How Organizational Structure can Foster Equity: Lessons from the Life Sciences

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How does the structure of a STEM company impact how well it does in achieving equitable opportunity for its staff and management?

- Universities and most modern companies are bureaucracies (Weber 1922)
  - Structures of hierarchical authority and resource distribution, formal policies

Research Context: Life sciences

- US life scientists: since 1990s about half of PhDs are women
- Research-intensive workplaces: universities, large pharmaceutical companies, biotech start-ups, government science agencies
- National sample based on NIGMS records

NIH National Institute of General Medical Sciences

Source: Smith-Doerr (2004)

Network Organizations v. Hierarchies

- Network Organizations:

Indefinite and sequential interaction structure, norms govern relations, partners pool resources, expectations foster collaboration but are not rule bound, flows of non-redundant "freer" info (Powell 1990).

Life sciences example:
biotechnology firms dedicated to human therapeutics

Question for women in science—do old boy networks flourish in the absence of rules?

- Hierarchies:

Employment in formal authority structure patterns interaction, rules govern relations, resources (including info) distributed according to rank, mass production of reliable products of a given quality.

Life sciences examples:
multinational pharmaceutical corporations, universities

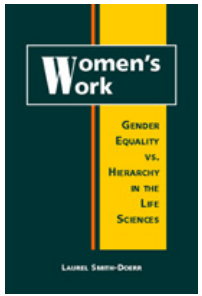
Question for women in science—does bureaucratic procedure combat discrimination, or hide biased informal organization?

Data sources

- US life scientists' holding **leadership roles** in different organizational settings by gender: Smith-Doerr (2004).
- USPTO **patenting** by organizational setting and gender: Whittington and Smith-Doerr (2008).
- Massachusetts biotechnology **firm founders** by gender and immigrant status: Monti, Smith-Doerr and McQuaid (2010).

Likelihood of scientists moving into supervisory positions, Network v. Hierarchical settings

	Change in Odds of Supervising in **Network firms**	Change in Odds of Supervising in **Hierarchies**
Men	*No difference*	*No difference*
Women	*7.9 times more likely*	*60% decrease in odds*



Source: Smith-Doerr (2004, *Women's Work*), based on logistic regression analysis controlling for years since PhD, prestige of PhD program; N=2,062

