Designing Future-Oriented Doctoral Education

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Source: M. Nerad. Singapore 8/28/07

Overview

1. **Nations prepare for the knowledge economy: increase in PhD production**

2. **Common assumptions have shaped approaches to doctoral education and thinking about successful PhD outcomes.**

3. **Future faculty will need to prepare PhD students for multiple careers inside and outside academe, foster professional development, and prepare themselves and their doctoral students to become world-citizens.**

Source: M. Nerad. Singapore 8/28/07

Are we preparing our graduate students for the future?

The context:

Globalization
and the knowledge economy

Source: M. Nerad. Singapore 8/28/07

Forces of Change in PhD Education Worldwide

- **Globalization**
- **Knowledge-based economy (theory)**
- **Expanded notions of need for PhD-educated workers**
- **Interdisciplinary work**
- **ACCOUNTABILITY demands!**

Source: M. Nerad. Singapore 8/28/07

Nations Prepare for the Knowledge Economy

Increase of PhD production + Governmental Financial Support (selected examples)

- **Europe**: Bologna Agreement (3.2% of GDP for R&D) increased PhDs in 2002 – 76,500
- **China**: PhDs in 1991 - 2,556; in 2001 -12,500
- **Japan**: PhDs in 1991 -10,758; in 2001- 16,000
- **South Korea**: PhDs in 1991 -3,000; in 2002- 7,000
- **UK** : PhDs in 1991 - 8,400; in 2001 -14,200
- **Germany**: PhDs in 1991 -22,500; in 2001- 25,000
- **US**: PhDs in 1991 - 31,300; in 2001 - 41,000
- **Source: NSF Science Indicators , 2006**

Source: M. Nerad. Singapore 8/28/07

Nations Prepare for the Knowledge Economy

% of International PhD production of total PhDs awarded in 2003 and

% of international PhDs Science and Engineering PhDs (selected examples)

Germany: 10% of all PhDs; 14% of S&E degrees

Japan: 13% of all PhDs; 13% of S&E degrees

UK: 37% of all PhDs; 39% of S&E degrees

US: 30% of all PhDs; 37% of S&E degrees

Australia, New Zealand, UK, European Union actively recruit international doctoral students

Source: NSF Science Indicators , 2006

Source: M. Nerad. Singapore 8/28/07

Empirical Findings from Three US *PhDs –10+ and 5+ Years Later* Studies

1. **PhDs—Ten Years Later** ***(surveyed 1997)***

   MELLON FOUNDATION AND NSF FUNDED

   61 US universities, 6 disciplines

   Survey population: 5,864 response rate: 66%

   Biochemistry - Computer Science - Electrical Engin.

   English – Mathematics - Political Science

2. **PhDs in Art History – Over a Decade Later** ***(surveyed in 2002)***

   GETTY GRANT FOUNDATION FUNDED

   54 US universities, all art history PhD programs

   survey population: 725 response rate: 70%

3. **Social Science PhDs- 5+ Year Out (surveyed 2005/06)**

   FORD FOUNDATION funded

   65 universities, 6 disciplines, 45% response rate (3,025 respondents)

Source: M. Nerad. Singapore 8/28/07

Common Assumptions about PhDs' Employment

1. All PhD students want to become professors.
2. The "best" PhD students do become professors.
3. PhD recipients' academic career paths are linear and smooth.
4. Everybody can take the "best" job offered.
5. Professors enjoy the highest job satisfaction.

Source: M. Nerad. Singapore 8/28/07

Common Assumption 1

All students who pursue a PhD want to become professors.

