

# Designing Future-Oriented Doctoral Education



**Professor Maresi Nerad**  
**Associate Graduate Dean, The Graduate School**

***Center for Innovation and Research in Graduate  
Education (CIRGE)***

**University of Washington**

***National University of Singapore***

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# 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.**

# Are we preparing our graduate students for the future?



**The context:**

**Globalization  
and the knowledge economy**

# Forces of Change in PhD Education Worldwide



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

# 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

# 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

# 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)**

# 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.**

# Common Assumption 1



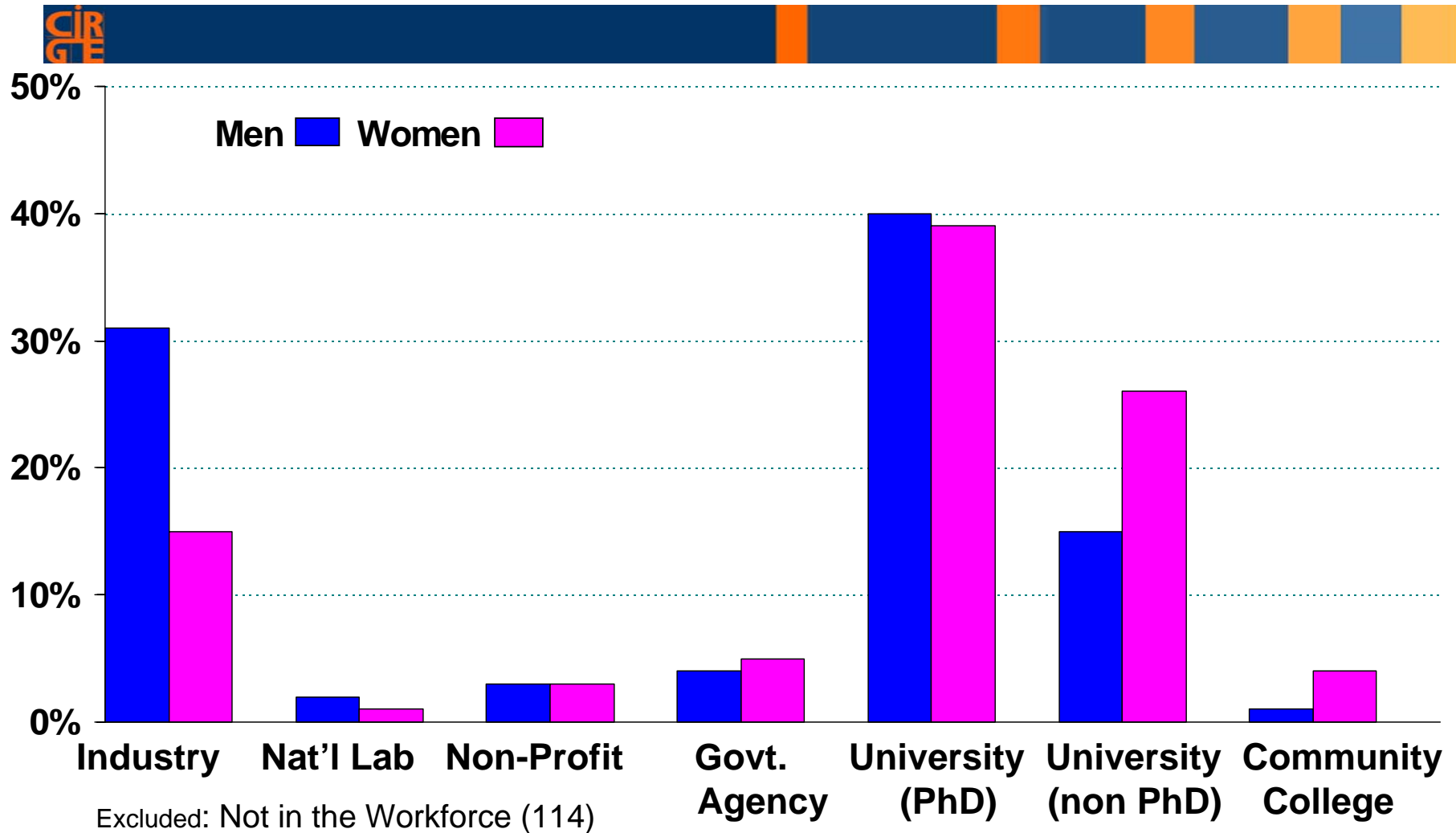
**All students who pursue a PhD  
want to become professors.**

