What can interdisciplinary collaborations learn from the science of team science?

*Teamwork makes the dream work, and for interdisciplinary collaborations there are many lessons to be learned from the science of team science. **Suzi Spitzer** shares ten such lessons here: start by assembling participants with a variety of social skills, such as negotiation and social perceptiveness; avoid jargon and make sure shared words have shared meaning; and accept that conflict, while inevitable, can be healthy!*

How can we improve interdisciplinary collaborations? There are many lessons to be learned from the science of team science. The following ten lessons summarise many of the ideas that were shared at the [International Science of Team Science Conference](#) in Galveston, Texas, in May 2018.

1. Team up with the right people

On the most basic level, scientists working in teams should be willing to integrate their thoughts with their teammates' ideas. Participants should also possess a variety of social skills, such as negotiation and social perceptiveness. The most successful teams also encompass a moderate degree of deep-level diversity (values, perspectives, cognitive styles) and include women in leadership roles.

2. Start off on the right note

Take some time before beginning a team task or project to make sure everyone is on the same page. Consider using checklists to ensure that an activity starts (and ends) successfully. For new science teams, a basic checklist could make sure that everyone knows: 1) each other; 2) the details of the project; and 3) their role in the team.

3. Practice self-awareness as a leader

You don't need to be good at all aspects of leadership, but it is important for everyone in a team to understand their own leadership style. Be transparent with others and yourself about where your strengths and weaknesses lie, and surround yourself with teammates who excel in areas you do not.

4. Employ different styles of collaboration to balance efficiency and integration

Sports can help us conceptualise different forms of collaboration. Pooled collaboration involves teammates simultaneously, but separately, contributing to a team task (gymnastics). Sequential collaboration involves a specified order of contribution, where one person's output becomes the next person's input, until the team completes the task (American football). Reciprocal collaboration involves teammates contributing and communicating back and forth to complete a task (basketball). Science teams should adopt whichever collaborative structure is most appropriate for their project.

5. Go beyond avoiding jargon to develop a shared understanding

Interdisciplinary translation is a process that promotes understanding between scientists who speak different "disciplinary languages". When working in a team of scientists with different epistemological backgrounds, always bear in mind that each teammate possesses their own "thought world", or set of perspectives and experiences. When working in interdisciplinary teams, of course scientists must clarify disciplinary terms that others might not know, but less obviously, scientists must also make sure that their shared words have shared meaning (e.g. culture, diversity, bias, objective).

6. Use visualisations as translation tools

Science teams can create and discuss interactive visuals to facilitate analytical thinking, knowledge integration, and data exploration. Visualisations, such as conceptual diagrams, can function as boundary objects between teammates who possess different perspectives or expertise. A visualisation can also serve as a "great equaliser" because teams can use it to collapse hierarchies and layer information in a way that creates a more egalitarian structure where all ideas are represented.

7. Do not avoid conflict — it's inevitable…and it can be healthy!

Learn how to express and resolve conflicts effectively. Be specific about the subject of the disagreement and your position on the matter, and express conflict directly to the antagonist, rather than through a third party. Avoid high-intensity behaviours that are offensive (e.g. undermining) or defensive, (e.g. stonewalling). Healthy debate can actually energise a team because it can be encouraging to collaboratively move towards a solution.

8. Share knowledge and advice

Effective teams have more communication and *more equal* communication. Social network analyses of successful teams show teammates learning from each other and forming close relationships with several other teammates (high network density and centrality). Avoid the "star model", which signifies an underlying cultural understanding that there is one lone genius leading the team. This top-down model causes teams to miss out on valuable questioning and input flowing from the bottom. Instead, develop collective cognitive responsibility, where success of the group effort is distributed among members and not concentrated in a single leader.

9. Build in "alone time" to maximise team creativity

The most creative team ideas often do not emerge within a single meeting. Ideation in team science should be longitudinal, and oscillate between convergent and divergent stages. Teammates should have time to converge and deliberate and generate transformative ideas as a group, and then also have an opportunity to reflect on the ideas and let them marinate before the team reconvenes. The interplay of these opportunities discourages teams from settling on "mean (average) ideas" that represent a snapshot agreement, and instead makes ideas and teams stronger and more creative.

