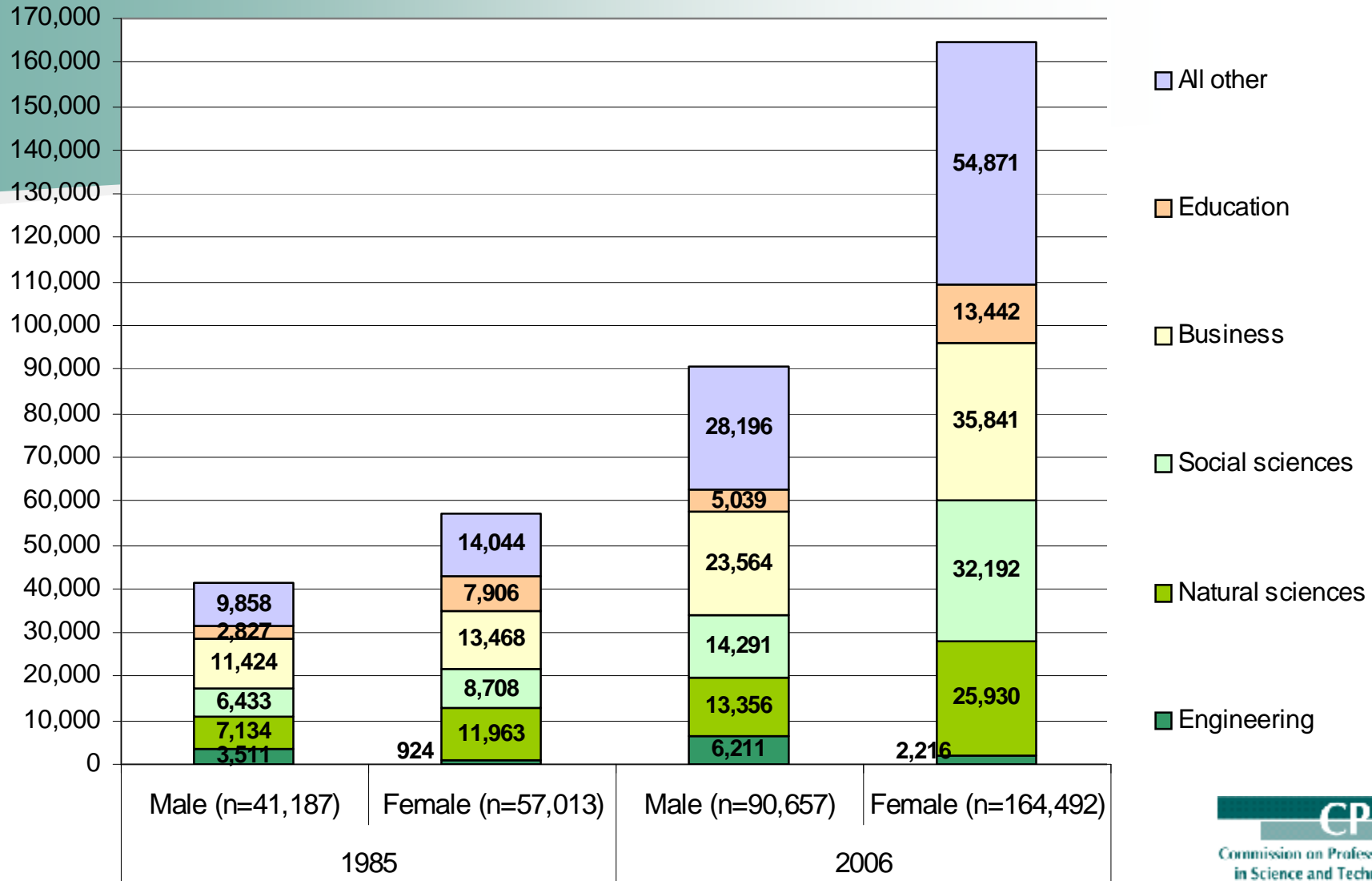
Associates Degrees Earned by URMs in 1985 and 2006 by Field and Gender (U.S. Citizens and Permanent Residents only)



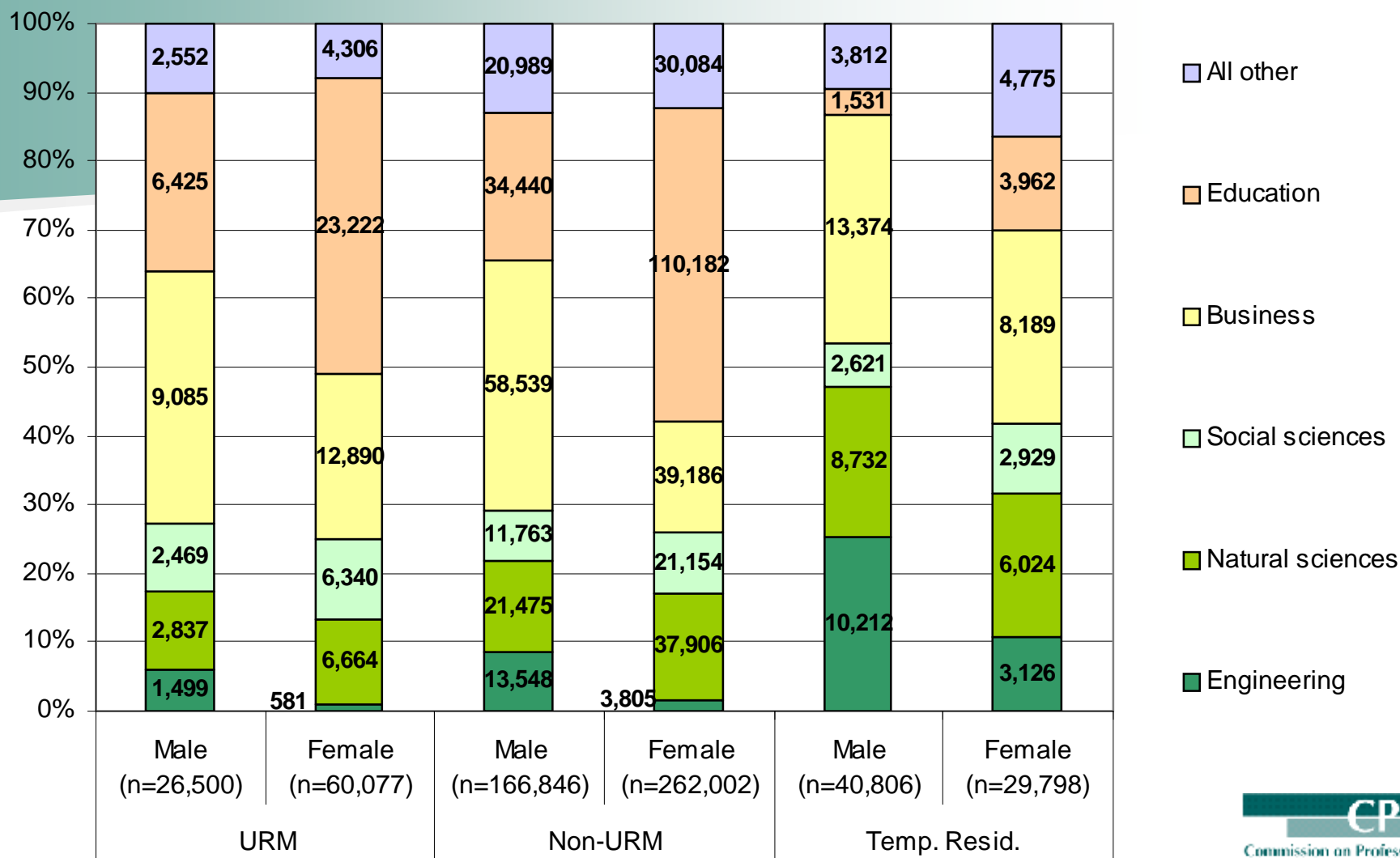
Bachelor's Degrees, 2006, by Citizenship and URM Status, Gender, and Field



