Integrating Team Science into the Trainee's Journey Toward Independence

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Introductions

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ICTR Team Science Core

The Team Science Core aims to facilitate high-impact team science by developing infrastructure to support interdisciplinary teams.

- Team Science Education
- Team Science Interventions
- SCiTS Research
- Culture of Team Science

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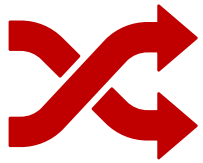
Team Science

Collaborative

Scientific



Interdisciplinary

Interdependent

Team science allows for greater impact, innovation, productivity and reproducibility

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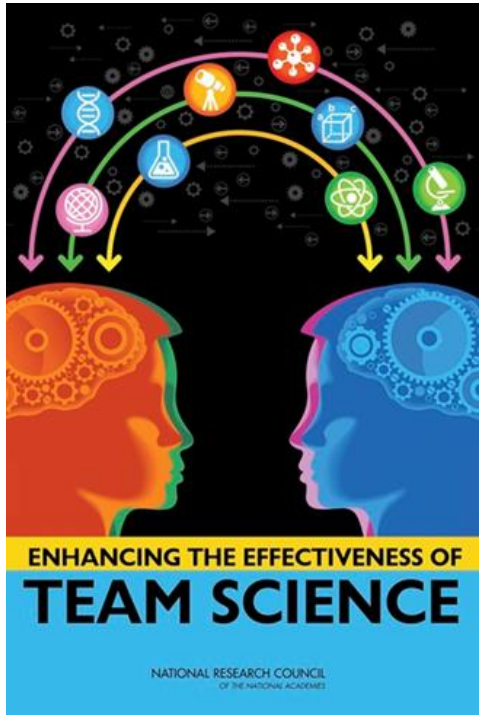
(National Research Council, 2015; Rolland et al. 2020)

Challenges of Conducting Team Science



- **Highly Diverse Teams** can lack a common vocabulary stymieing creation of research goals and processes.
- **Deep Knowledge Integration** is hard if members can't cross boundaries and build on each other's knowledge.
- **Large Team Size** magnifies the burden of communicating and coordinating research tasks among members.
- **Goal Misalignment** among teams or subgroups can generate conflict and require careful management.
- **Permeable Boundaries** can disrupt team performance if goals and process are not well documented.
- **Geographic Dispersion** adds complexity based on time zones and cultural expectations about scientific work.
- **High Task Interdependence** can increase conflict and require additional coordination and communication.

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(National Research Council, 2015)

High-Performing Teams

Team Management	• Shared Vision, Clear Roles and Responsibilities, Effective Project Management
Communication	• Shared Knowledge, Transactive Memory
Collaborative Problem Solving	• Learning/Adaptation, Collective Intelligence, Transdisciplinarity
Affect	• Trust, Cohesion, Psychological Safety
Leadership	• Sense-making, Conflict Resolution, Goal-Setting

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(Brasier et al 2023)

UW-ICTR Collaboration Planning Intervention

>40 teams received intervention

90 minute facilitated sessions

7 thematic focus areas

TEAM CULTURE

What are your team norms and expectations?

TEAM VISION

What is the overarching goal of this team?

TEAM OUTPUTS

What kinds of outputs do you anticipate arising from this project?

PEOPLE, ROLES & RESPONSIBILITIES

Who is on the team and how will they contribute?

PROJECT MANAGEMENT & INFRASTRUCTURE

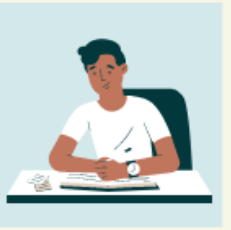
How will you manage your tasks, information and data?

TEAM PROCESS & FUNCTIONING

How will you make decisions and resolve disputes?

IMPLEMENTATION & MAINTENANCE

How will your team implement your plan?



Section 1

Team Vision

Team Vision
Benefits of a Clear Shared Vision

- Clarity in communication to team members.
- Clarity in roles and responsibilities.
- Motivation for the work.
- Target for assessment and evaluation.
- Enhances team effectiveness.