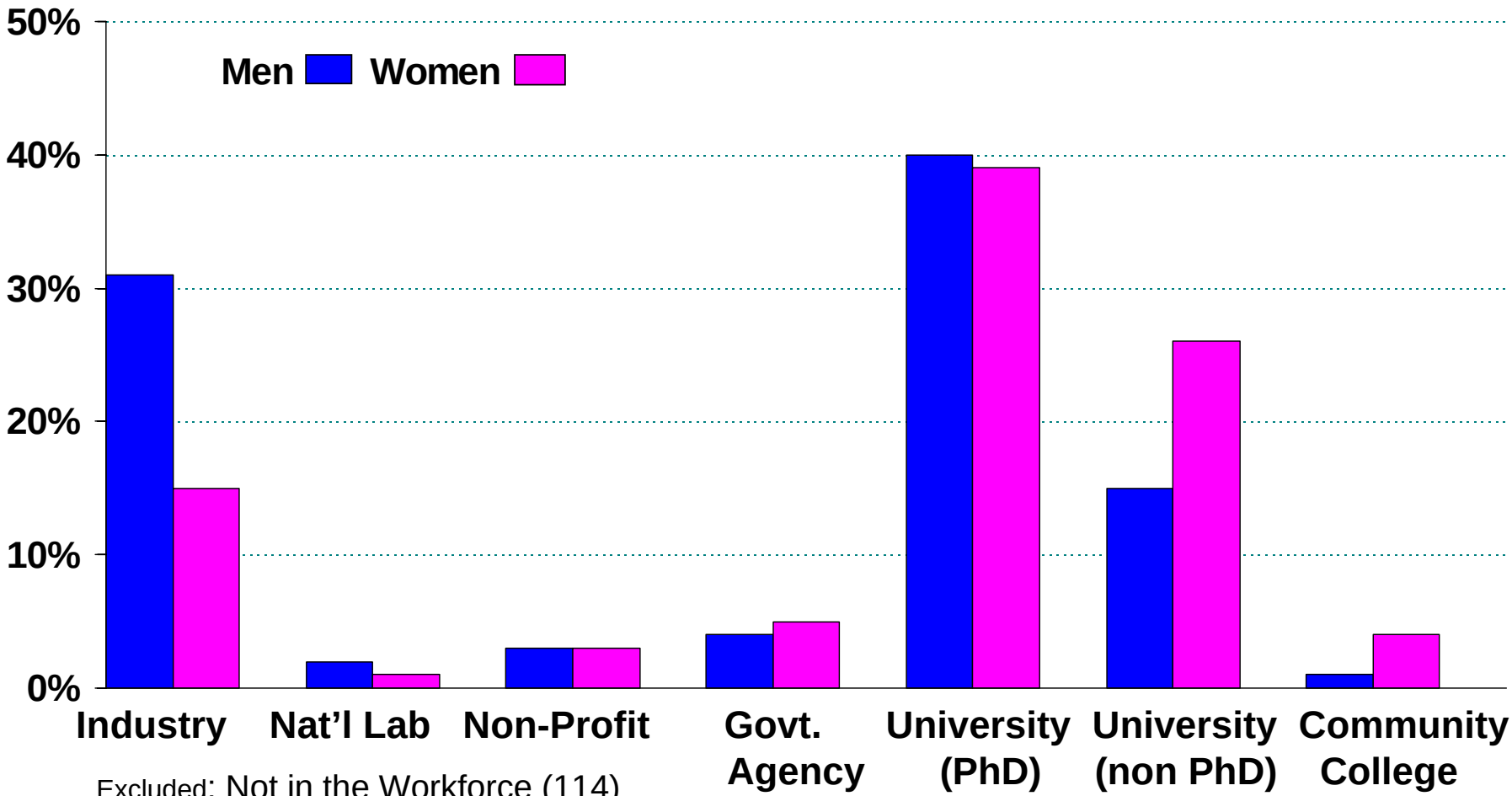
Source: M. Nerad. Singapore 8/28/07

Career Goal at PhD Completion and Tenured 10-14 Years Later

	(1) % Wanted to Be Professor	(2) % Tenured of (1)	(3) % Tenured of All PhDs	N of All PhDs
Bio-Chemistry	32	34	19	*(605)*
Computer Sc.	46	61	34	*(282)*
Electrical Engin.	19	67	22	*(328)*
English	81	64	55	*(767)*
Mathematics	54	73	54	*(522)*
Political Sc.	72	66	53	*(455)*

Source: M. Nerad. Singapore 8/28/07

Selected Employers 10+ Years Later by Gender



Excluded: Not in the Workforce (114)

