Team Interventions for Team Science

Organization Scientists on a Journey: Foster Innovation in Science Teams

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“The ability to transform knowledge through integration is a core competence of innovative teams. ‘Integration is defined as the extent to which a [science] team combines its distinct expertise and work into a unified whole.’”

Sources: Balakrishnan, et al, 2011
Salazar, et a, 2012;
How do we build an Integrative Capacity for Interdisciplinary Teams?
Evidence-Based Team Training

- We compared over 60 different interdisciplinary medical science teams generating research proposals over 9 months.
- Our research team attended the meetings of 10 of these 60 teams, recording, transcribing, and coding team dialogue.
- Our team science training workshops are based on what we found by comparing the team design and communication processes of the most and least innovative teams...
Quasi-Experimental study of team training effectiveness on Integrative Capacity & TD Orientation in:

- Interdisciplinary Student Teams at CGU and East Coast University
- Interdisciplinary Science Teams at Top Medical Research Institutions across the country

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<tr>
<th>Strategic Team Mapping</th>
<th>Communication Principles</th>
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<td>Yes</td>
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Designing a team is the process of purposefully configuring the elements of the team to foster the achievement of valued outcomes.
To go from an isolated approach…
To an integrative approach...
To Making Translational Connections
Findings from Studying over 60 Interdisciplinary Science Teams:

- **Assumptions**: Put smart people together from different disciplines and they’ll be able to solve complex problems.

- **What we found**: Failure to carefully design a team can lead to misaligned resources, overlooking key assets, underutilizing talent and ultimately undermining performance!
9 Step Team Design Exercise

Purposefully configure the elements of your team to achieve valued outcomes

- Identify shared team aim
- Establish critical components of the project
- Identify experience, expertise, and approaches of team members
- Assigning roles and responsibilities based on expertise
Step 1: Identify Shared Team Aim

Take 5-10 minutes to discuss and write your team aim on the bright colored 4 X 6 post-it, and place it centered at the top of your flip chart.

Our overarching team aim is:

**Example:** *This team is devoted to research and clinical advances toward the treatment and cure of ____________________*
On the 4X4 yellow post-its write key research work groups (RWGs) that could help your team reach its aim.

- Basic Research Groups (Basic neuroscience, cell biology, pathology, etc)
- Clinical Groups (diagnosis, clinical trials unit, pharmacology, etc)
- Behavioral (health behavior change, behavioral therapies)
- Imaging Groups (Radiology for Imaging Correlates of Disease, etc.)
- Community Groups (Community Outreach, Prevention, Epidemiology)

Use names of representatives from these RWGs
Write only one name/group per post it
Place anywhere on your flip chart
Step 3: Identify Infrastructure Cores

On 4X4 post-its of another color, write infrastructural resources (cores, labs, etc.) that are available to help your team accomplish its aim.

- Administrative Core
- Basic Core – immunology core, systems biology
- Clinical Core - sample collection and maintenance
- Bioinformatics/biostatistics
- Imaging
- Genetics - sequencing
- Computational Core
- Community partners and outreach

Write only one core per post it
Place anywhere on your flip chart
Step 4: Identify Translational Research Projects (TRPs)

On 4X4 post-its of another color, write translational research projects (TRPs) that your team would like to pursue.

- Example: Develop hand-held technology to track pediatric exercise

Write only one TRP per post it
Place anywhere on your flip chart
Step 5: Organizing RWGs & Infrastructural Cores to Create Cross-Group Integration

Now that you have identified RWGs, Cores, and TRPs, organize the RWGs and cores around translational research projects:
- Identify representatives from RWGs who will work on particular TRPs.
- Reorganize your post-its to represent your thinking.
- Draw a circle around those individuals or RWGs that will work on each TRP.
Step 6: Resourced for Success?

Take a look at each of your **Translational Research Projects** and the outputs listed for each. Discuss the following question: Do you have all of the people and tools to complete your TRPs? If not, what and who do you need to add (even if you don’t immediately have the people/ resources available) to make your “ideal” team?
Step 7: Are components integrated?

