#### **Teaming for Interdisciplinary Research**

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- Works with NASA, the military, scientific teams, and senior executives to facilitate effective leadership, communication, and collaboration processes across industries

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- Doctoral Candidate, Industrial/Organizational Psychology
- Studying team science, leadership and followership emergence in teams, team membership and composition, and social network approaches to studying teams

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# Why Think About Teamwork?

#### The Rise of Science Teams



Wuchty, Jones and Uzzi (2007) Science Jones, Wuchty, and Uzzi (2008) Science Guimera, Uzzi, Spiro and Amaral (2005) Science



Research produced by teams (rather than solo scientists) is becoming *more common* and *more impactful* on science across disciplines

#### The Impact of Interdisciplinarity



Fig. 2. The probability of a "hit" paper, conditional on novelty and conventionality.

"The top 1% most cited papers exhibit higher levels of interdisciplinarity...in more than 90% of NSF specialties" (Chen et al., 2015)



Atypical Combinations and Scientific Impact Brian Uzzi *et al. Science* **342**, 468 (2013); DOI: 10.1126/science.1240474

#### **Funding Opportunities**

 Many agencies encourage submissions from interdisciplinary scientific teams



#### 21<sup>st</sup> Century Challenges...

Military Endeavors





#### New Product Development



**Global Healthcare** 



Deep Space Exploration



Cyber security



#### **Emergency Response**



#### 21<sup>st</sup> Century Challenges...

Military Endeavors



**Global Healthcare** 







**Emergency Response** 





#### Science Teams Often Underperform

Interdisciplinary science teams often experience performance decrements, particularly...



<u>Source</u>: Lee, Y. N., Walsh, J. P., & Wang, J. (2015). Creativity in scientific teams: Unpacking novelty and impact. *Research Policy*, *44*(3), 684-697.



<u>Source</u>: Wang, J., Thijs, B., & Glänzel, W. (2015). Interdisciplinarity and impact: Distinct effects of variety, balance, and disparity. *PloS one, 10*(5), 1-18.

## ... or when team members come from many different disciplines.



<u>Source</u>: Cummings & Kiesler (2013). Group heterogeneity increases the risks of large group size: a longitudinal study of productivity in research groups. *Psychological Science*, *24*(6), 880-890.



How can leaders facilitate the effectiveness of interdisciplinary teams?

Figure 1 Input-Process-Outcome (IPO) Team Effectiveness Framework



The "black box" of team success

## Are Two Heads Better than One?

- Groups are better than individuals at arriving at precise, factual answers
- (ask the audience if you want to be a millionaire)
- However, in many situations, group decisions are no better than those rendered by individuals
- The reduction in group performance (in comparison to its potential) due to obstacles created by group processes = "PROCESS LOSS"









Laissez faire leadership

Authoritative leadership



# But what processes need to be managed??

#### **Three Levers for Leading Teams**

- Affect (Feeling). Team members share positive feelings about the team; the team enhances their self esteem & is a source of pride; members are more motivated because of (not in spite of) the team
- **B.** Behavior (Doing). Team members smoothly integrate their contributions; members contribute frequently and evenly to the team



C. Cognition (Thinking). Team members have a shared understanding of the task, team, and how things work; members are efficient, specializing in separate aspects of the task & then rely on one another for their expertise

## Sources of Process Loss

#### Ineffective "Affect"

- 1. Lack of positive team-focused feelings
- 2. Poor conflict management
- 3. Misaligned priorities

#### • Ineffective "Behaviors"

- 4. Planning biases
- 5. Communication breakdowns
- 6. Coordination challenges
- 7. Social loafing
- 8. Brainstorming challenges
- 9. Group "escalation" in decision-making

#### Ineffective "Cognition"

- 10. Groupthink
- 11. Lack of shared mental models
- 12. Lack of a transactive memory system



#### (1) Team-Focused Feelings





## (2) Conflict/Conflict Management



TEAM AFFECT

Less Effective: Individualistic Approaches

- Competing (moving against)
- Avoiding (moving away)
- Accommodating (moving away)
- Compromising (moving away in some respects, moving against in others)
- Preserve individuality; but subjugate the team to safeguard the disparate views of the individuals

#### **More Effective: Collectivistic Approaches**

- Collaborating (moving toward)
- Openness (open sharing of information)

 Incorporate differences in individuals' viewpoints while still preserving the focus on the team



