

Proposed Panel: The Philosophy of the Science of Team Science

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The science of team science isn't one. That is, it's not a science. The science of team science operates by exploring a range of issues related to scientific collaboration. These explorations are scientific in the sense that they take one or another disciplinary approach to a question that arises from within that disciplinary perspective and address it accordingly. In this way, we have psychological studies of collaborative interaction and group dynamics, ethnographic studies of laboratory processes in collaborative settings, bibliometric studies of collaborative research publications, and network analysis of productive teams, etc. Each is an important contribution to that discipline's understanding of collaboration, team science, interdisciplinarity or whatever it is that that particular discipline takes to be its object of study. Each is also important for the general understanding of scientific collaboration. The structure of SciTS thus has more in common with area studies than it does with any given science. As is the case with area studies, there is no shared understanding or definition of the object under study, there are only related studies addressing related issues in different, and occasionally competing or contradictory ways. This is, very briefly, the state of the science of team science as a discipline.

If SciTS were to be a science, what kind of science would it be? It would seem unlikely, given its origins that it is likely to become a single-discipline science. Would it then be interdisciplinary? Would it be transdisciplinary? What would these labels mean about how SciTS would be structured, what its object(s) would be and how it would operate? For these questions to be answered, SciTS needs what all sciences have – a projection that posits something. When modern science arose out of Aristotelian science it did so on the basis of a novel set of posits, this is what makes modern sciences posit-ive. Descartes posited the idea of a uniform space that could be laid out on an infinite grid. This posit reversed the Aristotelian position that things were drawn to specific places in space based on their natures. Newton posited uniform motion, this was not an empirical generalization or something that could be tested, it was a posit placed out in advance of any question one wanted to ask about the motion of bodies. If SciTS is to become a science it will need to posit something.

Maybe SciTS will not become a science; perhaps it will remain a phenomenon akin to area studies. If so, it will still need to develop some level of shared conceptual understanding, some means of delimiting what counts as team science and what does not, and of what constitutes a study of team science and what does not. In short, it will need a level of self-understanding and a level of critical reflection. Historically, philosophers have served both of these functions; they have helped science develop positive projections (e.g., Descartes) and as philosophers of science they provide disciplines with self-understanding and critical reflection. For the Science of Team Science to mature as an academic/intellectual practice, as opposed to being a disparate set of disciplines discussing a range of broadly related phenomena, it requires a Philosophy of the Science of Team Science. This does not mean that every practitioner of team science needs to become a philosopher, but it does mean that they need to develop a self-understanding and some capacity for critical reflection about what they do that extends beyond their particular approach, its particular objects, and its particular questions such that an intellectual community is fostered that can talk about itself as the science of team science.

The purpose of this panel is to inaugurate that philosophy and to present ongoing work in three areas: a critical reflection on the concept of integration in team science (Stone); how scientists understand key scientific concepts

and what that means for team science (Crowley); and the relationship between disciplines and peers in the context of team science – and what can't it mean (Holbrook).

Paper 1: Critical Reflection on Integration and its Role in SciTS

David A. Stone, Ph.D.

Work on team science through SciTS covers a lot of ground, some of it related to the practical and institutional activities that support team science in academic, corporate, governmental, and community settings. But central to much of the work in team science is the understanding of what is going on when teams of scientists (or scientists and community representatives) are working together across disciplinary boundaries. Virtually all of the literature on interdisciplinary team science (ID) operates from the position that what is going on is something called “integration,” almost as though it was an assumption or a foregone conclusion. But, integration, in the senses that it arises in the ID literature, is a metaphor. Disciplinary scientists who are working together in an interdisciplinary way are said to be “integrating,” whether at the level of language, assumptions, methodologies, theories, perspectives. Efforts are then made to explore ways to improve or accelerate integration.

But what if what is going on in ID collaborations and ID communication is not helpfully understood as integration? As the SciTS matures, it is essential that it build into its development moments of critical reflection and that it be open to critique and the possibility of mid-course correction. The purpose of this paper is to briefly present, first, the fact that there significant critiques of the integrationist model, as well as alternative ways of thinking about what is going on in ID collaboration, and second, to briefly describe what a couple of those alternative approaches look like and how they might be used as the basis for further work in the SciTS.

As early as 2001, Latucca raised a number of questions about the viability of integration: what is it for 2 or more disciplines to be integrated? how is integration measured? what counts as integration? what elements of the disciplines are required to be integrated in order for interdisciplinarity to be achieved? These kinds of internalist questions remain problematic. More recently, Stone, Holbrook, and others have developed critiques that deconstruct the assumed relationships between language, thought, and action that serve as the pillars of the integrationist model. In the presentation, I will highlight two of these: 1) Holbrook's Kuhn-MacIntyre thesis, which argues that disciplines are holistic frameworks with languages embedded in them such that real communication across them cannot simply rely on translation, which is what integrationists assume is happening, but requires participants to learn each other's language as second first languages. And 2) the Heidegger-Stone thesis, which argues that the common ground sought by integrationists (as the basis for translation) operates only at the level of the epistemological features of the disciplines. I further argue that this level is insufficient for an understanding of what is taking place in ID collaboration (for reasons not accounted for by the Kuhn-MacIntyre thesis, and I demonstrate the value of a transdisciplinary ontological approach to understanding and developing ID collaboration. The presentation will highlight the need for SciTS research programs to take seriously the need to question concepts that have been handed down from the earliest days of ID scholarship and introduce them to alternatives that may be worth exploring.