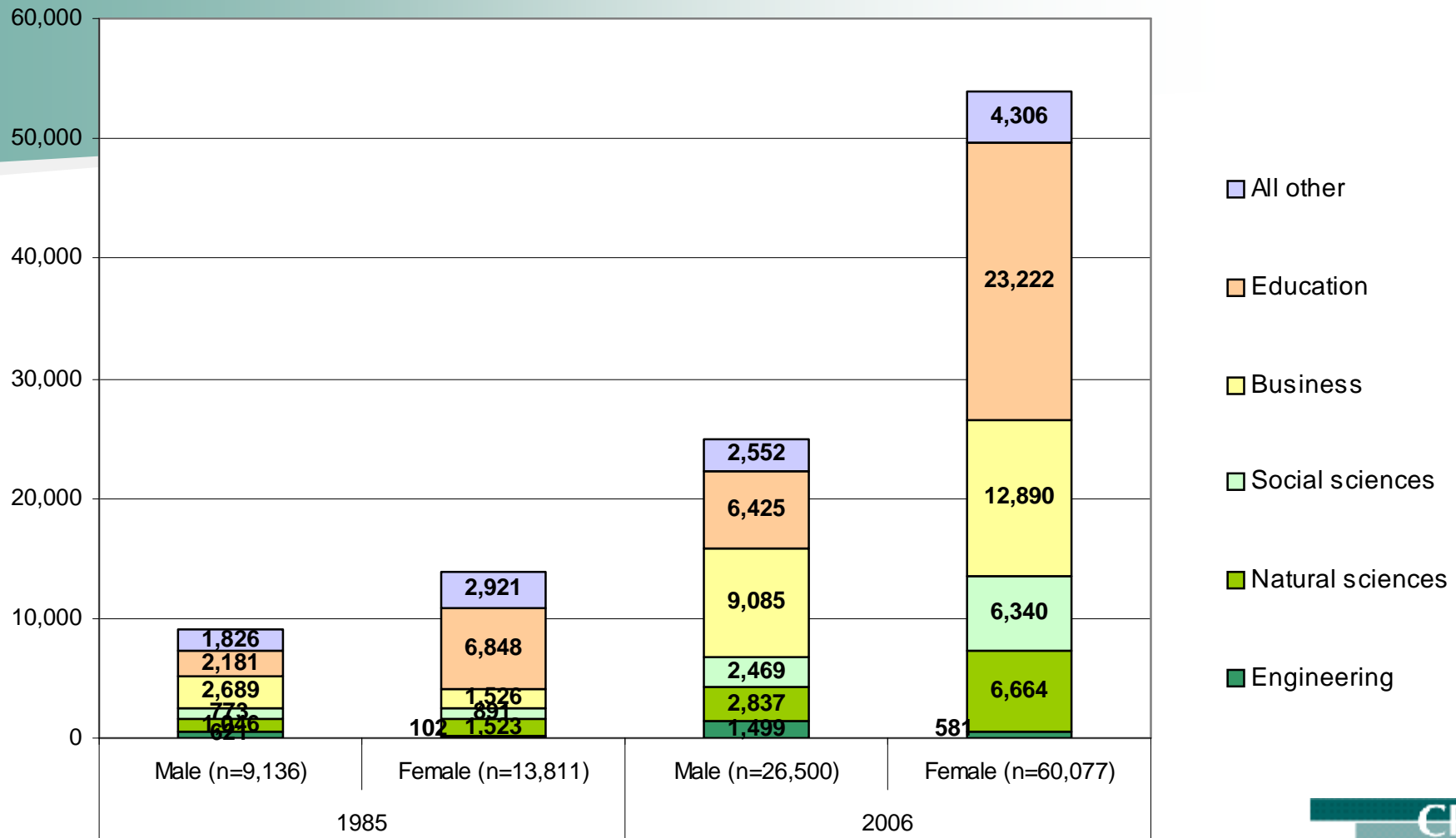
Bachelor's Degrees Earned by URMs, Gender, and Field, 1985 and 2006



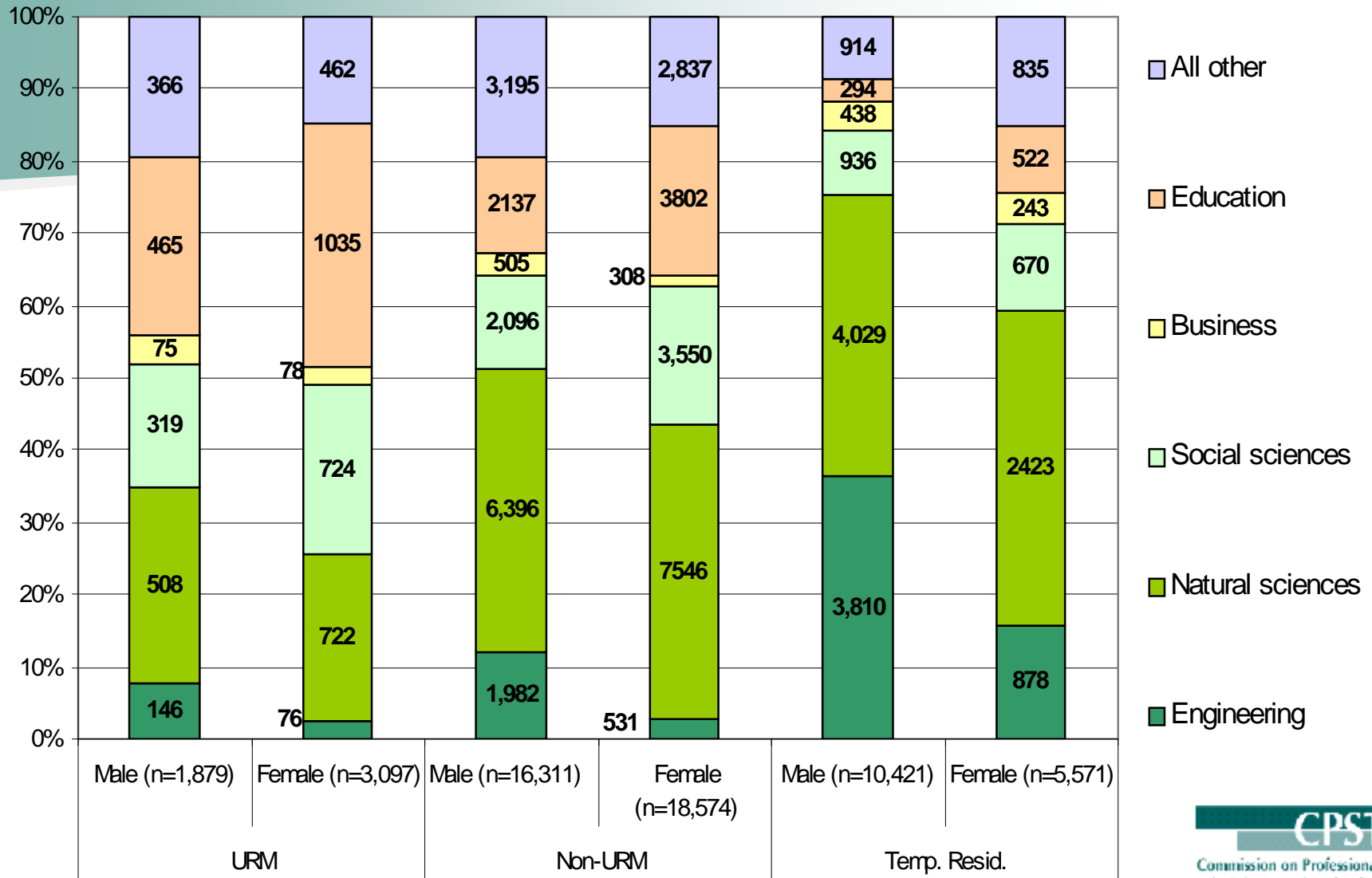
Masters Degrees, 2006, by Citizenship and URM Status, Gender, and Field