Take a look at the composition of individuals within each TRP and discuss the following questions:

• Who needs to work with whom? And when?
• Where might there be difficulty for communication and collaboration due to interdisciplinary differences?
• Who possesses expertise critical to achieving project aims that no one else has?
Step 8: Create Synergies within TRPs: Integrators

Integrators are individuals who have substantial work or educational experiences in more than a single domain. Which individuals in your team could serve as integrators? Place individual names on the “star” post-it notes and place them within your Team Mapping Board where they will help create synergy.
Step 9: Creating Synergy *between* TRPs

Liaison & Cores

Take a look at the various TRPs and discuss the following questions:
- Are they connected to one another?
- What resources will they need to share? How can their collaboration be supported?
• Enable innovation and problem solving by taking the time to design a team at the onset.
• Align resources with team aims using a data-driven approach.
• Foster efficient coordination by integrating the team’s resources.
• Make team members feel well utilized by leveraging their unique talents.
“A reciprocal process of team members’ sending and receiving information that forms and re-forms a team’s attitudes, behaviors, and cognitions”
(Salas et al., in press, p. 16)
Poor Communication

“Miscommunication and...misinterpretation...are two of the biggest causes of conflict [on teams]”

We practice the Four Principles of Interdisciplinary Communication!

1. Perspective Seeking
2. Promotive Voice
3. Team Reflection
4. Managing Connections
LEADER: (Looking at other clinical trial members). Let me just take a few minutes here. We, the clinical trials core team, have a good idea of where the trials will go, as we’ve been thinking about this for a long time. We’d like to figure out more about the variation in response and are considering a few ways to do so. We know that there are alcohol preferring and non-preferring mice. We want to keep exploring if there are clear differences in stimulant responsivity in other strains; we want to move to rats.

MEMBER 1: Testing with rats is quite time consuming. Perhaps in mice it would be the easiest? There is a big literature on that for cocaine, amphetamines, alcohol, etc.

LEADER: (defensively) Yeah, we’re aware. Not all of our ideas will be so time-consuming – for instance we will look at a behavioral response as a first discriminator – like mice preference for drugs. Anyhow, the plan is to continue in our current direction and I feel that the clinical trials team has some really great ideas. We’ll write them up and if anyone wants more detail on where we’re headed, just let me know and I’ll email info.
LEADER: Let me just take a few minutes here. We have a good idea of where the trials will go. But I think that the strengths that we have here, meaning here in this room right now, are the very basic science people and the genetics people, and so I would focus us on some of the going backward, in terms of thinking about questions like, how does this treatment really work? What are the mechanisms of the cellular, genetic, and cell pathology levels? And can we explain the variability in response, both at the animal level and human level?

MEMBER 1: Ok, are there particular strains that have key features?

MEMBER 2: Yes. Let’s see, most of the community is collecting data at all levels, physiological, neurobiological, etc. This can be an advantage because we can cross correlate these results with other physiological measures.

LEADER: We know that there are alcohol preferring and non preferring mice. This is probably the best-established finding about genetic strains that we have. Are there any strains where we know there are clear differences in stimulant responsivity?
MEMBER 2: In mice it would be easiest. There is literature on that for cocaine, amphetamines & alcohol.

LEADER: And these mice are available for research?

MEMBER 2: Yes. Most of these mice are commercially available.

LEADER: So, I want to ask, what would be the outcome measure, perhaps self-administration and behavioral outcomes? And would we also want to look at the brain responses? Might we be able to map out in vitro metabolic responses and neuro-chemical responses within certain limits, as i.e., variability of response?

MEMBER 3: Yes, we probably could. We’d have to think about what we want to induce and how. We’d need a test for mice even though micro-dialysis would not be as easy as it might be with rats; plus, we’d have genetic analysis available if we used mice.

LEADER: Good – great ideas. Doing this, plus looking at the simple behavioral responses of mice preference could be a real strength. These ideas together really enhance the project and makes that bridge from the clinical back to the basic.
Perspective Seeking is characterized by:

- Seeking to understand others’ positions or perspectives
- Consideration of how others feel about any given idea or topic
- Taking on viewpoints different from your own in order to understand others’ perspectives
- Directly asking about others’ uniquely held information
How do we facilitate Perspective Seeking?