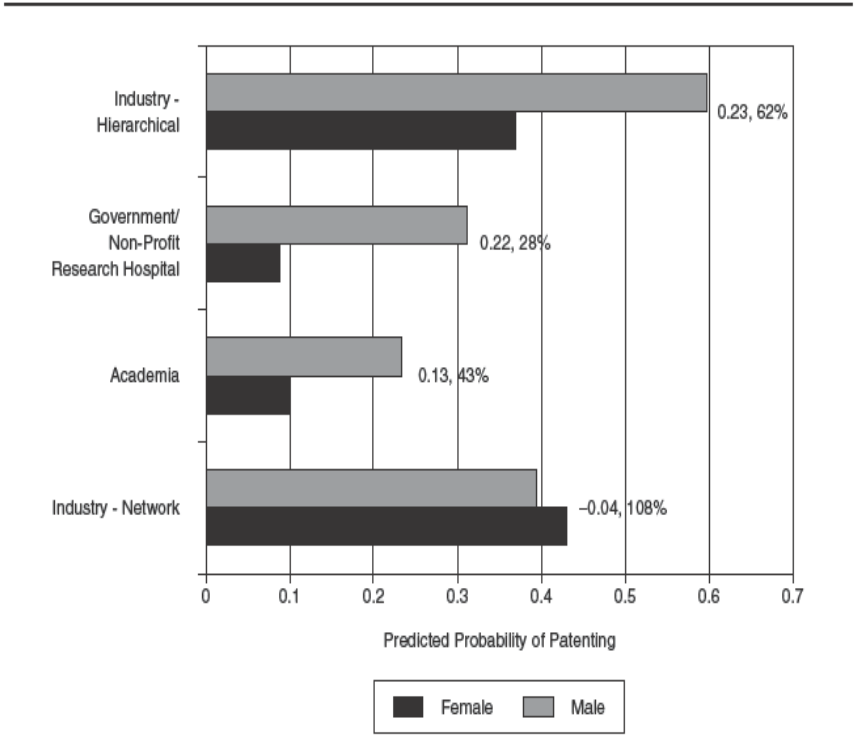


Figure 1: Predicted Probabilities of Patenting, by Sex and Sector

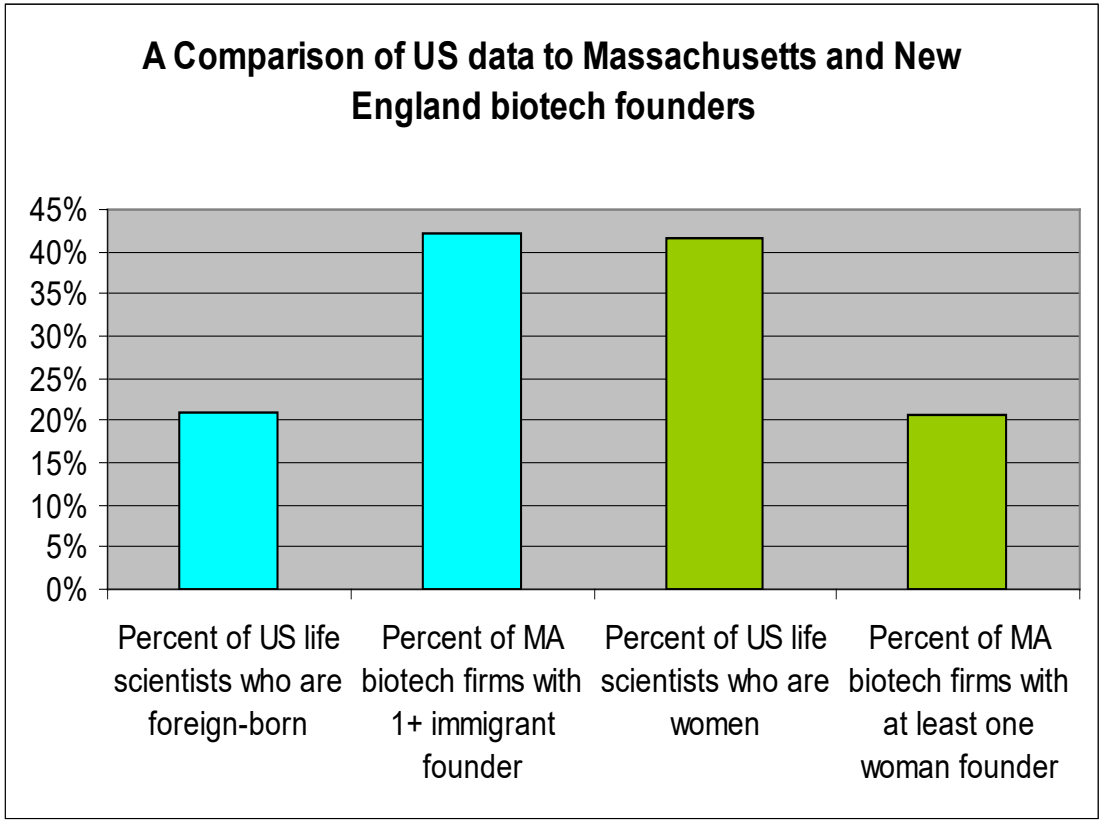
NOTE: Numbers in boxes refer to the difference in probabilities between men and women (M-F) and the F/M predicted probability ratio (multiplied by 100).

Note: All other variables are held at mean.
Source: Whittington and Smith-Doerr (2008). N=961.