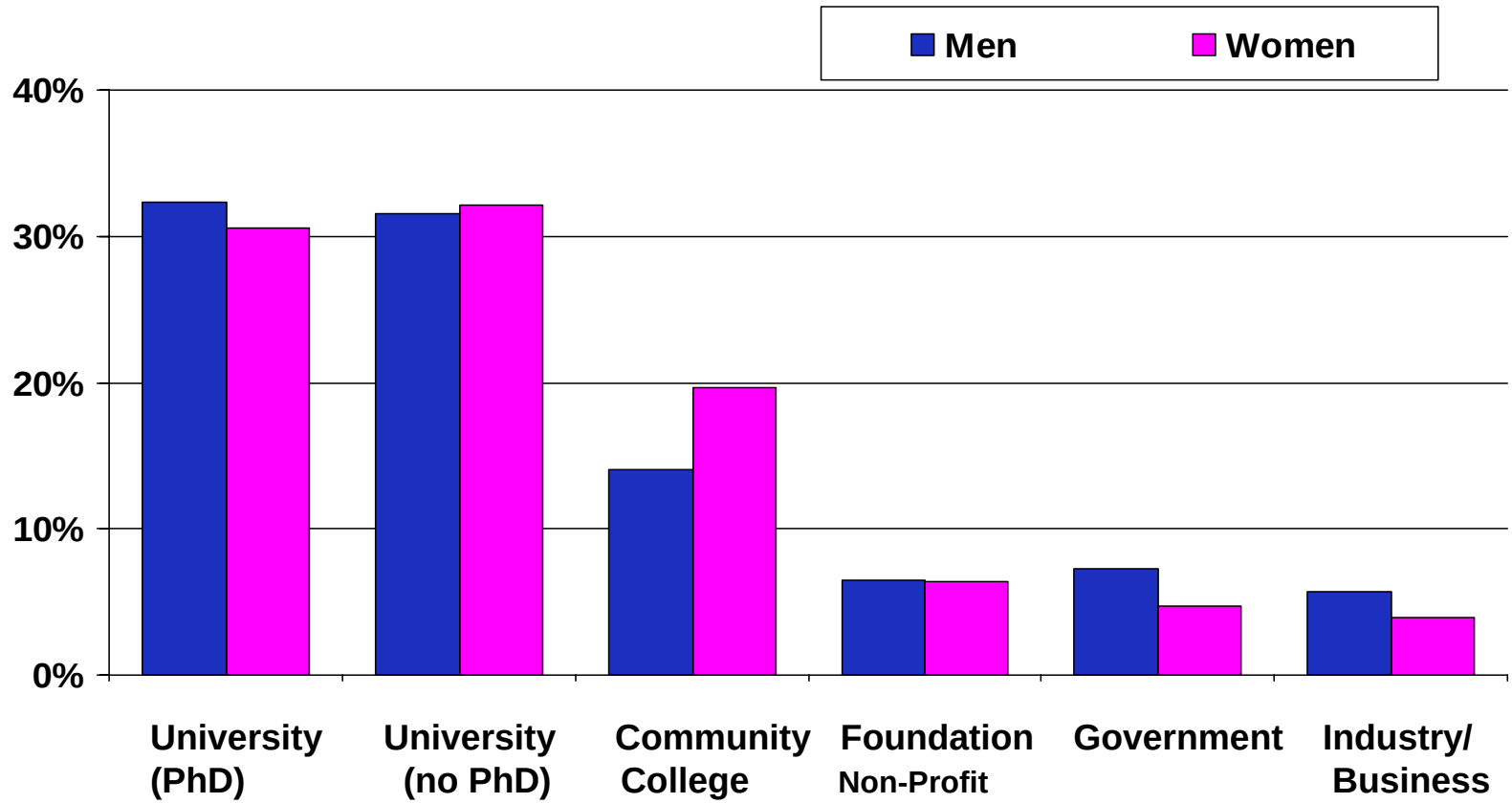
Source: M. Nerad. Singapore 8/28/07

Career Goal at PhD Completion and % Tenured or Tenure-Track 5+ Years Later

	(1) % Wanted to Be Professor	(2) % Tenured + TT of (1)	(3) %Tenured+T-T of All PhDs	N of All PhDs
Anthropology	72	59	49	*(407)*
Communication	75	78	66	*(319)*
Geography	65	69	49	*(155)*
History	84	72	62	*(789)*
Political Sc.	76	76	63	*(674)*
Sociology	75	74	60	*(521)*

Source: M. Nerad. Singapore 8/28/07

Selected Employer at Time of Survey (2005/2006) Social Science



Excluded: Not in the Workforce (55=2.1%)

Source: M. Nerad. Singapore 8/28/07

Common Assumption 2

The “best” PhD students do become professors

measures: many publications
short time-to-degree

Source: M. Nerad. Singapore 8/28/07

Publications at PhD Completion by Last Employment Sector (Social Sciences)

	Academe			BGN Business/Government/Non-Profits		
	% None	% 1 - 2	% ≥ 3	% None	% 1 - 2	% ≥ 3
Anthropology	34	43	23	37	31	32
Communication	37	40	23	61	14	25
Geography	26	48	26	32	32	36
History	42	38	19	47	37	17
Political Science	45	40	14	46	40	14
Sociology	24	47	30	35	41	24

Source: M. Nerad. Singapore 8/28/07

Common Assumption 2
The "best" become professors (*PhD10*)

Short time-to-doctoral degree and number of publications only mattered significantly for English and political science PhDs.

These factors did NOT matter for PhDs in biochemistry, electrical engineering, and mathematics. Time-to-degree mattered for computer scientists

(logistic regression analysis).

Source: M. Nerad. Singapore 8/28/07

Common Assumptions the "best" (*PhD10*)

What mattered most is the RANK of PhD-granting program.

However in fields with an attractive job market outside academia -- computer science and electrical engineering -- RANK did NOT matter significantly.

Source: M. Nerad. Singapore 8/28/07

Social Science PhDs—Five+ Years Out
Publications During Graduate School

Peer-reviewed Journal Articles (author or co-author published or in press at PhD)

#	Percent Respondents
0	49%
1	25%
2	13%
3+	13%

Source: M. Nerad. Singapore 8/28/07

Publications at PhD Completion by Last Employment Sector (Social Sciences)