# 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	<b>32</b>	<b>34</b>	<b>19</b>	(605)
Computer Sc.	<b>46</b>	<b>61</b>	<b>34</b>	(282)
Electrical Engin.	<b>19</b>	<b>67</b>	<b>22</b>	(328)
English	<b>81</b>	<b>64</b>	<b>55</b>	(767)
Mathematics	<b>54</b>	<b>73</b>	<b>54</b>	(522)
<b>Political Sc.</b>	<b>72</b>	<b>66</b>	<b>53</b>	<b>(455)</b>

# Selected Employers 10+ Years Later by Gender

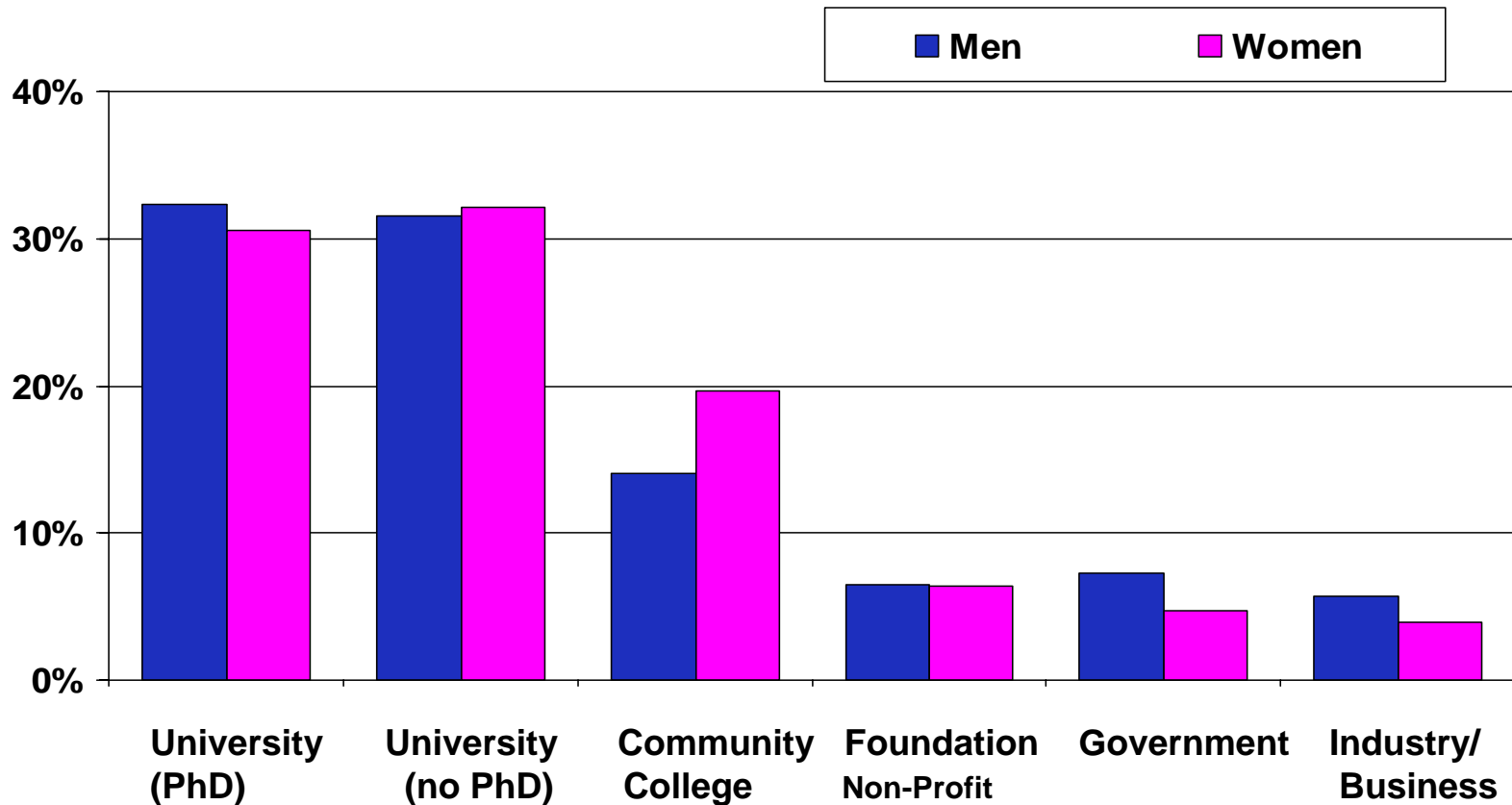


# Career Goal at PhD Completion and % Tenured or Tenure-Track 5+ Years Later



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

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



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