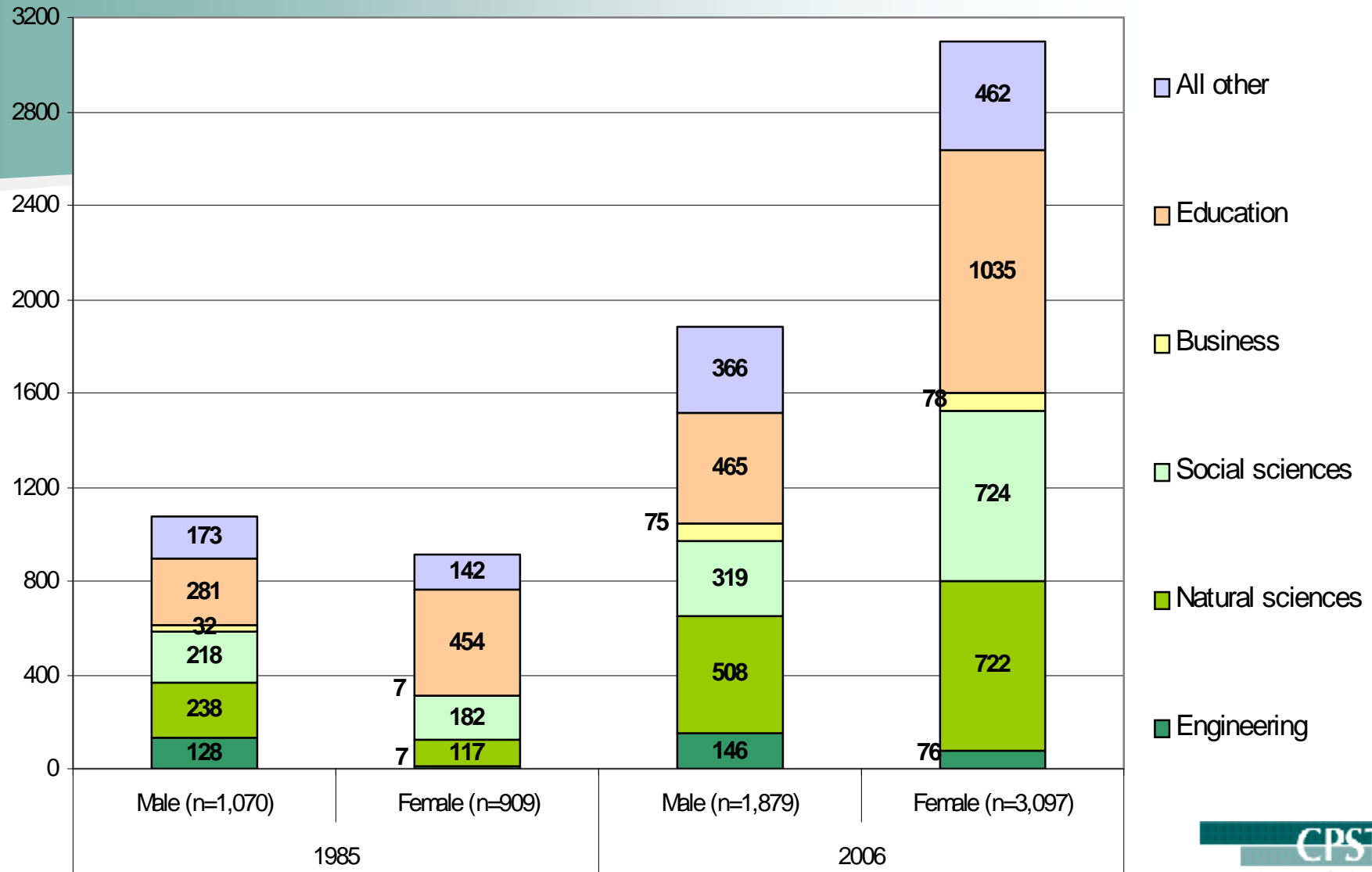
Masters Degrees Earned by URMs by Gender, and Field, 1985 and 2006