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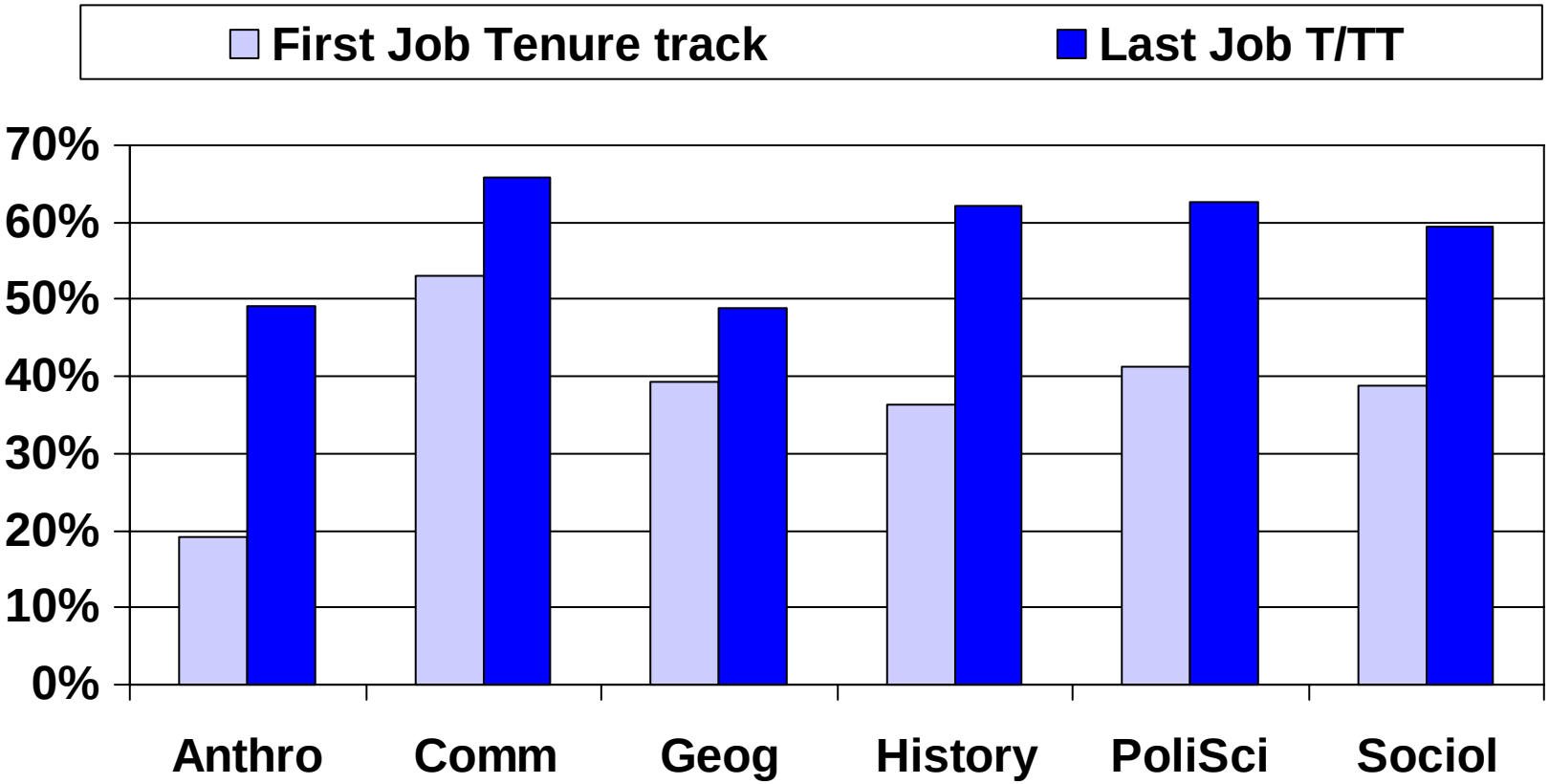
Source: M. Nerad. Singapore 8/28/07

Common Assumption 3

PhD recipients' academic career paths are linear and smooth

Source: M. Nerad. Singapore 8/28/07

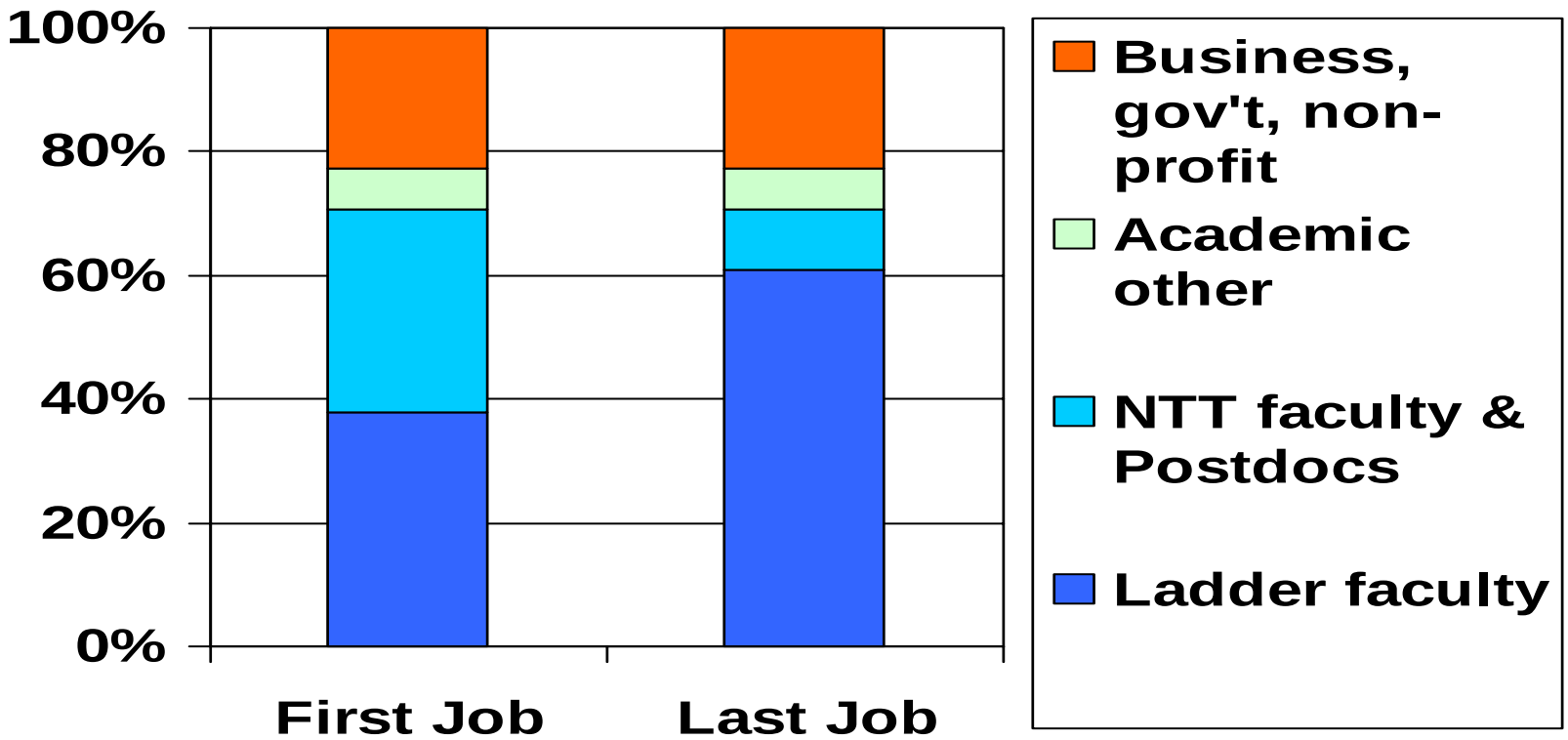
% Whose First Job was Tenure Track, and % whose Last Job was Tenured/Tenure Track



