PROMOTING INTERDISCIPLINARY COLLABORATION:
Tools for Developing Diverse Research Teams
These materials were co-produced via collaboration among the following scholars:

**CREDITS:** [https://oru.research.ucsb.edu/teamscience/about/](https://oru.research.ucsb.edu/teamscience/about/)

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**Kyle Lewis, Professor and Chair, Technology Management Program, UC Santa Barbara** provided many of the concepts and slides used in this presentation.
OVERVIEW

- Team Science and Diversity
- What make some teams great!
- Starting Collaborations
- Action
WHY DO YOU WANT TO DEVELOP INTERDISCIPLINARY COLLABORATIONS?
TEAM SCIENCE & DIVERSITY
Team Science

Definition: interdisciplinary, collaborative research among two or more researchers in which team members integrate their perspectives and methods in a single research endeavor.

- Increasingly the norm with exception of arts and humanities
  - (Wuchty et al. 2007; Englander 2014)

- Solve most complex and intractable scientific and social problems

- Accelerate scientific and technological innovation, and provide a mechanism for translating scientific research into practices and policy
  - (Uzzi et al. 2013).
TEAM SCIENCE IMPACTS ON CAREER AND INSTITUTION

- TS projects garner more funding
- TS projects yield greater publication productivity
- TS projects yield higher impact publications

- Strong network of collaborators and co-authors is critical to a more productive and successful academic career
COLLECTIVE INTELLIGENCE ...
Experience and practice with members, technologies, tools, creates knowledge embedded in a team’s structure and routines.

Research shows that team knowledge has distinct value.
WHAT PREDICTS COLLECTIVE INTELLIGENCE IN TEAMS?

- *Not* members’ intelligence
- *Not* group satisfaction, cohesion, or motivation
- *Not* personality traits of individuals

Proportion of females in group

Among ecology and environmental scientists, authorship teams with at least one woman received 34% more citations than publications produced by homogeneous teams, and that peers perceive the publications produced by gender-diverse groups to be of higher quality.
By examining the ethnic identity of authors in over 2.5 million scientific papers written by US-based authors from 1985 to 2008, we find that persons of similar ethnicity coauthor together more frequently than predicted by their proportion among authors. The greater homophily is associated with publication in lower-impact journals and with fewer citations. Meanwhile, papers with authors in more locations and with longer reference lists get published in higher-impact journals and receive more citations.
“FEMALE FACTOR” EXPLAINED BY SOCIAL INTELLIGENCE

| Playful | Comforting | Irritated | Bored |

Source: Simon-Baron Cohen
"FEMALE FACTOR" EXPLAINED BY COMMUNICATION PATTERNS

- Uneven distribution in speaking turns negatively predicts team productivity
- Higher proportion of females leads to more even distribution of speaking

Sociometric Badge
DIVERSITY CAN AMPLIFY BENEFICIAL EFFECTS OF TEAMS

- Diversity on teams has positive effects on creativity, innovation, and productivity.

- Scientific research enhanced when informed by diverse (and thus often broader) viewpoints and research questions.
  - Margolis & Fisher 2003

- Women and URM scientists have made scientific discoveries because of their particular gendered and racialized perspectives experiences.
  - Melo-Martín & Intemann 2010
1. Women and URM scientists are **less likely** to participate in collaborations, and these networks **develops later** in their careers.
   - (Kyvik & Teigen 1996; Fox & Mohapatra 2007; Misra et al. 2012; Kegen 2013)

2. Diversity can hinder team cohesion and individual performance
   a) Low psychological safety and trust
   b) Implicit bias
   c) Stereotype threat

3. Universities reward single author, last author, and first author

**THREE INTERRELATED CHALLENGES:**

Can reduce communication, help-and feedback-seeking, boundary-spanning, new ideas, innovation
Research on effects of diversity and collaboration in UC and CSU systems

Annual Team Science Retreats to build team science capacity in CA

https://oru.research.ucsb.edu/teamscience/about/
WHAT MAKES SOME TEAMS GREAT
It’s the MEMBERS!

It’s what members DO!