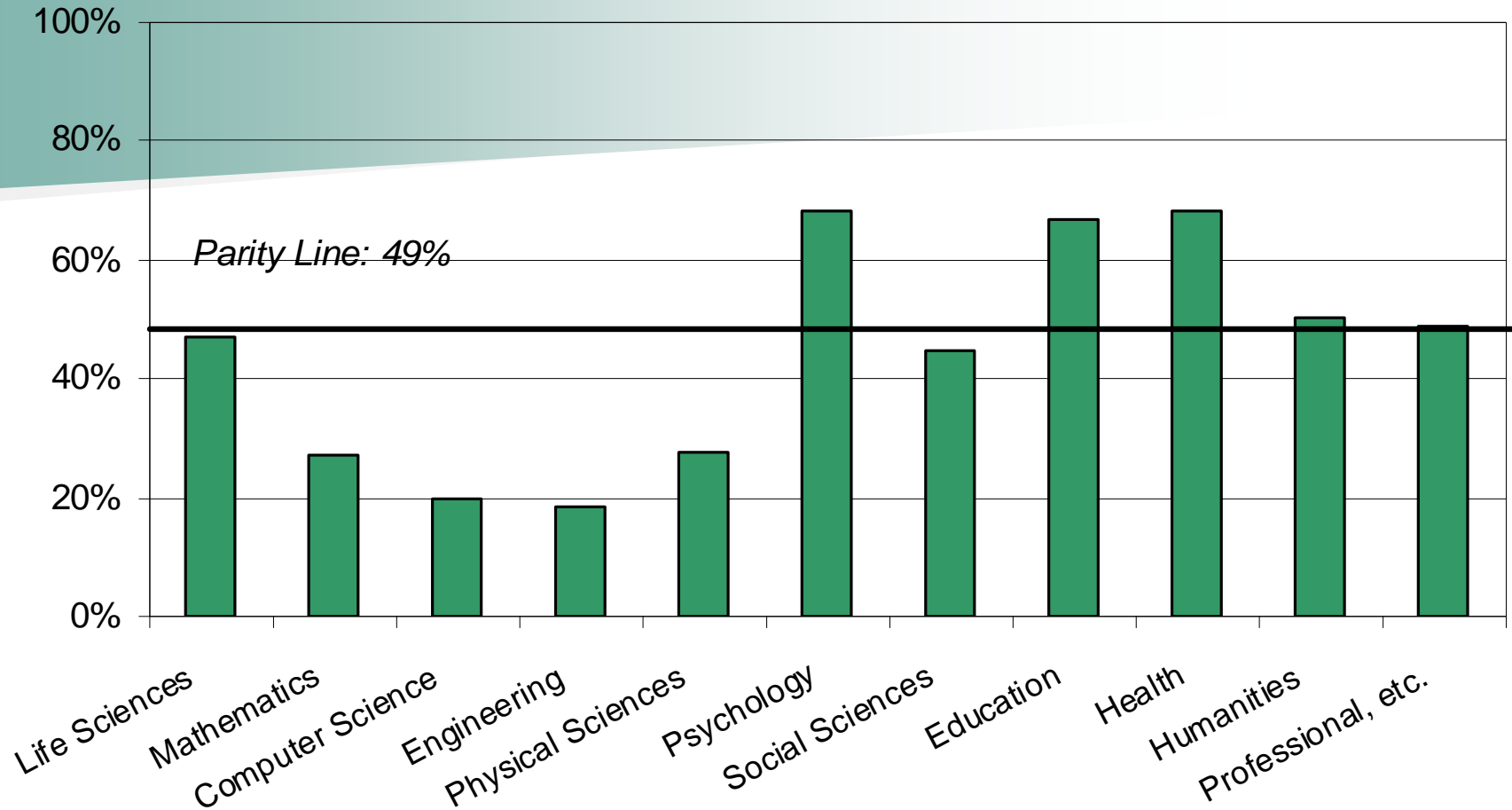
Doctorates Awarded, 2006, by Citizenship and URM Status, Gender and Field



Doctorates Earned by URM's by Gender and Field, 1985 and 2006

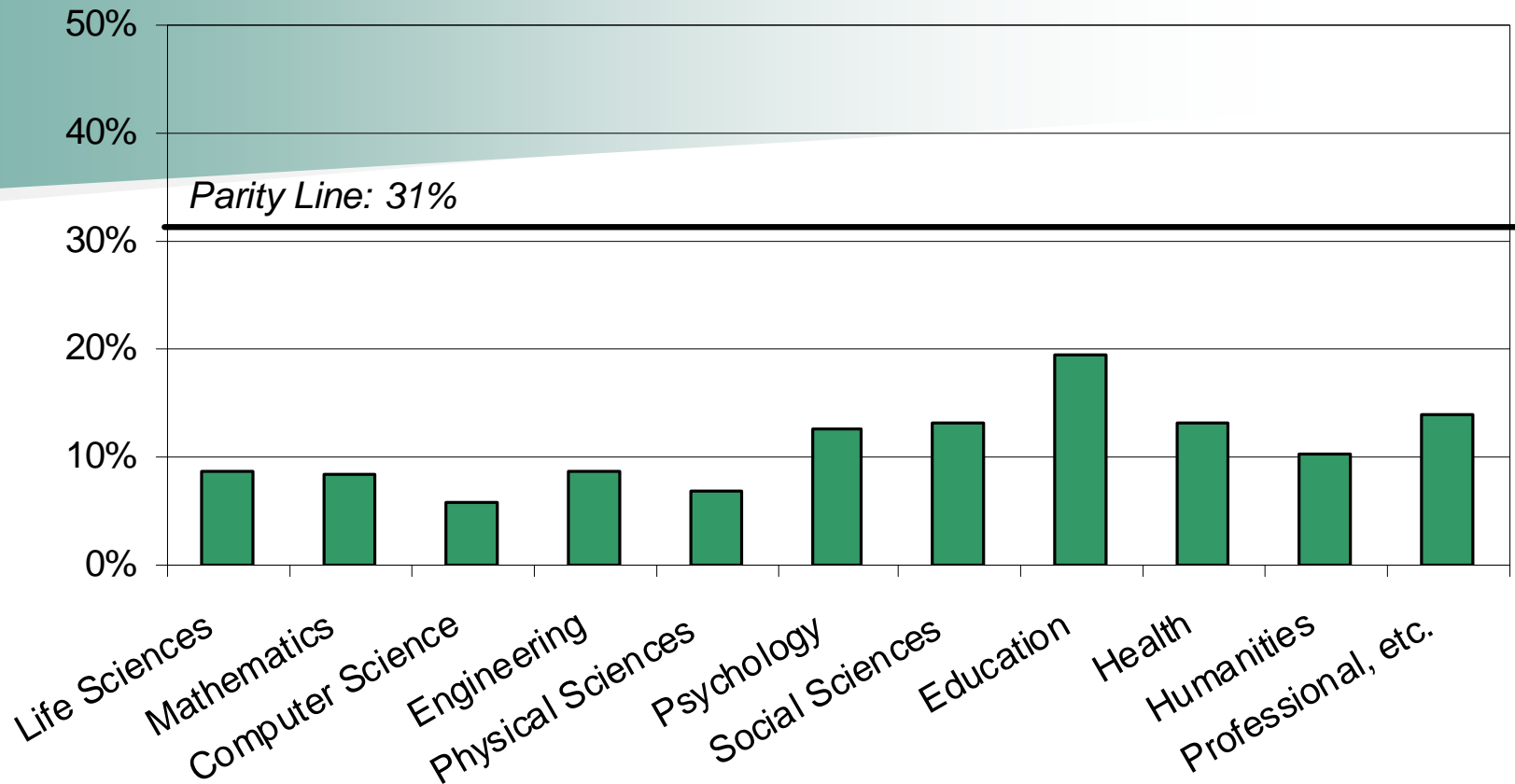


Percent Female Among Doctorate Recipients, 2005



Source: NSF Science and Engineering Doctorate Awards: 2005. "Professional, etc." includes professional, unknown, and other.