Source: M. Nerad. Singapore 8/28/07

Social Science PhDs—Five+ Years Out

First and Last Jobs



Source: M. Nerad. Singapore 8/28/07

Three Major Trajectories: Political Science (PhD10+Yrs Later)

			Percent of Total
1. Faculty	TT to Ten. (219)	→	42%
2. BGN Employees	Business (29)	6%	13%
	Government (21)	4%	
	Non-Profit (15)	3%	
3. Crossovers	Acad. to BGN (22)	4%	12%
	BGN to Acad. (10)	2%	
	Back and Forth (30)	6%	

Trajectory 1: Under 2yrs. BGN.
Trajectory 2: Under 1yr. Acad.
Trajectory 3: Over 2yrs. BGN and over 1yr. Acad.

Source: M. Nerad. Singapore 8/28/07

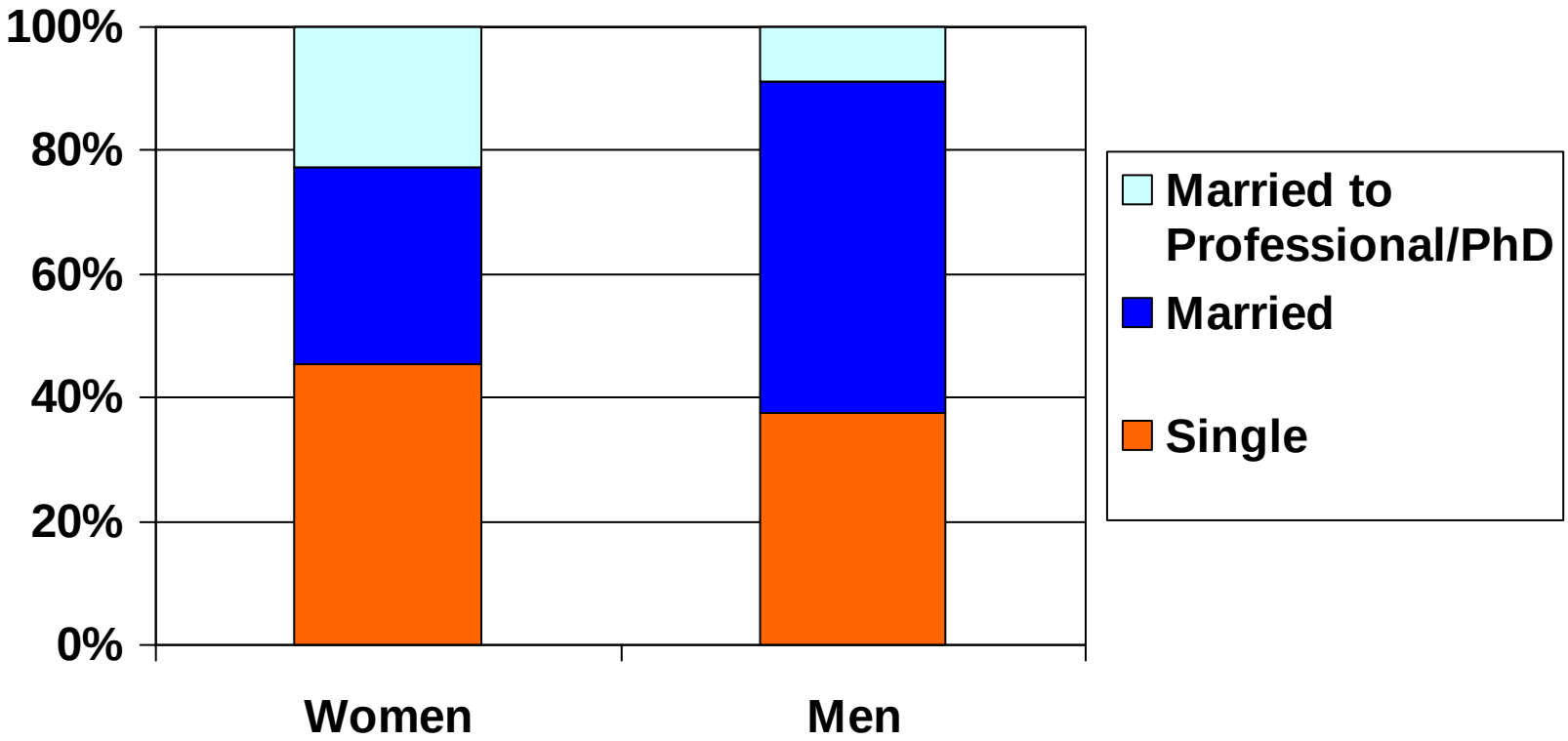
Common Assumption 4

Everybody can take the “best” job offered,
everybody is mobile!