# Common Assumption 2



**The “best” PhD students do  
become professors**

**measures: many publications  
short time-to-degree**

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



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

# 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).*

# 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.**

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



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

<b>#</b>	<b>Percent Respondents</b>
0	49%
1	25%
2	13%
3+	13%

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



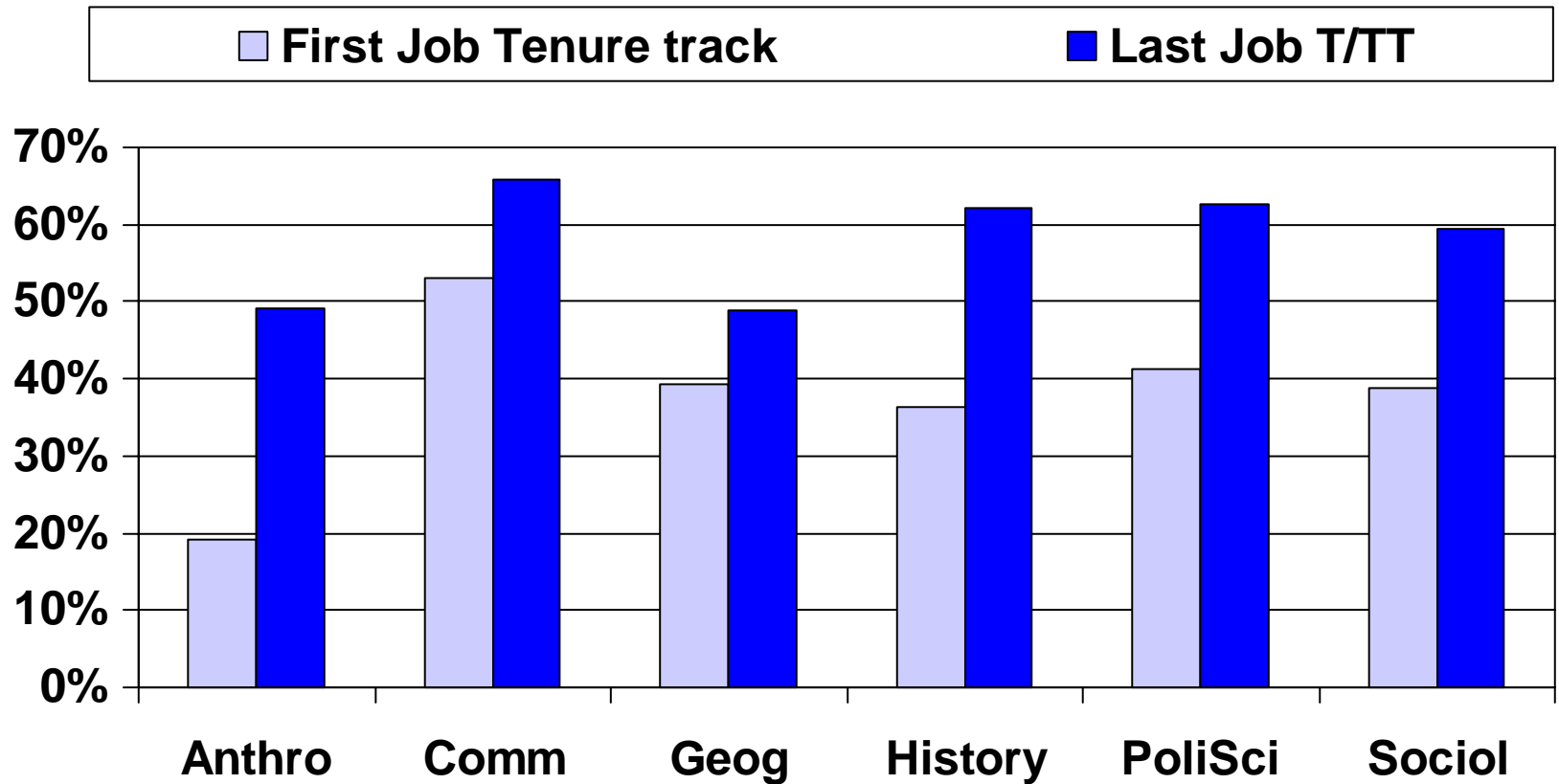
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# Common Assumption 3