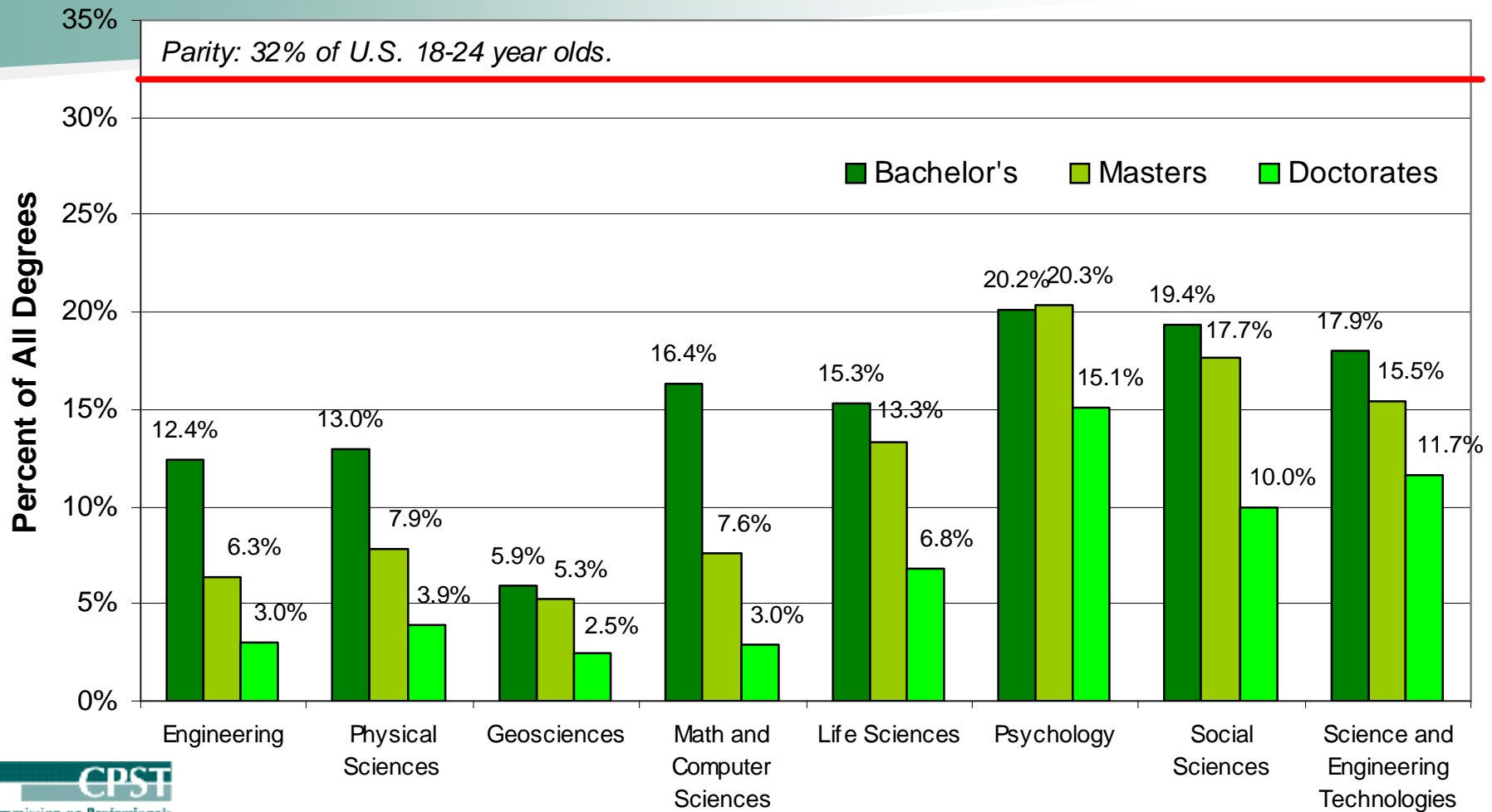
Percent URM Among Doctorate Recipients, U.S. Citizens and Permanent Residents, 2005



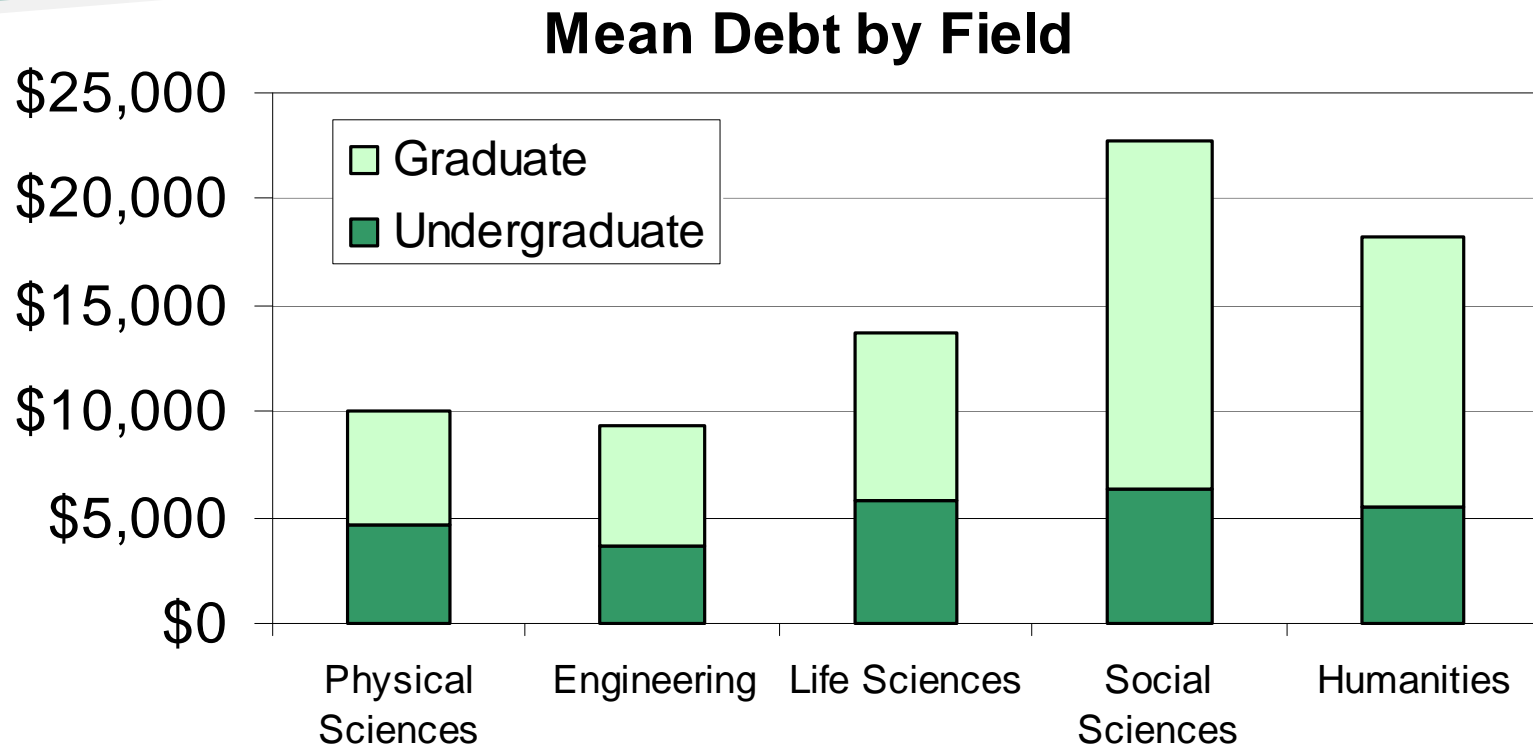
Source: *NSF Science and Engineering Doctorate Awards: 2005*. "Professional, etc." includes professional, unknown, and other. URM includes African American, Hispanic, and American Indian.

The URM pipeline to doctoral degrees is far from "full" . . .
 Not at "parity" with representation in the population.