Gender – Family - Career

Source: M. Nerad. Singapore 8/28/07

Social Science PhDs—Five+ Years Out



Source: M. Nerad. Singapore 8/28/07

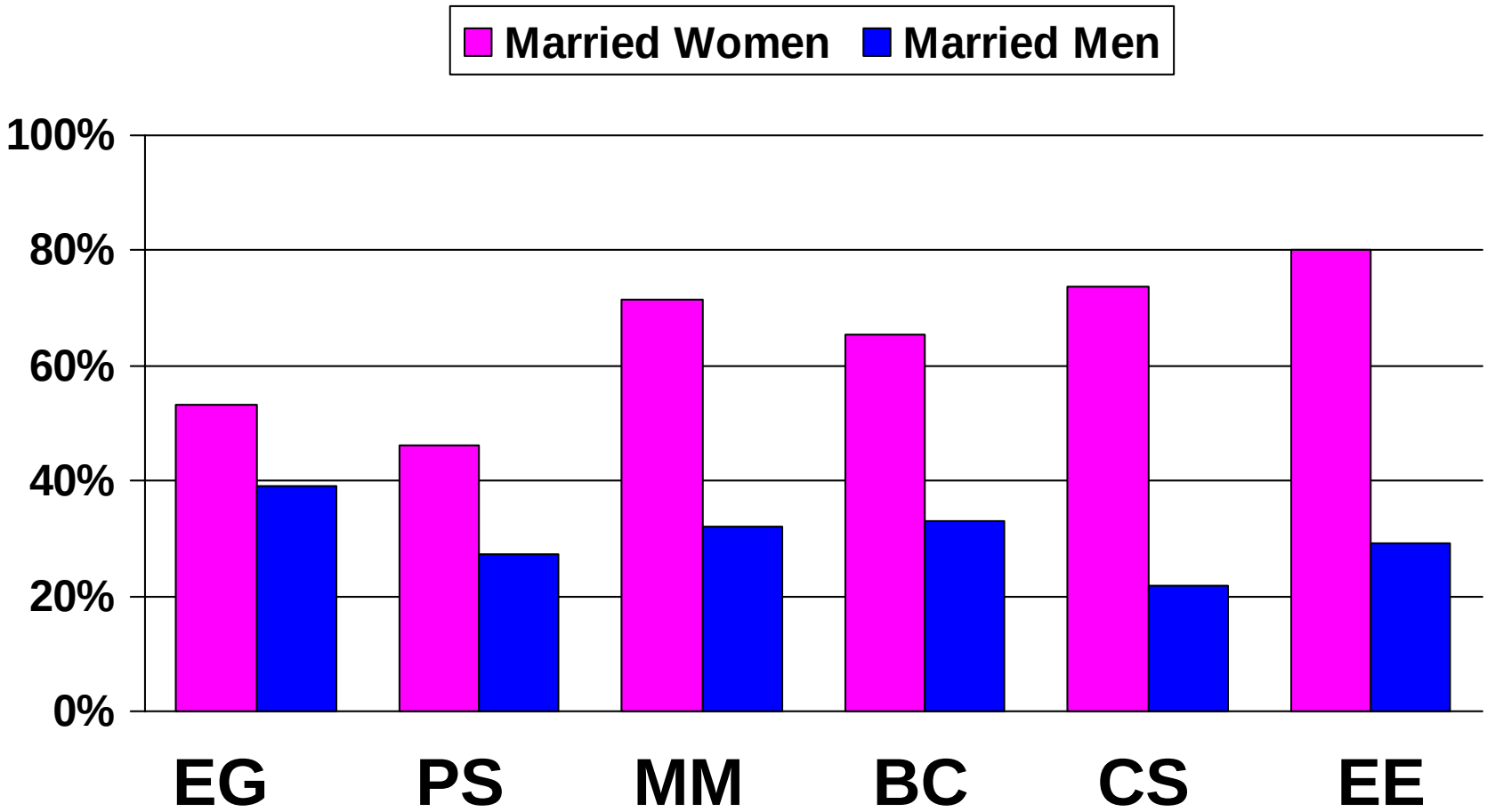
Educational Level of Spouse by Gender and Field

At PhD completion married women/ men <u>BIOCHEMISTS</u> had spouses with PhD/JD/MD (1997): 75% / 24%

At PhD completion married women/ men <u>MATHEMATICIANS</u> had spouses with PhD/JD/MD (1997): 84% / 25%

Source: M. Nerad. Singapore 8/28/07

%"Good Opportunities for My Partner" Very Important in First Job Choice



Source: M. Nerad. Singapore 8/28/07

Educational Level of Spouse At Time of Survey by Gender (all social science fields)