It’s the CONTEXT!
TYPES OF TEAMS

- Global teams
- Functional
- Problem-solving
- Cross-Functional
- Self-managed
- Virtual

Brought together to tackle a specific issue or problem

Typically short to medium term, with ending point

Example: Project Research Team
COMPOSING A TEAM ... CONSIDER

**Expertise**
- Choose people with knowledge, skills, needed
- Research: Diverse expertise can increase performance and innovation

**Personality**
- Choose a variety of personalities
- Research: Both introverts and extroverts; “big picture” and “detail-oriented”; worriers and non-worriers

**Demography**
- Choose demographic mix to bring in new perspectives
- Research: Women and underrepresented minorities can be disadvantaged if they are “solos”
Assemble in teams of 5-6 people
Each person will be given a card to study (2 minutes)
In your team, come up with a solution to the problem!

RULES:
- 25 minutes
- Do not pass around your card to others in your team
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<thead>
<tr>
<th>Room</th>
<th>Period 1</th>
<th>Period 2</th>
<th>Period 3</th>
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LET’S DISCUSS!

- Did your team arrive at the “correct” solution?
- How many people spoke / provided input?
- If not all members contributed, why not?
- Was all of the information used to develop a solution?

Contributions tend to be uneven:
- In a 4-person group, 2 people do over 70% of talking
- In a 6-person group, 3 people do over 86% of talking
- In an 8-person group, 3 people do 77% of talking
DISCUSSION BIAS

Contrary to our expectations, groups spend the vast majority of their time discussing (and repeating) information members all have in common; unique information is less often surfaced and discussed.

Why?

• Socially reinforced – agreement feels good
• Assume, seek agreement – don’t examine alternatives
• Dysfunctional processes or outcomes – what happens if I speak up? Are goals congruent?
• Blurry role-expertise linkages – doubt about credibility
FACTORS THAT MAKE MANAGING TEAMS HARD

- Status Differences
  - Impoverished knowledge exchange
  - Curtailed discussion
- Goal Differences
  - Members working at cross purposes
  - Lack of cooperation
- Conflict
  - Reduces “psychological safety”
  - Can escalate if low trust
- Knowledge utilization
  - Important (and uniquely-held) knowledge not considered
TACKLING STATUS DIFFERENCES

Where do status differences come from?
- Formal hierarchy / title
- Experience / tenure / age
- Discipline
- Demography

Reduce status differences
- Each member has important (and perhaps unique) input
- Eye contact – gaze at all (not just high status) members
- Amplification of members’ comments
TACKLING GOAL DIFFERENCES

Create Team Goals

- Create team goal and values
- Choose learning goals, not only performance goals
- Get buy-in from members
- Remind, remind, remind

Differences are not often articulated

Superordinate goal can become the team “glue”

Learning goals promote collective intelligence
- AND team performance
- AND individual performance
Manage Conflict

- Identify "type" of conflict
- Frame decisions as collaborations towards best possible solutions
- Create norms for “safe” speaking up

Foster trust with team identification

- Team "artifacts"
- Team meetings AND social events
- Emphasize collective, not individual

Conflict can take two forms:
- Disagreements about the TASK
- Personal relationship conflicts

Task conflicts CAN escalate to relationship conflicts

Need to build TRUST to manage conflict effectively
TACKLING KNOWLEDGE UTILIZATION

- Members’ knowledge is not always applied!
- Discussion tends to favor “shared” versus “uniquely-held” knowledge
- Turnover can exacerbate knowledge utilization

Leverage Team Knowledge

- Train and practice as a team
- Assign roles based on actual expertise ... and make sure members know
- Encourage face-to-face interactions
- Maintain stable membership
Teams are powerful engines for innovation and performance

Diverse teams are more innovative

BUT, teaming is hard ...

Leaders can strongly affect team processes

*The big win: Team is greater than the sum of its parts*
STARTING COLLABORATIONS
TEAM “CHECKLIST” – USE TEAMS WHEN:

- The task is knowledge intensive
- Task activities are interdependent
- Different expertise / perspectives are needed
PRE-NUPHTIAL AGREEMENT

- https://ccrod.cancer.gov/confluence/display/NIHOMBUD/Collaborative+Agreement+Template

- Overall Goals

- Who Will Do What?