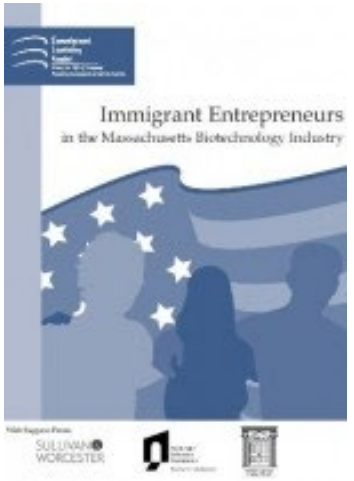
Why greater equity in biotech firms?

Clues from interviews (Smith-Doerr 2004, N=47).

- **1. Flexibility in collaboration**
  - About a woman scientist friend: “left a tenured position at [an elite university] to go to [a biotechnology firm]…said the university department under [Chairman] was an autocracy…could do science there [at firm]—working with who they wanted to rather than dealing with [Chairman].”
- **2. Transparency**
  - “From my experience at [academic setting] I could tell you many a true story about political infighting…[at biotech firm] we are not compartmentalized—and get to work with many good scientists both here and outside the firm. And we choose who to work with based on non-financial considerations, like how good they are in their field.”
- **3. Collective rewards**
  - “While I was on maternity leave here [biotech firm] I could keep in touch with my colleagues who kept it moving forward…when I was a postdoc at [prestigious academic institute], people collaborated somewhat, on the fringes of their work, but still had their main turf which they guarded carefully.”



US data from CPST (2002);
MA data from Monti, Smith-Doerr & McQuaid (2007)



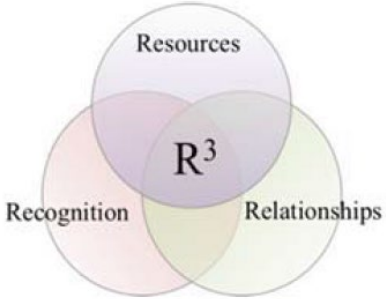
Can lessons from biotech network organizations translate to larger organizations… even bureaucracies?

- Kalev (2009): *Cracking the glass cages*

In large for-profit business organizations, found greater equity for women and people of color in less hierarchical, cross-functional collaborative teams

UMass ADVANCE: Collaboration and Equity

- Focus on collaboration in: inclusive communities, research, and shared decision-making
- R^3 Model—resources, relationships, and recognition