Paper 2: The Philosophy of the Science of Team Science: Disciplines, Peers, and SciTSeers

J. Britt Holbrook

Peer review governs knowledge production, defining not only scholarly worth, but also the boundaries of disciplines. Peers play a decisive role in determining who and what are ‘in’ and who and what are ‘out’. This applies to conference presentations, to publications, to grants, to hiring decisions, to promotion and tenure, and so on. There is, then, no more important way than exploring peer review to address the question: If SciTS were to be a science, what kind of science would it be?

But surely the discipline itself must be defined before we can answer this question: Who should count as a peer in SciTS?! In other words, I've got it backwards! The discipline is a necessary condition for peer review – isn't it?!

I argue, on the contrary, that *peers precede disciplines*, even though disciplines serve to produce peers. But disciplining a field is not necessary to produce peers. The extent to which a field of enquiry becomes a discipline is a choice that peers can and should make.

Our idea that disciplines produce and define peers is correct, from a certain point of view – namely, from the point of view of established disciplines. But a key question for a philosophy of SciTS is the extent to which SciTS ought to become an established discipline. In addressing this question, we SciTSeers (that is, we philosophers of SciTS) ought to take a look at some other fields. David Stone has suggested that the current state of SciTS is akin to that of Area Studies. I suggest that a tour through the field of STS (Science and Technology Studies) might prove enlightening.

In her contribution to *The Oxford Handbook of Interdisciplinarity*, Sheila Jasanoff argues that STS has finally become 'a field of its own'. But, despite the fact that Jasanoff evinces a desire for STS to become a discipline like other disciplines and disparages Steve Fuller's distinction between "High Church" and "Low Church" STS, she also maintains a tension between the desire of the so-called High Churchers to discipline STS and the so-called Low Churchers to resist such an identity. She maintains this tension by undermining our notion of what constitutes a discipline. After discussing Jasanoff's archipelagic view of disciplines and outlining some of the characteristics of disciplines thus redefined, I return to the territory of SciTS.

Just as the question of what constitutes a discipline remains open, so does the question of whether SciTS should become a discipline. But SciTS already boasts some trappings of disciplinarity: proposals for presentations are subject to peer review, and SciTS has now been holding an annual conference for three years. Other possibilities exist, of course: SciTS journals may be created, federal funders could develop specific programs to fund SciTS research, SciTS departments may arise, or degrees in SciTS may be granted. Only the last two possibilities, however, seem fully disciplinary ... whatever that means. Despite proposing a philosophy of the science of team science, we are not proposing to develop a subdiscipline of the discipline of philosophy (or of the discipline of SciTS). Instead, we aim to open a reflexive discussion about the status of SciTS, one that is open to participation by any of us SciTSeers.

Paper 3: Intellectual Frameworks: Yours, Mine, and Ours

Stephen Crowley and Michael O'Rourke

The goal of this paper is not to describe a possible philosophy of SciTS but rather to make a case for how the development of any such philosophy might be undertaken. This requires saying a little bit about where we see SciTS at the moment and a little bit about what the community ought to value.

At the moment the SciTS community consists of a loose affiliation of groups with common interests in scientific collaboration. Just what aspects of scientific collaboration are of interest to those groups and how questions of interest are pursued varies wildly. Some groups are practitioners of team science seeking ideas about how to improve their own performance; other groups are students of team science interested in trying to understand and explain the nature of team science. There is considerable variation in the scale of collaboration—both in terms of time and size—ranging from 3 or 4 person student groups working together for a semester to multi-institutional networks with lifetimes measured in decades. Kinds of evidence also show significant diversity, with some groups focusing on face-to-face interactions and others on technical infrastructure and still others on bibliometric data. As a result our community is somewhat like a garage sale: you are almost certain to find something of interest but there will also be a great many things whose nature and purpose are obscure.

We think that SciTS should aspire to a greater degree of interaction than is suggested by the garage sale metaphor. A key part of any move to greater interaction is the harmonizing of our varied intellectual frameworks. That task can seem more than a little daunting – what, after all is "harmonizing" and how is it accomplished given such a

variety of intellectual starting points? We can't tell you what harmonizing will amount to in any particular case—that will depend on the conceptual frameworks involved and the goals of the folk who possess those frameworks. But we do think there are generally applicable mechanisms for creating harmony whatever the intellectual frameworks involved may be. Furthermore, and perhaps unsurprisingly, these mechanisms are those we advocate for groups of collaborating scientists faced with the challenge of effectively combining (or “harmonizing”) their various areas of expertise (or intellectual frameworks).

Intellectual frameworks are tools for getting work done and not works of art to be displayed and admired. A consequence of being tool-like is that we *use* elements of our intellectual framework, and like any familiar, functional tool, these elements cease being things we are aware of and become part of who we are. In this talk, we argue that if we want to harmonize these frameworks, we will need to make them explicit. But making them explicit is not enough; they also need to be rendered comparable, for if you and I cannot *compare* our differences then we will have little hope of negotiating ways to bring them into fruitful interaction.

We believe that intellectual frameworks can be made explicit and comparable by seeing them as a collection of answers to a set of underlying philosophical questions. By ‘philosophical’ in this case we mean only that the language in which the questions are framed has been developed to get at the essential features of science lying beneath its superficial variety. We need to identify which set of philosophical questions best reveals the variety of intellectual frameworks at work in SciTS. Identifying those questions then seems like an important next step in pursuing the philosophy of SciTS. What those questions will be we're not sure—but we suggest that principal among them will be questions involving the notions of *integration*, *peer*, and *discipline*.