- Authorship, Credit

- Communicating & Contingencies

- Conflict of Interest
DOUBLE THE TIMELINE

- Collaboration takes time – start early
- Pre-Nuptial Agreement
- Common language – translation
- Divide and conquer – more rounds of writing and review
- File sharing
- More campuses – more administrators – more signatures!
# Learning and/or Execution

| LEARNING TEAM | • Egalitarian  
|              | • Information Sharing  
|              | • Psychological Safety | Innovation and Creativity HIGH | Forming Storming |
| EXECUTION TEAM | • Hierarchy  
|              | • Roles  
|              | • Coordination | Innovation and Creativity LOW | Norming Performing |
Egalitarianism in developing ideas (learning team)

Strong leadership and hierarchy in the writing itself (execution team)

At some point, consensus ends and lead PI-writer makes decisions

STRONG LEADERSHIP MATTERS
RECOGNIZING AND REWARDING COLLABORATION
TRADITIONAL RECOGNITION AND REWARDS

- **Emphasis on Individual**
  - Author position – first and last
  - PI status
  - H-index
  - Election to prizes and academies, etc.

- **Collaboration contribution less recognized**
  - Being part of a team, although not the team leader
  - One of many authors


ACTION PLANNING
WHAT CAN I DO?

- Diverse teams are high performers (and are more creative) when:
  - Information diversity is leveraged
  - Diversity in preferences, values, beliefs is minimized
    ... emphasize superordinate values and goals
  - Team trust is high (so that task disagreements are welcome)
WHAT CAN I DO?

- Don’t become – or don’t invite – the “token” team member.
  - Engineering and arts
  - Society and STEM
  - Digital humanities

- All members and approaches should be thoroughly integrated into the project, and not just an after-thought or appendage to get the larger project funded.
Publication goals and assignments discussed up front as part of the proposal development process.

Each member should accomplish what they need from the collaboration.

Each team member should have
- lead or last-author role in a journal/book that will benefit their next promotion case.
- Evidence of their contribution to the collaboration and other publications.
- Share of funding and other resources that enables productivity by all members.
WHAT CAN I DO?

- Establish norms or rules for even distribution of speaking turns
  - Limit air time hogs
  - Reduce the amount of interruptions ... appoint an ‘interrupter cop’
  - Sit “boy – girl – boy – girl”
  - Eye contact ... gaze at all members
WHAT CAN I DO?

- Reduce status differences
  - Convey that everyone has important (and unique) input
  - Use group techniques for decision-making (consensus, deliberation, if a sensitive or controversial topic – electronic voting)
WHAT CAN I DO?

- Build and maintain team trust
  - Encourage “safe” scholarly debate and exchange as part of the team identity and everyday process.
  - Find opportunities for your team to interact outside of the work environment.
  - Identify and emphasize team values and goals.
  - Create a “superordinate identifier” (coffee mug or a poster).
When teams fall apart:
- Confronting team member – resolving problems
- Withdrawing from the team
- Soldier on in bad relationship

Carefully consider
- The commitments you made in terms of expertise, data, field sites, or samples.
- Losing access to jointly-collected data and/or co-authorship on publications and other products.
- Your reputation.
50 WAYS TO LEAVE YOUR COLLABORATOR

Resolve Conflict:
- Campus or agency ombudsperson
- Resources for resolving conflicts on academic teams (Bennett, Gadlin & Levine-Finley 2010).
  - Relationship
  - Process
  - Task

Side-Step Conflict:
- Divide the work and funding
- Reconfigure the project
- Satisfy mutual needs

Recognize interrelated power structures that may prevent you from adequately solving conflicts.


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<tr>
<th>Topic Area</th>
<th>Goal</th>
<th>Audience?</th>
<th>Division or Department?</th>
<th>Best way to Present Resources?</th>
<th>Who can present or facilitate the presentation of this material?</th>
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<td>2. Finding Funding for Multi-National Research</td>
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