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(Bennett & Gadlin, 2013; Stokols et al, 2008)

Section 1: Team Vision

- What is the research question?
- How can you and your team members create a shared vision of what success looks like?
- What is the longer-term vision?

Section 2

People, Roles and Responsibilities

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Strategically Select Your Team

- Determine what skills and expertise you need on your team
- Identify “Good” Collaborators
- Ask “Who else needs to be on the team?”
  - Community Partners
  - Program Managers
  - Research Administrators

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Sutton et al. 2019

What are the top three attributes that make a "good" collaborator?

Strategies for Selecting “Good” Collaborators

- Attend relevant workshops, conferences, and seminars with an interviewing lens
  - Does their work or expertise fit?
  - Do they have experience collaborating?
  - How do they discuss collaborations and authorship?
  - What kinds of stories do they tell you about their collaborations?

People, Roles, and Responsibilities

- Role clarity enhances team members' levels of job satisfaction, performance, and innovation
  (Horwitz et al 2005, 2007; Paletz 2010)
- Transactive Memory Systems (Hall et al., 2019)
  - Who does what
  - Who knows what
  - How to get things done

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Section 2:
People, Roles, and Responsibilities

- Who is on the team and what skill set(s) do they contribute?
- Are any skill sets missing?
- Do any of your team members have unique needs?

Section 3

Team Outputs

Team Outputs

- Tools for disseminating information
- Metrics for evaluating performance and impact
- Clear and attainable goals motivate team members
- Types of outputs
  - Publications
  - Intellectual property/patents
  - Data sets
  - Conference presentations
  - Public outreach/ communication
  - Preliminary data for future grants

Team Outputs
Authorship Policies

- Authorship of scientific papers is one of the most contentious issues in research ethics
  - Honorary authorship – named author who has not made a significant contribution
  - Ghost authorship – failure to name someone who made a significant contribution
  - Big-team Science and many multiple authors
  - Handling disputes and dissenting opinions especially with power imbalances in academic hierarchy

(Coles et al., 2023; Resnick et al 2016)

Section 3: Team Outputs

- What kind of outputs do you anticipate arising from this project?
- Of the outputs listed, which are the highest priority for this project? And why?
- What will your authorship or attribution policy be?

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Section 4

Team Culture

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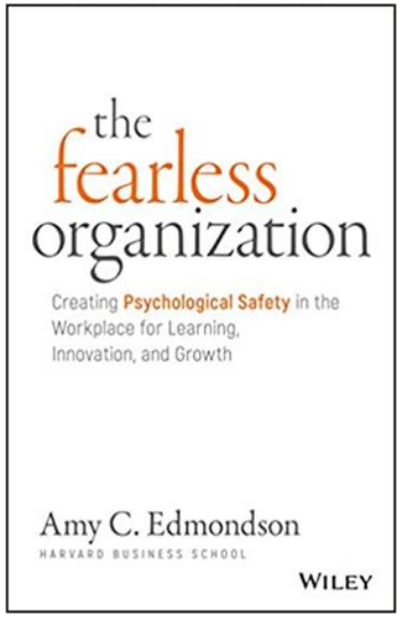
Team Culture:
What is Psychological Safety?

"...the belief that the work environment is safe for interpersonal risk taking… Psychological safety is present when colleagues trust and respect each other and feel able—even obligated—to be candid"



- ***Psychologically Safe Cultures***
  - *Everyone feels comfortable expressing themselves, sharing questions, concerns, and mistakes without fear of embarrassment or that they will be humiliated, ignored, or blamed*
  - *Team-emergent phenomena nurtured by every team member*

"… you don't have to be the boss to be a leader… the practice [of psychological safety] must be co-created—and continuously nurtured—by multiple stakeholders."