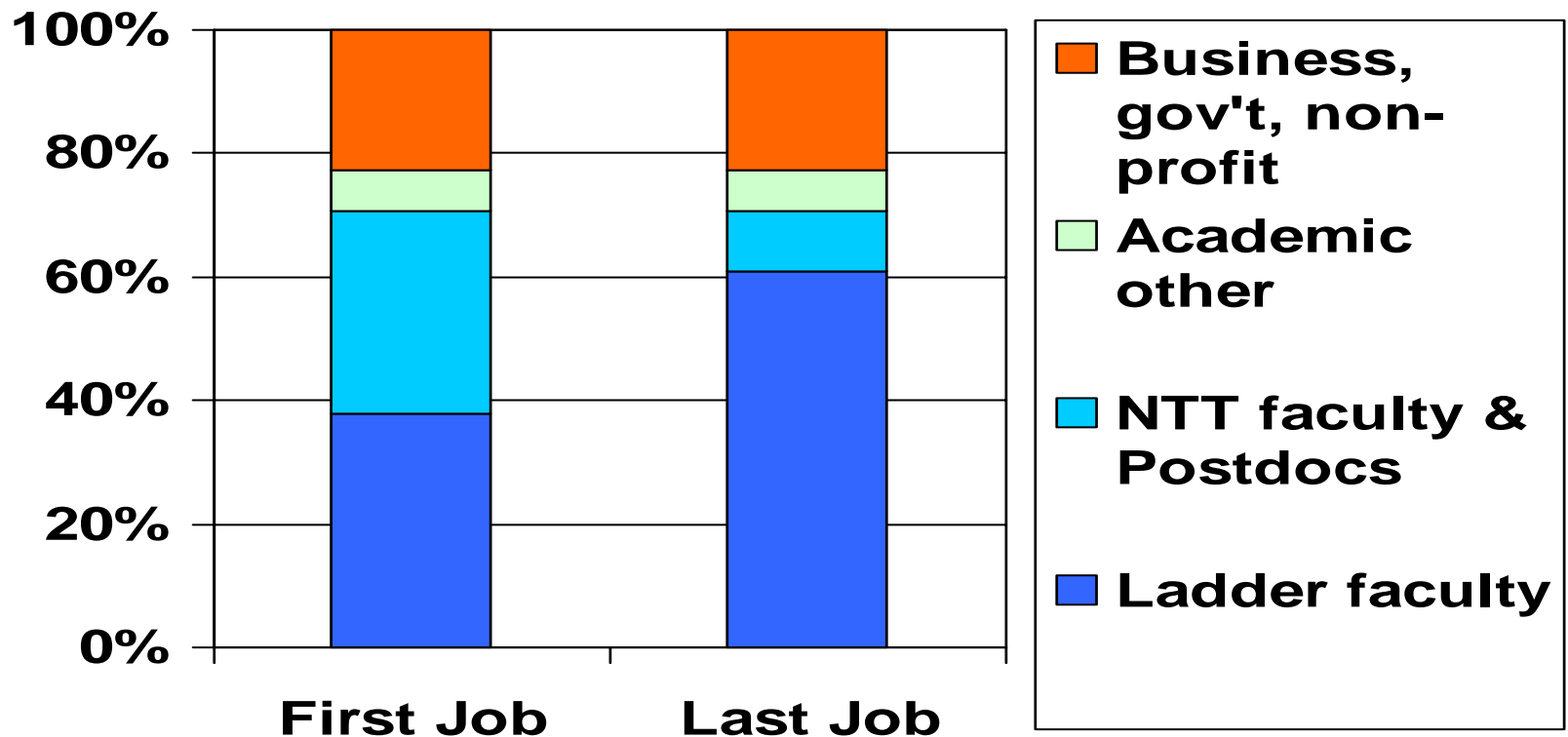


**PhD recipients' academic career paths are linear and smooth**

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



# Social Science PhDs—Five+ Years Out First and Last Jobs



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



**Percent  
of Total**

## 1. Faculty

TT to Ten. (219)



**42%**

## 2. BGN Employees

Business (29)

**6%**

Government (21)

**4%**

**13%**

Non-Profit (15)

**3%**

## 3. Crossovers

Acad. to BGN (22)

**4%**

BGN to Acad. (10)

**2%**

**12%**

Back and Forth (30)

**6%**

Trajectory 1: Under 2yrs. BGN.

Trajectory 2: Under 1yr. Acad.