Individual goals & team goals are (at least somewhat) in conflict Individual goals & team goals are perfectly aligned

## (4) Biases During Planning Phases

- The "pre-discussion bias"
  - Team members are likely to ignore information that counters their pre-discussion preferences and approach planning as a "negotiation" rather than an open discussion of information
- The "shared information" bias
  - Information held by more members before the team has more influence on team judgments than does information held by fewer members
  - Shared info is mentioned more, earlier, and repeated
- The "preference for action" bias
  - Many teams DON'T take the time to plan, preferring instead to move straight to the "action"





Distributed (partial) overlap: A, C: Common to all 3 people B, D: Shared by 2 people E, F: Unique to 1 person

> Distributed, Partial Overlap

## (5) Communication Breakdowns





- In most team discussions, the floor time is roughly evenly divided among team members. dominated by a few individuals.
- Also issues related to communication across boundaries (e.g., expertise, language, terminology, space, time)

<u>Source</u>: Bales, R. F., Strodtbeck, F. L., Mills, T. M., & Roseborough, M. E. (1951). Channels of communication in small groups. *American sociological review, 16*(4), 461-468.

## (6) Coordination Challenges



• The "needed" patterns of direct coordination don't always match up to the "actual" patterns of direct coordination



#### https://strategicleadershipsystems.org/

## (7) Social Loafing

• Group-produced reductions in individual output during tasks where contributions are pooled together





## (8) Brainstorming Challenges



- Groups are ½ as productive as individuals... Why?
  - Production blocking
    - People have to wait their turn to speak and may forget what they had to contribute
  - Social loafing/free riding
    - As others contribute, individuals may feel less motivated and/or feel like their contributions are less necessary
  - Performance matching
    - Group members work only as hard as they see others work
  - Evaluation apprehension
    - People may be less likely to suggest wild (creative) ideas in the presence of others



## (9) Group Polarization & Escalation

- Group Polarization = Exaggeration through group discussion of initial tendencies in the thinking of group members
  - Driven by tendencies to "get along"
  - Sometimes *risky shift*, other times extreme caution
- Group Escalation = Commitment to a failing course of action is increased to justify previous investments
  - People overweight sunk costs
  - Groups more likely to escalate commitment
  - Especially homogeneous, cohesive groups
  - Also likely to do it in more extreme ways





## (10) Groupthink



Pressure on dissenters Collective rationalization Self censorship

#### Antecedents:

- Overly high cohesiveness
- Homogenous members
- Isolation
- Directive/controlling leadership Unsystematic procedures for making/reviewing decisions
- High-stress/high-stakes situations
- Plus low degree of hope for finding a better solution than the one favored by the leader



#### (11) Shared Mental Models

"Winning is about having the whole team on the same page."

**Bill Walton** 





Shared mental models

"If everyone is thinking alike then somebody isn't thinking."

George Patton

Groupthink

## (12) Transactive Memory Systems

- TMS = Team members:
  - 1. Specialize in different knowledge,
  - 2. Share an understanding of who knows what,
  - 3. Efficiently retrieve information from one another
- Knowing "who knows what" is important so that the team accepts influence from individuals with the "right" expertise!
- But... TMS won't happen without sufficient information sharing





## How to "jumpstart" team success

#### Jumpstarting the ABCs: Team Charters

- Established team norms facilitate coordination and productivity in science teams
- *Team charter* = codified document outlining roles, expectations, and responsibilities for the team
- Interdisciplinary Science Team Charter sent out in mid March to be completed by leaders and team members

#### Jumpstarting the ABCs: Team Charters

"Devoting time to laying a foundation for both teamwork (through team "charts" or "contracts") and taskwork (performance) strategies can pay large dividends in terms of more effective team performance over time" (Mathieu & Rapp, 2009)



#### Jumpstarting the ABCs: Team Charters

"Devoting time to laying a foundation for both teamwork (through team "charts" or "contracts") and taskwork (performance) strategies can pay large dividends in terms of more effective team performance over time" (Mathieu & Rapp, 2009)



Mathieu & Rapp, 2009

Statement of Team Purpose	
Initial Team Goal	
Subtasks/Timeline for Goal	
Accomplishment	
Internal Resources (e.g., team	
members' expertise,	
resources, etc.)	
Individual Contributions	
Communication Norms	

Statement of Team Purpose		
Initial Team Goal		
	Establishes a "vision" for the team	
Subtasks/Timeline for Goal		
Accomplishment		
Internal Resources (e.g., team		
members' expertise,		
resources, etc.)		
Individual Contributions		
Communication Norms		-