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Impact of Psychological Safety

Helps Get Things Done

- Unlock individual performance
- Overcome barriers to teamwork
- Enhance team performance

Fosters Learning and Innovation

- Facilitates learning
- Promotes knowledge sharing
- Facilitates candid communication
- Fosters creativity and innovation

Improves Work Experience

- Allows for authentic engagement
- Increases coping with stress and strain
- Creates an inclusive environment

Promotes Effective Leadership

- Promotes better listening
- Related to transparency and competence

(Edmondson & Bransby, 2023)

Measuring Psychological Safety

Think about a team you participate in, and rate your agreement with each statement	SD	D	N	A	SA
If you make a mistake on this team, it is often held against you.	5	4	3	2	1
Members of this team are able to bring up problems and tough issues.	1	2	3	4	5
People on this team sometimes reject others for being different.	5	4	3	2	1
It is safe to take a risk on this team.	1	2	3	4	5
It is difficult to ask other members of this team for help.	5	4	3	2	1
No one on this team would deliberately act in a way that undermines my efforts.	1	2	3	4	5
Working with members of this team, my unique skills and talents are valued and utilized.	1	2	3	4	5

(Edmondson, 2018, Figure 1.2 A Survey Measure of Psychological Safety [p. 20])

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Practices that Promote Psychological Safety

- Transparently sharing information and motives
- Listening with attention, gratitude, and humility
    - Model failure sharing
    - Team members feel heard
    - Feedback is welcomed and used
- Reframing mistakes as opportunities for learning
- Setting boundaries and enforcing accountability

(Edmondson & Bransby, 2023; Oyer, 2015; McCullough et al., 2002; Li et al., 2020)

Section 4: Team Culture

- What are some of your team norms?
- How are these norms communicated and enforced?
- How will your team ensure all members have a voice?

What cultural norms are necessary to establish psychological safety?