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

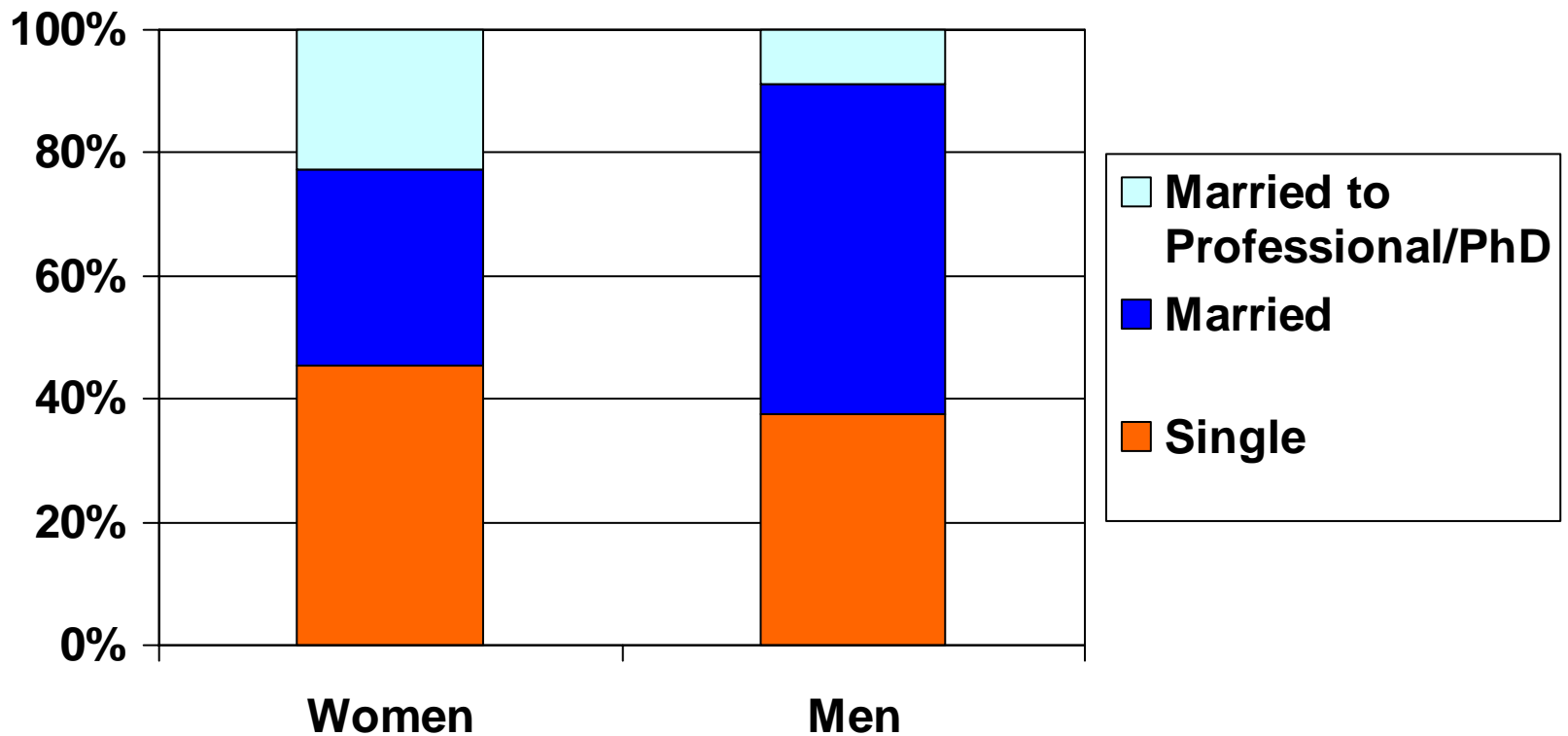
# Common Assumption 4



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

**Gender – Family - Career**

# Social Science