- “Floating a trial balloon”
- Critical questions (e.g., playing devil’s advocate)
- Clarifying questions – to better understand meaning
- Inquiring questions – asking for new insight from fellow team members
Perspective Seeking - Obstacles

What gets in the way?

- Lack of psychological safety; that is, high risk of ridicule
- Assuming that ideas are unanimously shared or understood by the whole group
- Assuming that an idea already has “buy-in” from others
- Strong association of ideas with certain individuals leading others to feel intimidated about asking questions that may challenge the idea

Edmondson, 1999; Detert & Edmondson, 2011
Perspective Seeking

Facilitators of Innovation

• Members, especially leaders, seek input about a new idea they have in the form of a question. “Could the symptoms be caused by the new medication?”

• Clarifying or critical questions about ideas are posed – especially by those from other disciplines – to enhance understanding and idea quality.

• A wide range of members are invited to share their input.

Inhibitors of Innovation

• Members, especially leaders, fail to seek input, or bring up new ideas in a declarative fashion. “The symptoms are caused by the new medication.”

• Clarifying or critical questions focus on implementation (e.g., who is going to do what, deadlines, and equipment) rather than on idea development.

• Input is only elicited from a select set of members.
Promotive Voice is characterized by…

- “attempts to propose new ideas/opinions/suggestions to improve the overall functioning of the work unit or organization” as it pertains to your area of expertise

Liang, 2007
Facilitators of Innovation:
• Original ideas are mentioned AND built upon throughout the discussion by both team leader(s) and members.
• Ideas and suggestions are offered by a wide variety of team members, rather than a select few.

Inhibitors of Innovation:
• Original ideas are mentioned but CUT OFF before building on or critically assessing the ideas presented.
• Ideas and suggestions by leaders and other high status members dominate, deterring others from voicing their suggestions.
Team Reflection is characterized by:

- A concern with reviewing and reflecting upon objectives, strategies, and work processes, in order to meet team objectives and adapt to the wider environment (Patterson et al, 2005, p. 386)
Set aside time for reflecting on team processes regularly, but try to avoid doing it in the middle of idea-generation meetings so that ideas can be fully developed.
Managing Connections is characterized by:

- *Building interpersonal connections* among team members
- *Leveraging resources* that stem from interpersonal connections, either internal (i.e. team members) or external (e.g. community or advocacy groups) to the team, to forge novel insights between disparate perspectives.
Whenever expertise, tools, or partnerships need to be brought together for completion of *translational* work.

To foster the novel combination of diverse *disciplinary* perspectives.
To Summarize: What Does an Effective Team Meeting Look Like?
Promotive voice, or idea discussion, is what teams do the most during their idea-generation meetings. What differentiates their performance?
Most innovative team...

- Team Reflection on goals at the beginning to bring group together is ideal.
- Promotive voice is best at the beginning of a discussion/meeting.
- Perspective seeking extends the length of idea development (string of shapes).
- Reflection on how to implement work wraps up meeting.
- Connecting members from different disciplines enables them to execute work.
Knowledge Integration Team Activity: MRSA Root Cause Analysis

Background:
You and your team members are part of the Task Force on MRSA working for the County Health Department. Recent MRSA cases that were reported over the 4th of July holiday have been linked to the local Healthy Lives Clinic, Inc. Since the outbreak, Healthy Lives Clinic, has completed an internal investigation and believes that they have found the sequence of events that allowed MRSA to reach some of their patients.

Objective:
To ensure that this problem does not happen again, the County Health Department feels strongly we should conduct our own independent investigation. You and your team members will discuss the events that took place at Healthy Lives Clinic and determine the cause of the outbreak.
5 Key Resources


2. Validated Integrative Capacity Scale

3. Our team science case study - Eric’s Dilemma

4. Team training supplementary material/handouts (4 communication principles and mapping workbook)

5. Knowledge integration team activities (MRSA, TB or not TB, Guillain Barre Syndrome)
THANK YOU!!

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