Section 5

Team Process and Functioning

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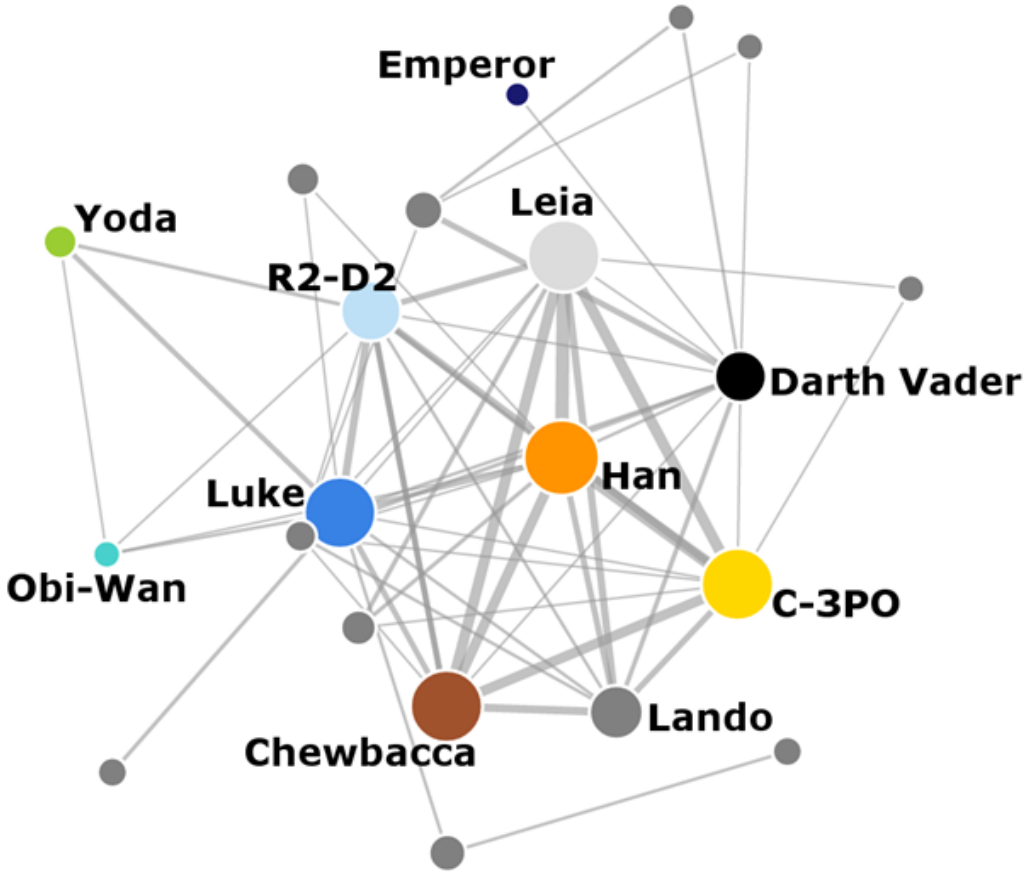
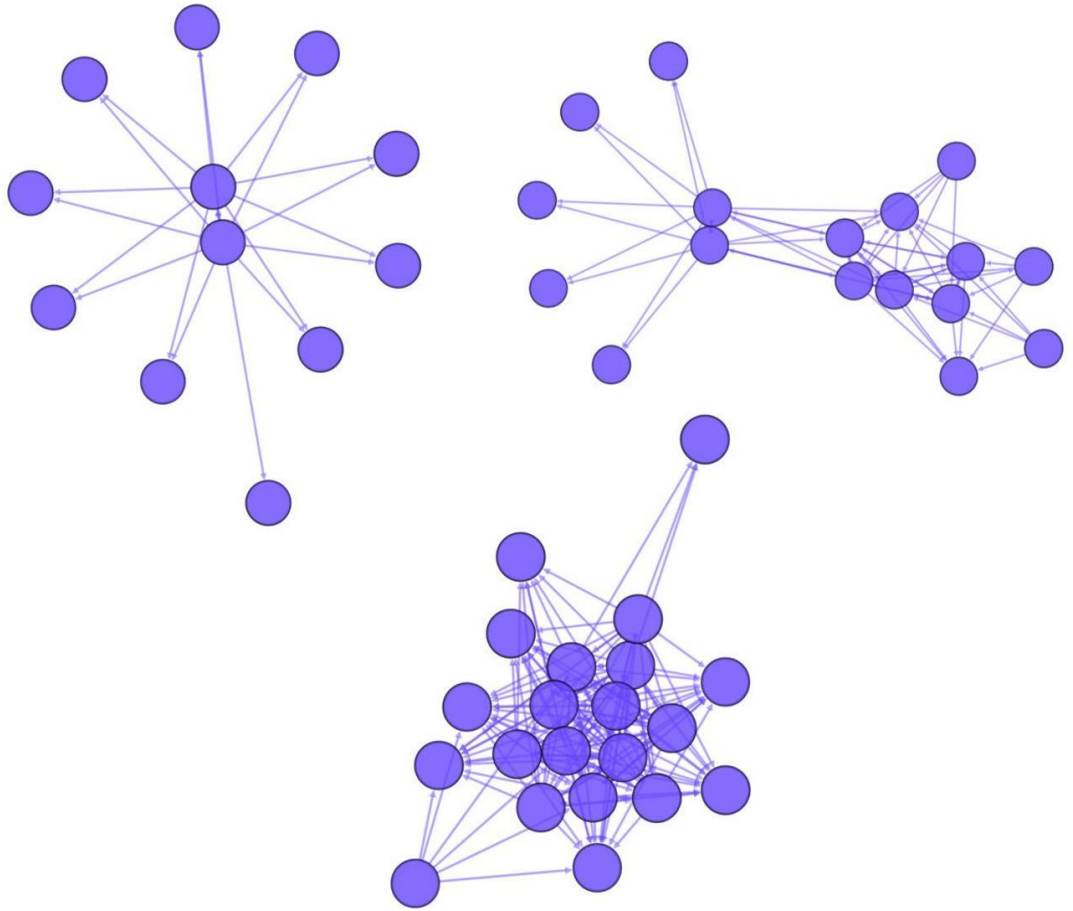
Team Process & Functioning
Team Organization and Leadership





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Team Process & Functioning
Team Evaluation

- Benefits of Evaluation
  - Provides direction
  - Identifies problem areas
  - Enhances team processes
  - Facilitates communication
  - Cultivates a strong culture
  - Improves motivation
  - **Maximizes team impact**

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Team Process & Functioning
Team Function Diagnostic

	SD	D	N	A	SA	What is working well?	Where are we falling short?
This team has a clear shared vision and team members are in alignment with this vision.	SD	D	N	A	SA		
The project this team is working on is managed effectively.	SD	D	N	A	SA		
This team communicates effectively.	SD	D	N	A	SA		
This team has a clear data management plan.	SD	D	N	A	SA		
This team has a strong inclusive team culture.	SD	D	N	A	SA		
This team learns and adapts well.	SD	D	N	A	SA		
The team has strong, functional leadership.	SD	D	N	A	SA		