PhDs—Five+ Years Out



# Educational Level of Spouse by Gender and Field



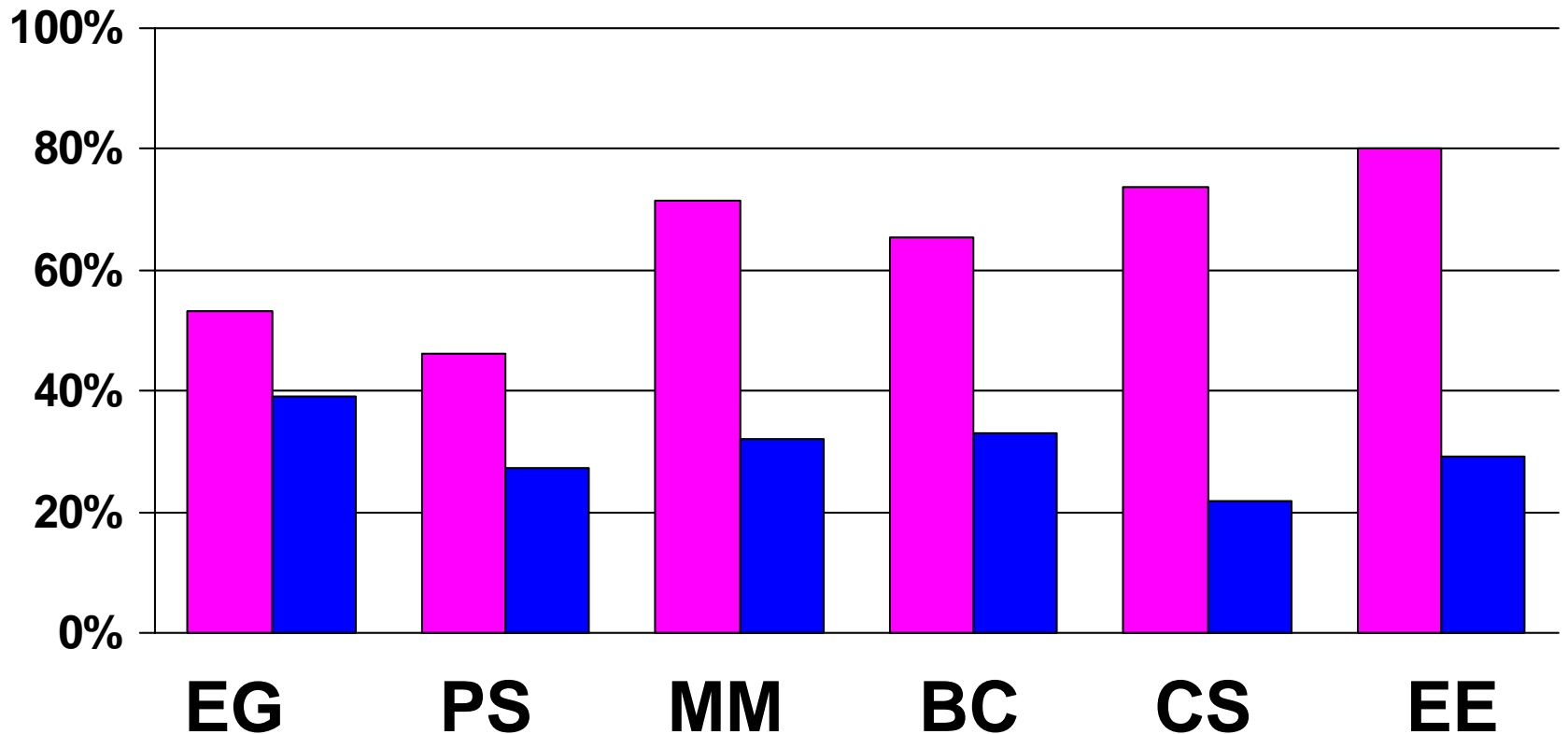
At PhD completion married **women/ men**  
BIOCHEMISTS had spouses with PhD/JD/MD  
(1997): **75% / 24%**