Women in Our Survey

Married to PhD/JD/MD: 34%

Men in Our Survey

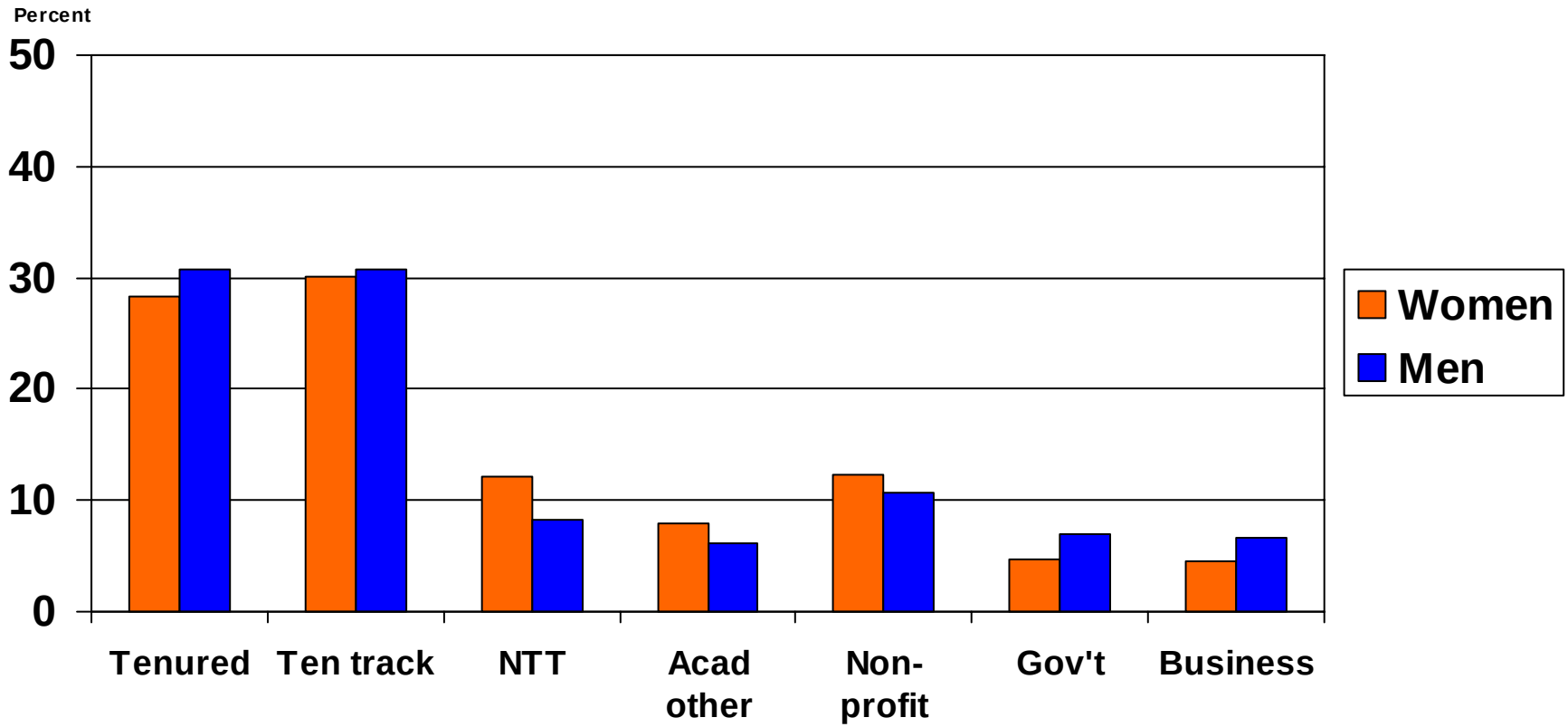
Married to PhD/JD/MD: 19%

PRELIMINARY RESULTS

Source: M. Nerad. Singapore 8/28/07

Social Science PhDs—Five+ Years Out

Jobs at Survey by Gender (2005/2006)



Source: M. Nerad. Singapore 8/28/07

Common Assumption 5

Faculty enjoy the highest job satisfaction

Source: M. Nerad. Singapore 8/28/07

% Very Satisfied in Job at Time of Survey (*All Fields/PhD10*)

	Rank	%	N
BNG manager/executive	1	40%	*243*
Academic administrator	2	39%	*54*
Acad. researcher	3	28%	*54*
Tenured Professors	4	26%	*851*
BNG researcher	5	24%	*430*
Administrators	6	22%	*54*
Temporary academic staff	7	18%	*131*