Statement of Team Purpose	
Initial Team Goal	
Subtasks/Timeline for Goal Accomplishment	Provides direction toward goal accomplishment
Internal Resources (e.g., team members' expertise, resources, etc.)	
Individual Contributions	
Communication Norms	

Statement of Team Purpose	
Initial Team Goal	
Subtasks/Timeline for Goal	
Accomplishment	
Accomplishment	
Internal Resources (e.g., team	
members' expertise	
	Determines the
resources, etc.)	Determines the
	resources available to
	aid the team in goal
Individual Contributions	aid the team in goal
	accomplishment
Communication Norms	

Statement of Team Purpose		
Initial Team Goal		
Subtasks/Timeline for Goal		
Internal Resources (e.g., team		
resources, etc.)		
Individual Contributions	Establishes norms/expectations for	
Communication Norms		

Team Member Information	Team Member 1	Team Member 2	Team Member 3
Name			
Email address			
Phone number			
Preferred communication method(s)			
Why did you decide to join this team?			
What do you hope to accomplish as a member of this team?			
Area(s) of expertise/ research interests			
Valued outcomes in your discipline/ department (e.g., preferred publication outlets, funding agencies, patents, performance, etc.)			

Team Member Information	Team Member 1	Team Member 2	Team Member 3
Name			
Email address			
Phone number			
Preferred communication method(s)		Ensures familiarity and	
Why did you decide to join this team?		among team members	
What do you hope to accomplish as a member of this team?			
Area(s) of expertise/ research interests			
Valued outcomes in your discipline/ department (e.g., preferred publication outlets, funding agencies, patents, performance, etc.)			

Team Member Information	Team Member 1	Team Member 2	Team Member 3
Name			
Email address			
Phone number			
Preferred communication method(s)			
Why did you decide to join this team?		Accounts for team	
What do you hope to accomplish as a member of this team?		and individual goals	
Area(s) of expertise/ research interests			
Valued outcomes in your discipline/ department (e.g., preferred publication outlets, funding agencies, patents, performance, etc.)			

Team Member Information	Team Member 1	Team Member 2	Team Member 3
Name			
Email address			
Phone number			
Preferred communication method(s)			
Why did you decide to join this team?			
What do you hope to accomplish as a member of this team?		Allows the team to capitalize on team	
Area(s) of expertise/ research interests		members' unique expertise/interests	
Valued outcomes in your discipline/ department (e.g., preferred publication outlets, funding agencies, patents, performance, etc.)			

Team Member Information	Team Member 1	Team Member 2	Team Member 3
Name			
Email address			
Phone number			
Preferred communication method(s)			
Why did you decide to join this team?			
What do you hope to accomplish as a member of this team?			
Area(s) of expertise/ research interests		Ensures that each team member will be	
Valued outcomes in your discipline/ department (e.g., preferred publication outlets, funding agencies, patents, performance, etc.)		"rewarded" by team outcomes	

Statement of Team Purpose	
Initial Team Goal	
Subtasks/Timeline for Goal	
Accomplishment	
Internal Resources (e.g., team	
members' expertise,	
resources, etc.)	
Individual Contributions	
Communication Norms	

Statement of Team Purpose	
Initial Team Goal	Refines leader's vision
	to reflect team
	members' goals
Subtasks/Timeline for Goal	
Accomplishment	
Internal Resources (e.g., team	
members' expertise,	
resources, etc.)	
Individual Contributions	
Communication Norms	

Statement of Team Purpose	
Initial Team Goal	
Subtasks/Timeline for Goal Accomplishment	Ensures that team members are on the same page about
Internal Resources (e.g., team members' expertise, resources, etc.)	tasks/time commitment
Individual Contributions	
Communication Norms	

Statement of Team Purpose		
Initial Team Goal		
Subtasks/Timeline for Goal Accomplishment		
Internal Resources (e.g., team members' expertise, resources, etc.)	Outlines expected contributions from each	
Individual Contributions	team member (and from other resources)	
Communication Norms		

Statement of Team Purpose			
Initial Team Goal			
Subtasks/Timeline for Goal Accomplishment			
Internal Resources (e.g., team members' expertise, resources, etc.)			
Individual Contributions	norms	Establishes s/expectations for ommunication	
Communication Norms			

#### Questions/Discussion Thank you!

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