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

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



Married Women Married Men



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



## Women in Our Survey

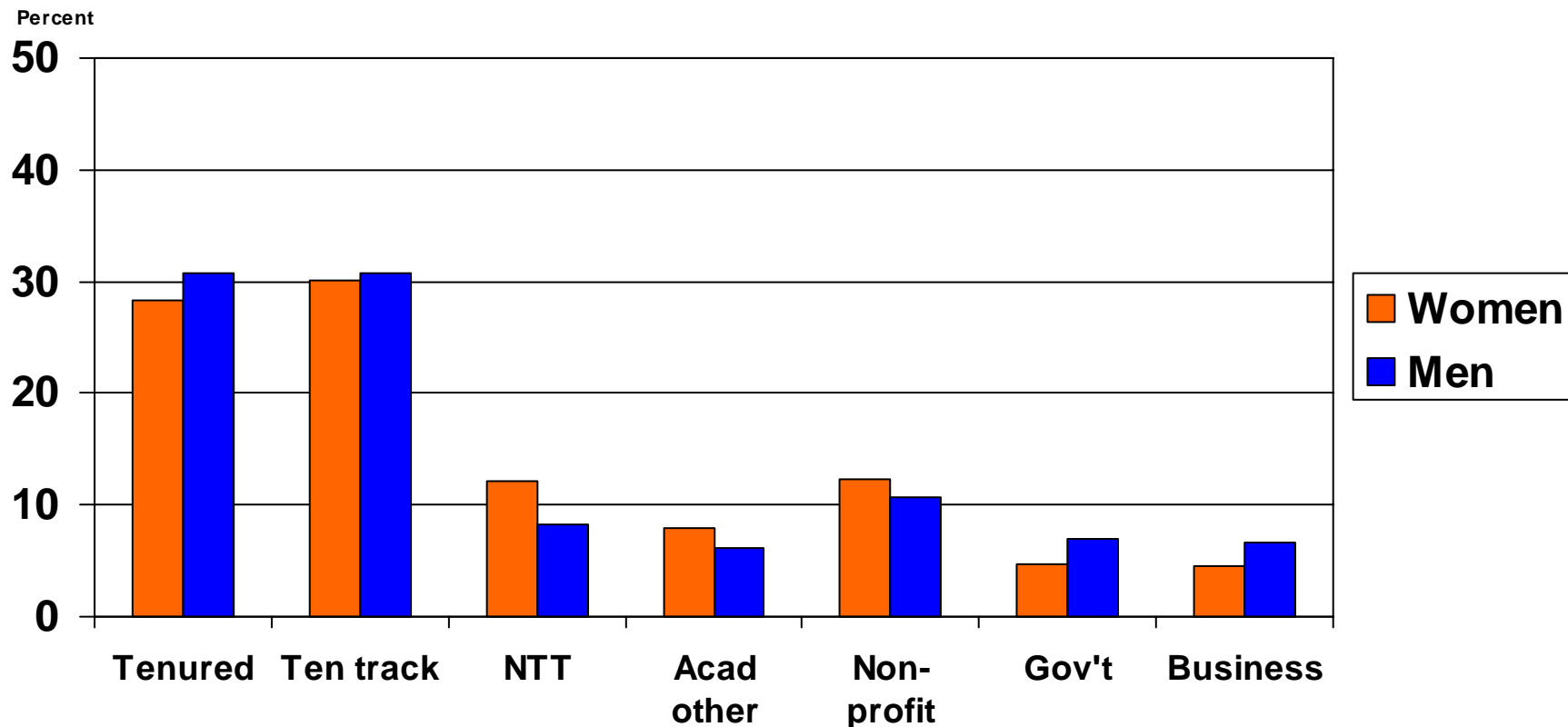
Married to PhD/JD/MD: 34%

## Men in Our Survey

Married to PhD/JD/MD: 19%

PRELIMINARY RESULTS

# Social Science PhDs—Five+ Years Out Jobs at Survey by Gender (2005/2006)



# Common Assumption 5



**Faculty enjoy the highest job satisfaction**

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



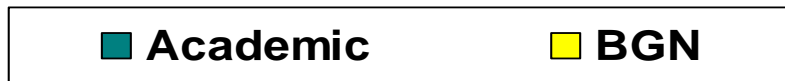
	Rank	%	N
<b>BNG manager/executive</b>	<b>1</b>	<b>40%</b>	<b>243</b>
<b>Academic administrator</b>	<b>2</b>	<b>39%</b>	<b>54</b>
<b>Acad. researcher</b>	<b>3</b>	<b>28%</b>	<b>54</b>
<b>Tenured Professors</b>	<b>4</b>	<b>26%</b>	<b>851</b>
<b>BNG researcher</b>	<b>5</b>	<b>24%</b>	<b>430</b>
<b>Administrators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

# 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

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



Thousands

\$100

Excluded: Not in the workforce, part time, working outside US.

\$80

\$60

\$40

\$20

\$0

Anthro.

Comm.

Geogr.

History

PoliSci.

Sociology

# Characteristics of Doctoral Education for the 21<sup>st</sup> 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**

# Characteristics of Doctoral Education for the 21<sup>st</sup> 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.

# 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.