URM Degree Pipeline, Percent of Degrees Earned by U.S. Citizen and Permanent Resident URM's by STEM Field and Level, 2006



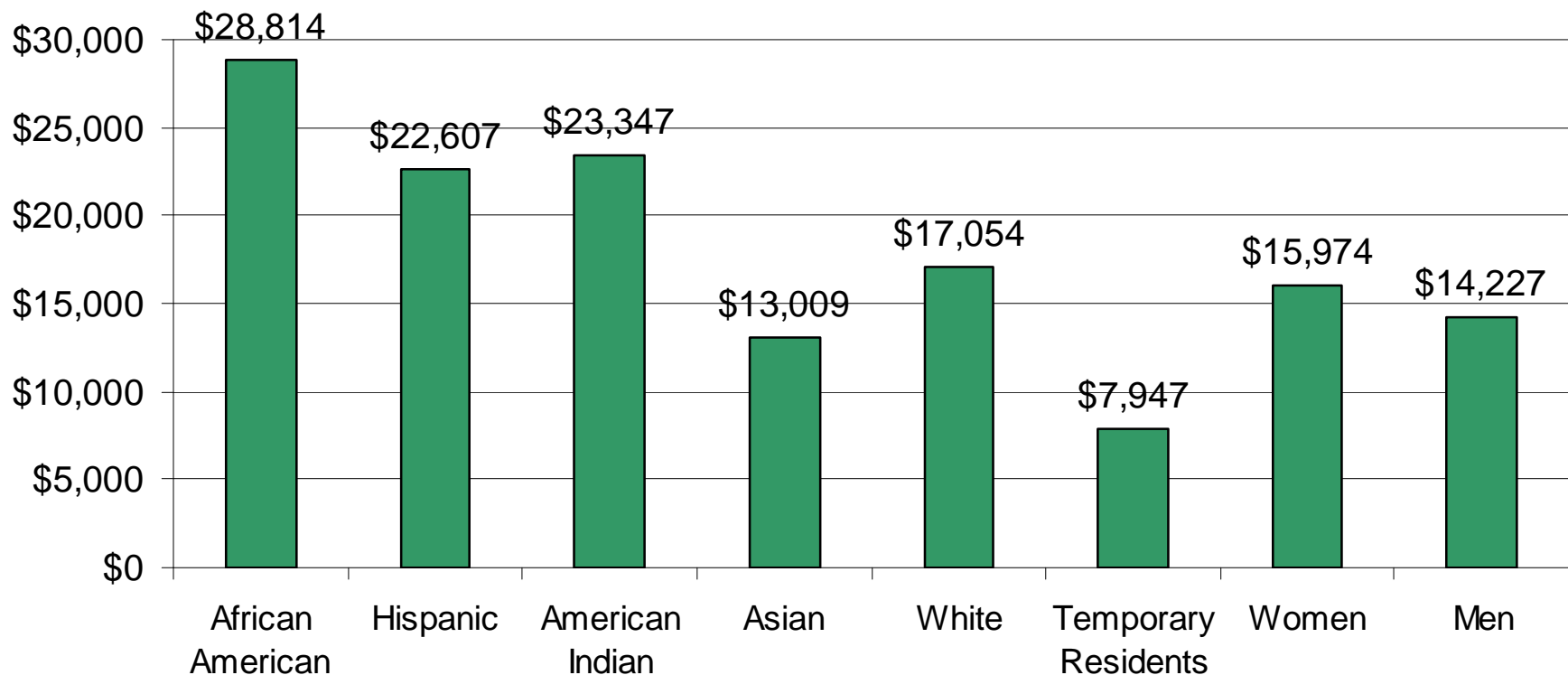
Financing graduate education differs by field. Less sources of support for social sciences and humanities means more debt upon graduation.



Source: CPST analysis of NSF Survey of Earned Doctorates data.

URMs start post-PhD careers with higher levels of debt than non-URMs

Mean Debt by Demographic Group



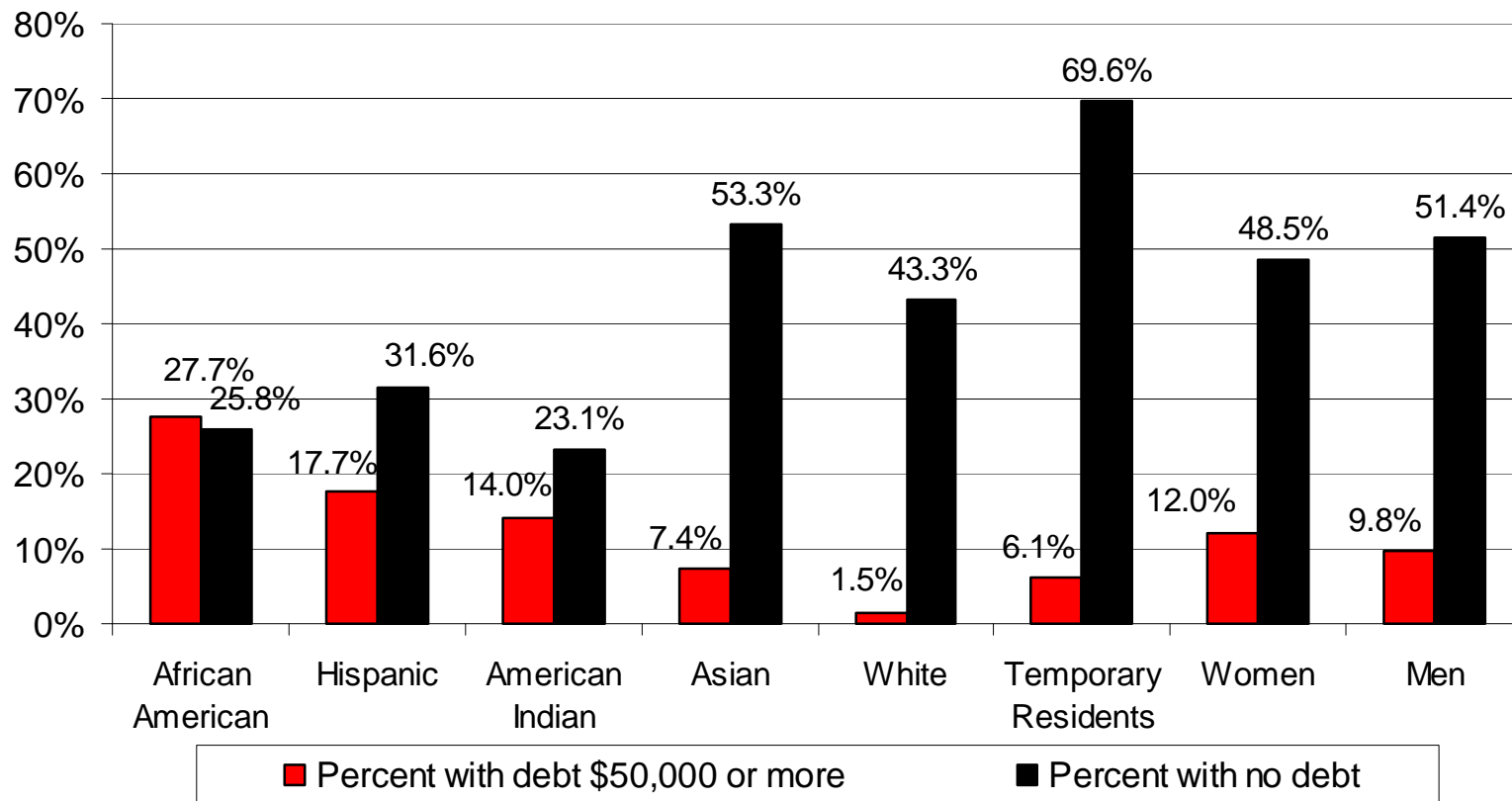
Source: CPST analysis of NSF Survey of Earned Doctorates data.