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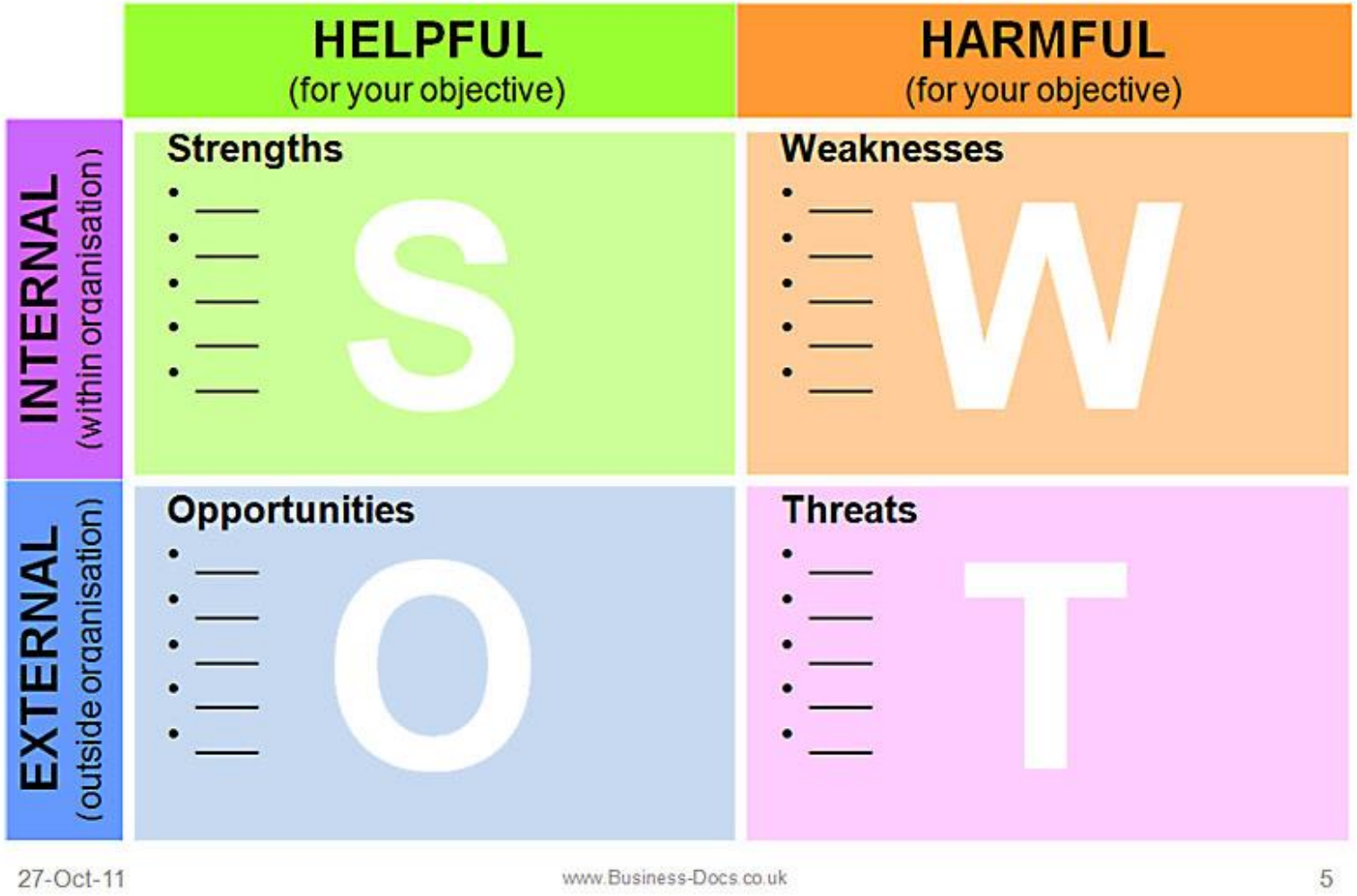
(Brasier et al., 2023)

SWOT Matrix



Section 5: Team Processes & Functioning

- What is your process for making major decisions?
- What is your process for resolving disputes?
- How can your team assess performance or progress? What red flags indicate problems?