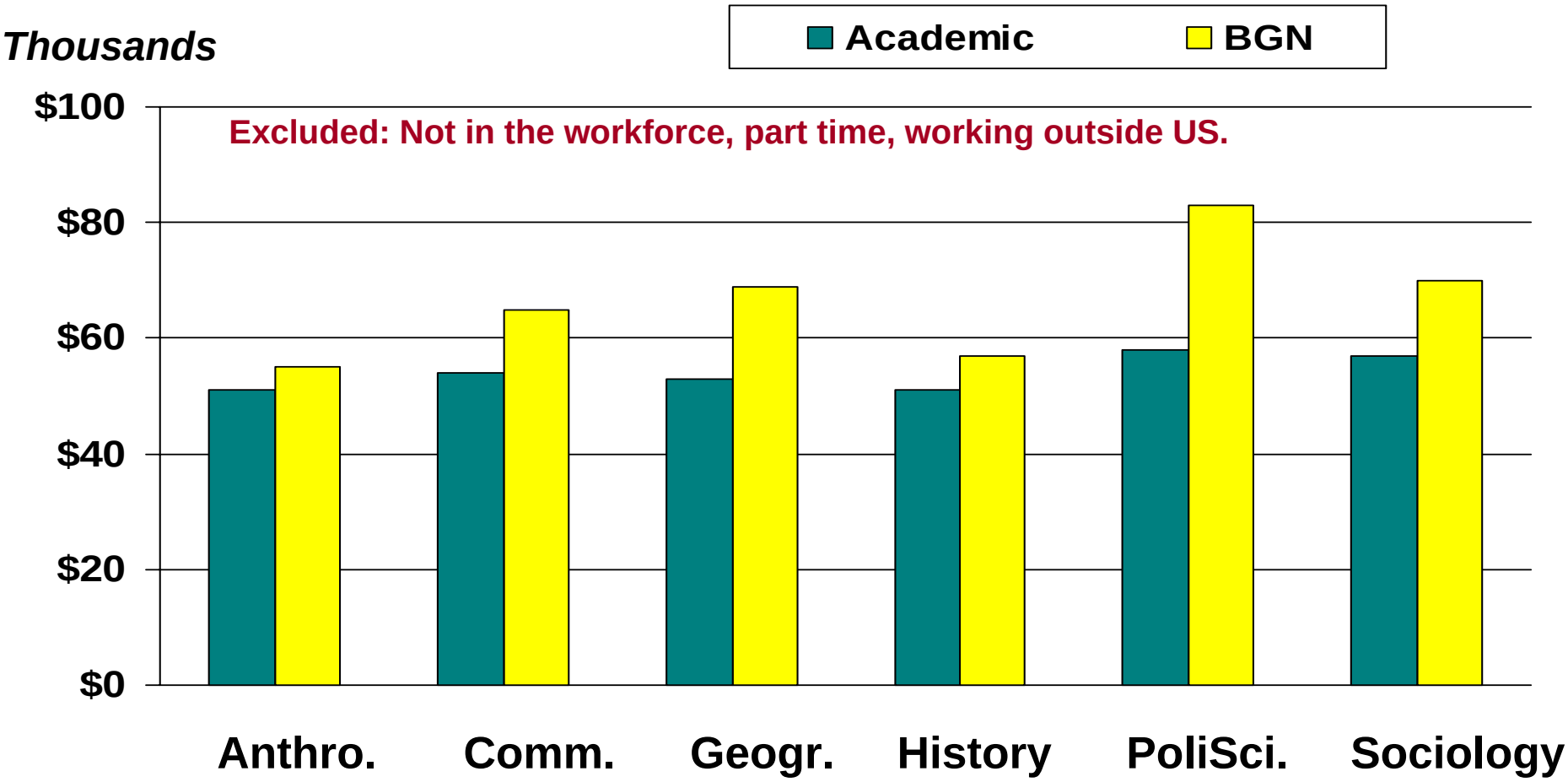
Source: M. Nerad. Singapore 8/28/07

Overall Satisfaction with Current Job (Social Sciences)

Major Field	Rank	Mean Satisfaction (1=very dissatisfied to 4=very satisfied)
Ten + TT Faculty	1	3.20
Government	1	3.20
Industry	3	3.18
Foundation/Social (non) Profit	4	3.17
Lecturer	5	3.12

Source: M. Nerad. Singapore 8/28/07

Median Salary at Time of Survey (2005/2006) among Full-time and Self-employed PhDs: Social Sciences



Source: M. Nerad. Singapore 8/28/07

Characteristics of Doctoral Education for the 21st Century

1. It prepares for a variety of careers (academic and non-academic).
2. It offers at least 3 years of funding with benchmarks and performance evaluation.
3. It begin with a general course on epistemology on different ways of knowing ("how do we know what we know, and what do we regard as evidence?")
4. Within a single discipline it will include interdisciplinary or multi-disciplinary components.
5. It integrates professional skill building
6. It integrates team work

Source: M. Nerad. Singapore 8/28/07

Characteristics of Doctoral Education for the 21st Century

7. Ethics education will become integral in all fields.
8. It will include a course on "environmental literacy."
9. It includes collaborative projects with other universities , research centers, or industrial research organizations.
10. Some proportion of the research will be carried out in a different country.
11. It integrates cultural expertise and knowledge of international doctoral students and creates a two-way learning street.
12. Doctoral students will need to master more than one language.
13. It prepares for leadership.
14. World citizenship will become a goal.

Source: M. Nerad. Singapore 8/28/07

Thank you!

Center for Innovation and Research in Graduate Education

CIRGE website

http://www.cirge.washington.edu

The Role of the Graduate School

In implementing the vision the Graduate School becomes an educational unit rather than a sole administrative unit

It will focus on 5 areas:

1. **Transition from undergraduate to graduate education.**
2. **Transition from a knowledge consumer to a knowledge producer.**
3. **Transition from education to work.**
4. **Transformation from national to an international focus on learning and research.**
5. **On improving graduate education by systematically collecting, analyzing, and feeding back data and information to graduate programs.**