CPST. . . Your workforce data source.

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URMs are more deeply in the red when they earn a PhD than non-URMs

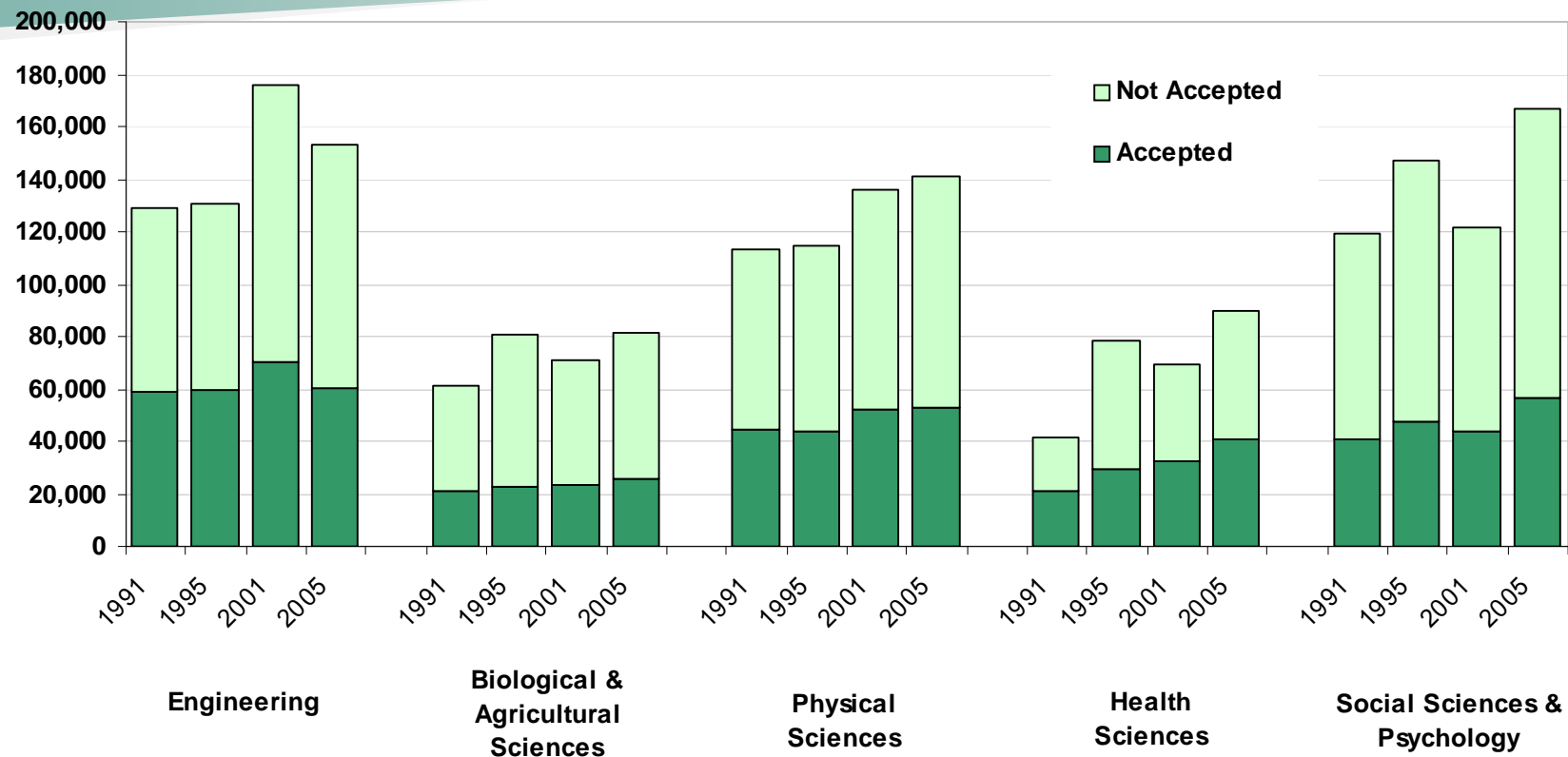
Debt by Demographic Group



Source: CPST analysis of NSF Survey of Earned Doctorates data.

The numbers of accepted applications have remained stable in some fields but have increased in others.

Graduate School Applications, Selected Years (Fall)



Note: Physical sciences includes mathematics and computer sciences.

Source: CPST analysis of data from Council of Graduate Schools, report series "Graduate Enrollments and Degrees" (1995, 2001, and 2005).



STEM Faculty

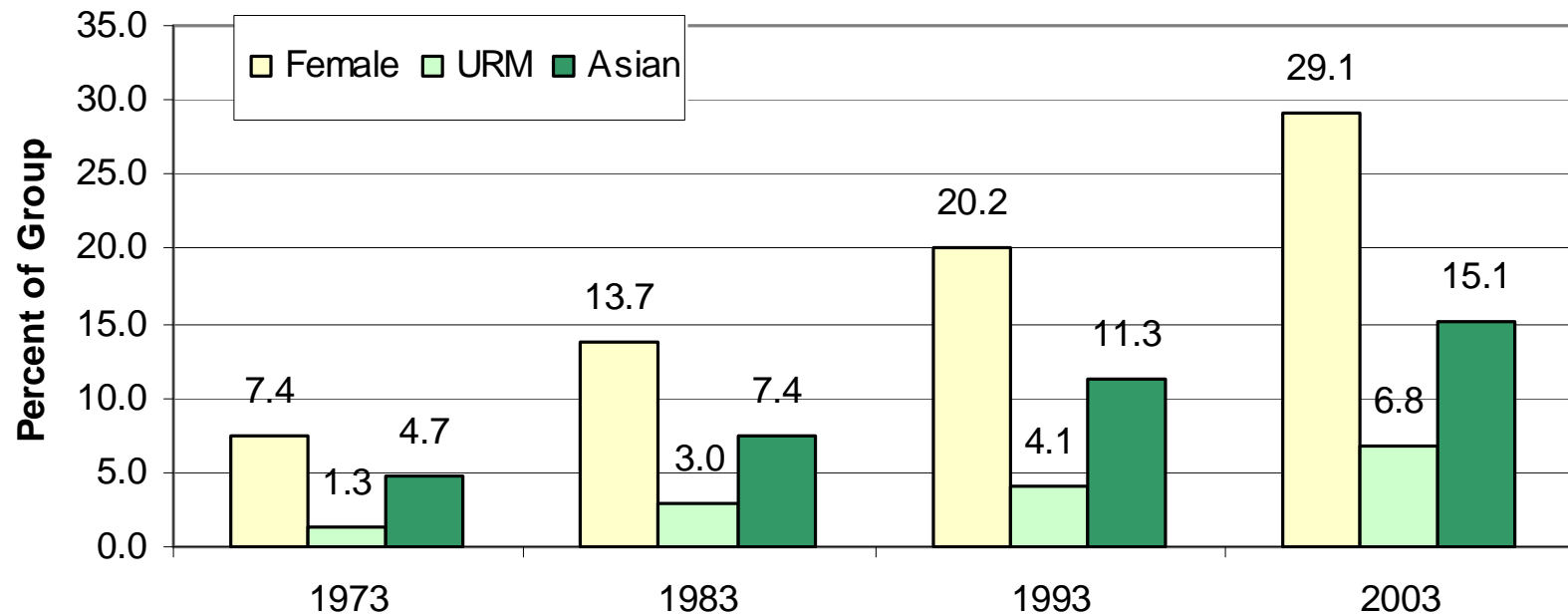
A few findings from:

**“Minorities and Non-Minorities in
Academia: A Natural Science and
Engineering Career Path
Comparison”**

(Funded by the Alfred P. Sloan Foundation, 2005-2007)

Representation of women, under represented minorities and Asian/Pacific Islanders has increased at Carnegie Research Universities

Representation of Selected S&E Doctorate Degree Holders as Faculty at U.S. Research Universities



Source: CPST analysis of National Science Foundation data reported in *Science and Engineering Indicators 2006*

URM faculty are less likely to be at Carnegie R1s than Asian or Non-Minority faculty and more likely at schools that serve URM students.

Characteristics of Current Institution, All S&E Faculty by Ethnicity



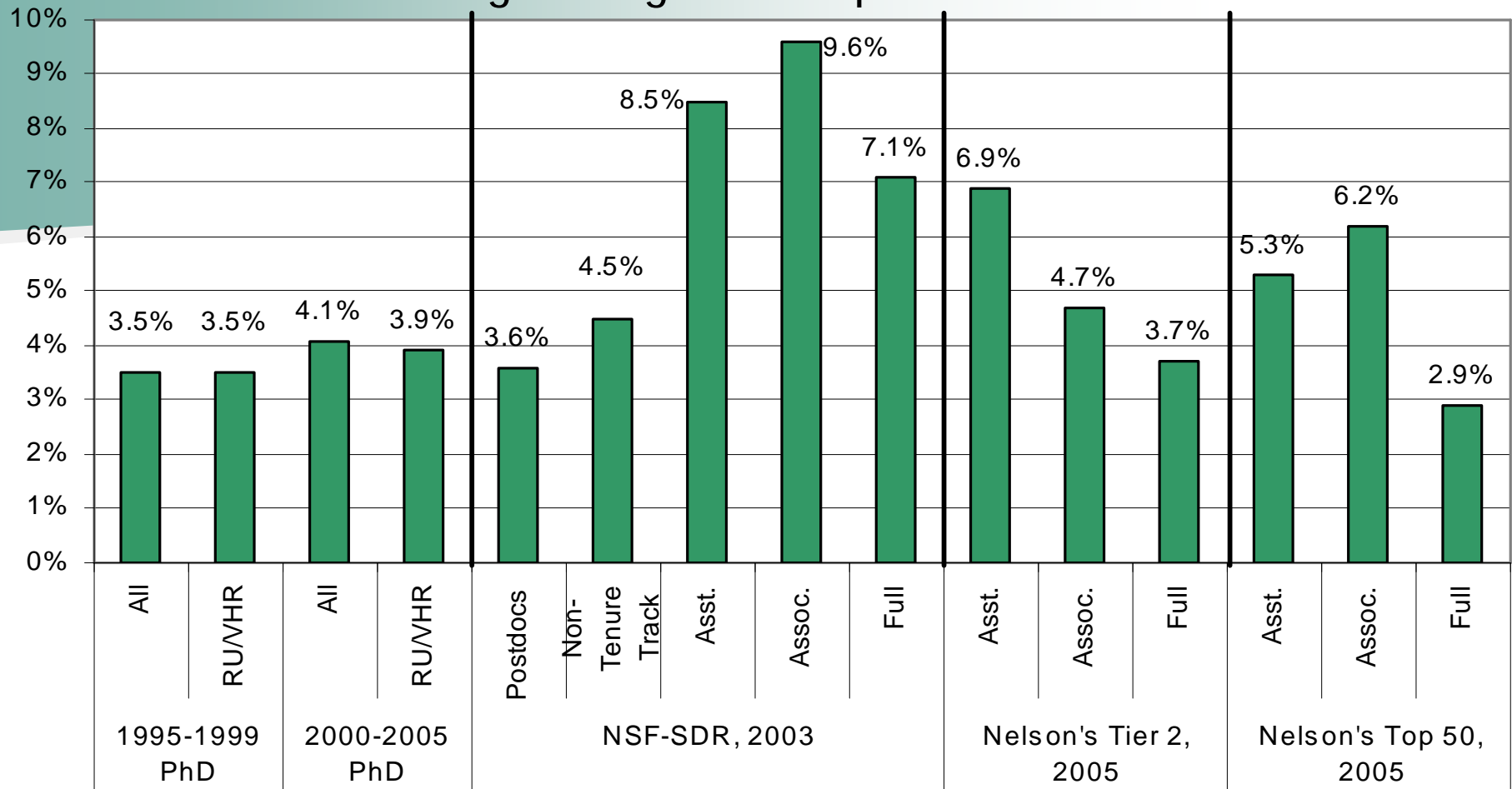
Source: CPST analysis of NSOPF 2004 weighted data. S&E includes natural, physical, and health sciences and engineering.

A majority of faculty at R1 schools earned Ph.D.s at R1s . . . URM and Asian/Pacific Islanders at R1s are more likely to have come from non-R1 schools than non-minority faculty.

(Source: National Study of Postsecondary Faculty, 2004)

		Current Institution					
		URM		Asian/Pacific Islander		Non-Minority	
		R1	< R1	R1	< R1	R1	< R1
PhD Inst.	R1	79.2%	63.7%	81.7%	68.4%	86.9%	65.4%
	<R1	19.8%	34.7%	16.7%	31.5%	10.2%	33.2%
	Unk.	1.1%	1.6%	1.6%	0.1%	2.9%	1.4%

Engineering: URM Representation



Sources: PhD data from NORC special analysis of SED data, RUMHR refers to institutions classified by the Carnegie Foundation as Research Universities-Very High Research Activity under the 2006 guidelines; "Nelson's Top 50" and "Tier 2" are from "Nelson Diversity Surveys" with "Top" departments defined by FY2002 research expenditures reported by NSF and data collected in 2005. "NSF-SDR, 2003" data are from NSF's Survey of Earned Doctorates, special tabulations by NORC. Postdocs are in all employment sectors.

Data GAPS

- n Enrollment by major
- n Undergraduate retention
 - Year-to-year
 - To degree
- n Postdocs
- n Timeliness of releases of NSF's SESTAT (Science and Engineering Statistical Analysis System) data.

Thanks!

CPST acknowledges the generous support of the Alfred P. Sloan Foundation for projects:

- (1) "Minorities and Non-Minorities in Academia: A Natural Science and Engineering Career Path Comparison"
- (2) "STEM Workforce Data Project" (Phases I and II).

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