10. Think about collaboration as a scientific virtue

Teamwork makes the dream work, but it is not always easy. When the going gets tough, remind yourself that collaboration makes you flourish as a scientist. Think about collaboration as virtuous "scientific friendship". Virtuous friendship does not stem from utility (they have something we need) or pleasure (we like them), but instead from a drive to be a good person and support others' greater achievements. Team scientists have an "interest in 'science-ing' with others because it contributes to science excellence" and should pride themselves on their determination to "work with other scientists because it makes everyone's science more awesome".

Do you have other lessons to share? Are there lessons that you disagree with?
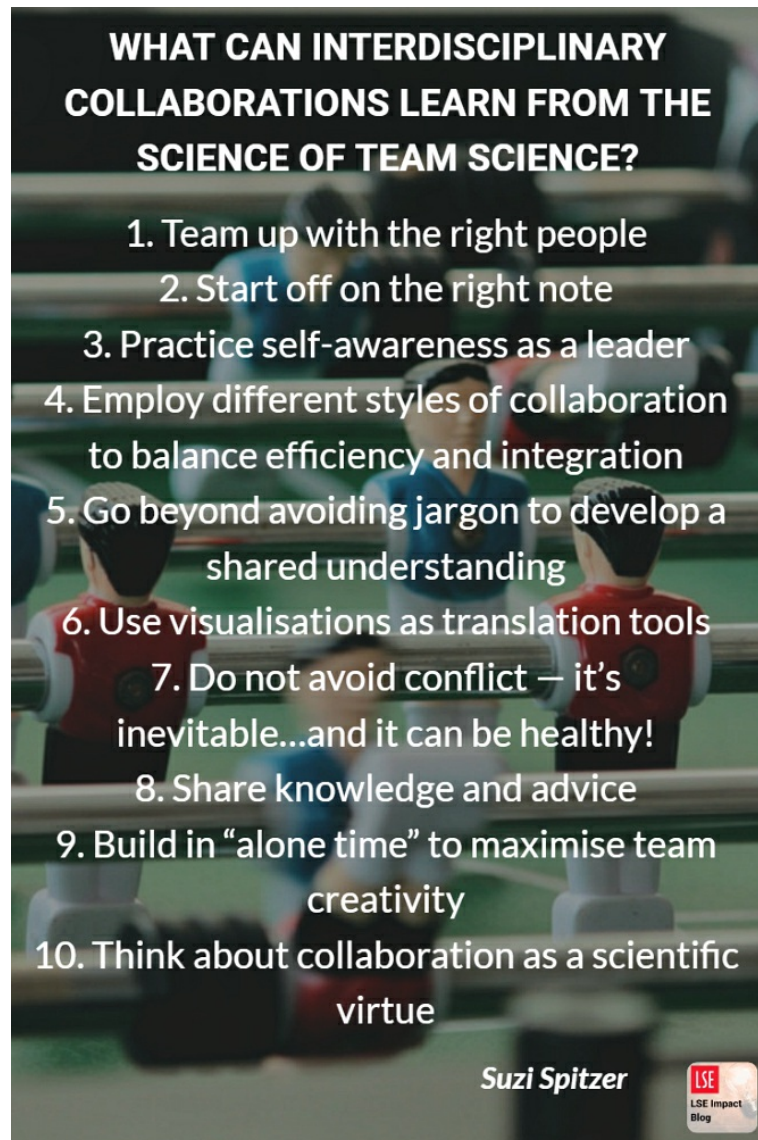
The ideas in this blog post represent a synthesis of the presentations and discussions throughout the duration of the conference, and, in particular, draw from the work of the following individuals: Anita Williams Woolley, James Sallis, Kevin Wooten, Laurie Weingart, Andi Hess, Suresh Bhavnani, Jennifer Cross, Hannah Love, Marshall Poole, Samuel Wilson, and Stephen Crowley.

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