Section 6

Project Management and Infrastructure

Project Management and Infrastructure Challenges for Research Coordination

- **Visibility:** Keeping team members and sub-groups apprised of each others' progress
- **Learning:** Supporting learning across members and sub-groups
- **Accountability:** Holding all members and sub-groups accountable for their goals and deliverables
- **Culture:** Creating a cohesive and psychologically safe community in which members and sub-groups can innovate

(Jiang, Boghrat, and Grabmeier, 2023)

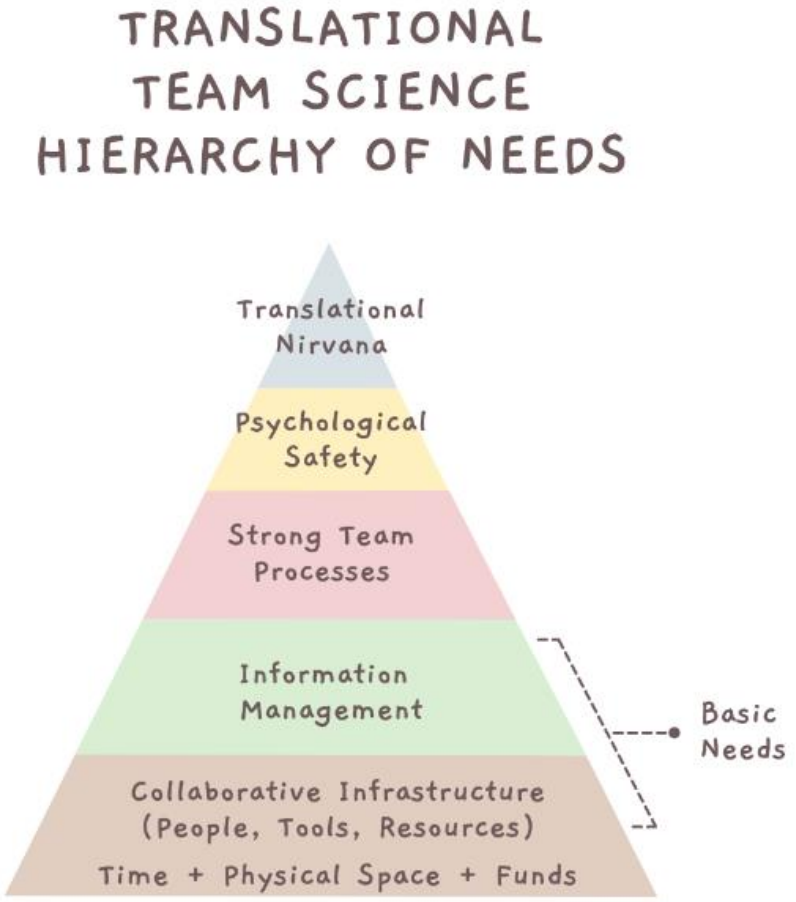
Project Management and Infrastructure
Purposes of Meetings

- Communication
  - Email?
  - Inform Stakeholders
  - Debate
- Problem-Solving
  - Trouble Shooting
  - Big Decision
- Project Management
  - Setting Deadlines
  - Providing Feedback
- Fostering Culture
  - Observing interpersonal interactions
  - Modeling interpersonal skills

(LeBlanc and Nosik, 2019; Scott, 2018)

Information Management

- Most team members are “freelance information management agents”
- Teams will benefit from clear documentation about information management processes



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(Kelly, Chladek, & Rolland, 2023)

Creating Shared Mental Models (SMMs)