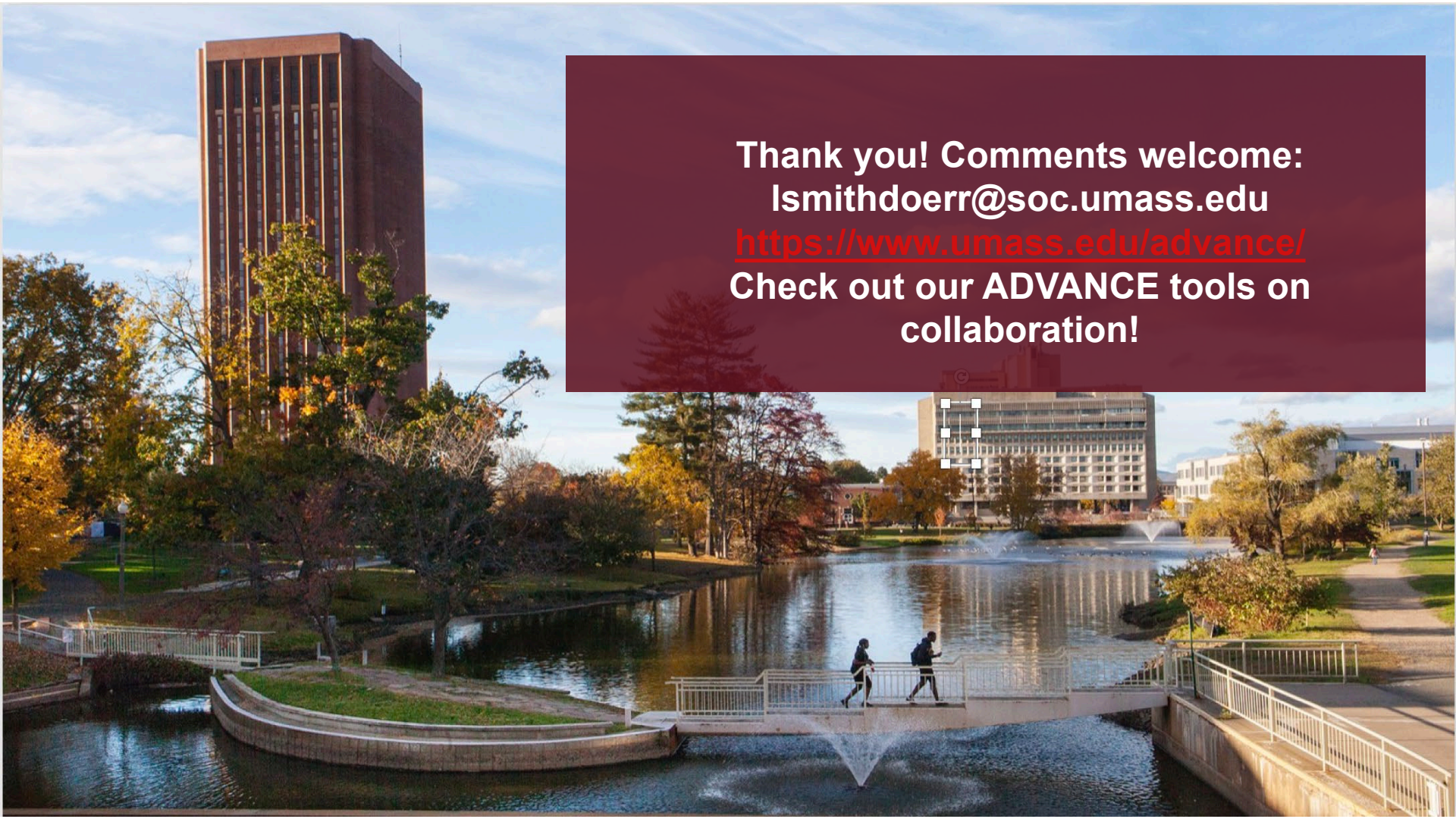
Building Relationships for collaboration:
Faculty Mentoring for Equity at UMass Amherst

- Research literature and existing knowledge: mutual mentoring
- UMass ADVANCE research identifies gender gap in mentoring, including for research collaboration (Misra et al. 2017)
- Programs with Resources (Mutual mentoring grants), Relationships (Peer Mentoring Workshop), and Recognition (ADVANCE College Mentoring Awards)
- Working with Provost's office on faculty mentoring plans for all new hires

Key take-away points

- Organizational structures that are less hierarchical and more collaborative not only foster gender and race equity, but also **innovation** and **productivity**

- Organizational characteristics that foster equity:
  - Giving women and BIPOC workers *flexibility* and autonomy in project collaborations
  - Providing *transparency* in resource distribution decisions, and in allocating credit
  - Establishing *collective rewards* for groups, teams and units rather than just individuals


Thank you! Comments welcome:
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https://www.umass.edu/advance/
Check out our ADVANCE tools on collaboration!

Dependent variable—leadership role in life sciences

TABLE 2

PhD Positions and Supervisory Level

Academic Position	*Industry Position*	*Supervisory Level*
Student in another discipline, RA		0
	Assistant, technician	0
Postdoctoral fellow		0
	Scientist	0
	Team director	1
Assistant professor		1
Associate professor		1
	Department/section head	1
Full professor		1
	Upper research administration	1
Dean/administration		1
	Board of directors, CEO	1

Source: Smith-Doerr (2004, *Soc Perspectives*)