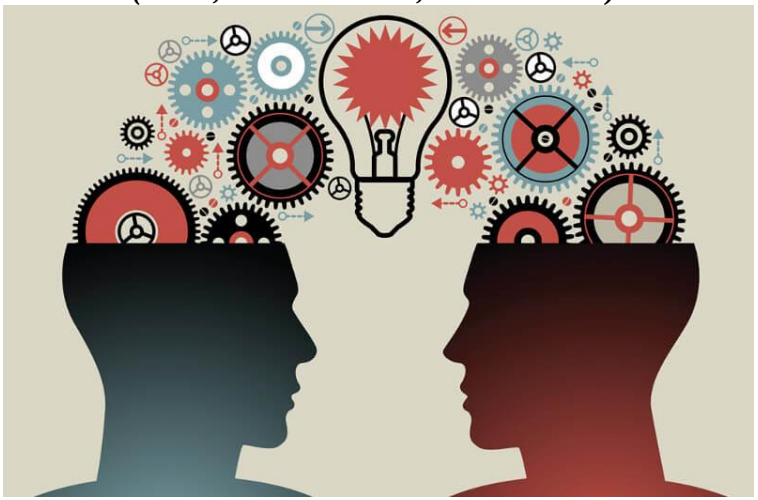
SMMs refer to a shared understanding among team members about important aspects of a team environment

Establishing SMMs helps to

- Reduce uncertainty
- Lower misunderstandings
- Prevent conflict
- Improve coordination and adaptation
- Increase effective team functioning

Teams that perform well hold shared mental models.

(Rouse, Cannon-Bowers, and Salas 1992)



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(Van Rensburg et al., 2022)

TABLE 3 | 5-PSMMS items.

Dimensions and items	Obtained or adapted from
Equipment	
How to use other team members' equipment	Lim and Klein, 2006
What equipment is important for which tasks	Kang et al., 2006
The tools needed to complete our tasks[a]	Santos et al., 2015b
The technology needed to complete our tasks[a]	Santos et al., 2015b
Execution	
Specific strategies for completing various tasks	Johnson et al., 2007
How to deal with the task	Van den Bossche et al., 2006
How best to perform our tasks	Guchait et al., 2014
The relationships between tasks	Kang et al., 2006
Interaction	
How to communicate with each other[a]	Lee and Johnson, 2008
Sharing information with each other[a]	Johnson et al., 2007
How we should interact with each other[a]	Lee and Johnson, 2008
The best methods to communicate with each other[b]	N/A
Composition	
Each other's knowledge	Lee and Johnson, 2008
Each other's abilities[a]	Lim and Klein, 2006
Each other's skills for doing various team tasks[a]	Johnson et al., 2007
Each other's individual strengths and weaknesses	Burtscher and Oostlander, 2019
Temporal	
Our deadlines[a]	Levesque et al., 2001
How quickly we need to work[a]	Marhefka et al., 2018
Appropriately timing our work[a]	Mohammed et al., 2015
Coordinating the timing of our work[a]	Levesque et al., 2001

All items share the item stem "Team members have a similar understanding about. . .".
[a]*Items that were adapted from the original.*
[b]*Newly created item.*

(Van Rensburg et al., 2022)

Section 6: Project Management & Infrastructure

- How do you anticipate managing the project?
- What communication technologies will you use?
- What coordination technologies will you use?
- How is team information documented and shared?
- How is data managed and shared?

Section 7

Implementation and Maintenance of Your Collaboration Plan

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Section 7: Implementation and Maintenance Strategically Planning Your Collaboration

- How can your team work together to create the Collaboration Plan?
- How can you build in reflection time to assess your team processes and alignment?
- How can you allocate resources to support team function?

Section 7: Implementation and Maintenance
Assessing Team Function

- Can you add a short “team function” question to each team meeting?
  - Did our team work as effectively as possible this past [month, week]?
  - What did our team learn this week and how does that impact what we do next?
  - What is one thing that happened this month that exemplified our team values?
  - How did we do this month in making progress toward our goals?
  - Where are we struggling to meet our team expectations?
  - Is there a way that our team can better support you in your work?

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Effective Teaming is a Practice

“There are many amazing benefits of Collaboration Planning—it makes us more productive, innovative, and agile. Regular practice in Team Science Skills allows us to explore parts of our teams that we might otherwise ignore. It provides a psychologically safe space where we can try new things, fail, and try again. It teaches us patience, perseverance, balance and humility.”

https://www.yogabasics.com/practice/

Questions?

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