# Collaboration Plans: Planning for Success in Team Science

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## Why Plan for Collaboration?

Although team science has the potential to achieve complex and sophisticated research goals, it can also introduce unique costs in terms of finances, time, and effort related to the management of large, complex teams. Written collaboration plans help to maximize the likelihood of success in scientific collaborations by laying out a plan for effective team functioning.

These documents aid in building a strong foundation for a scientific collaboration; identifying facilitating factors and challenges likely to influence the success of the collaboration; developing strategies for working within these influences; executing the collaboration; and engaging in quality improvement specific to team functioning.

Collaboration planning may benefit any team science endeavor that includes two or more investigators, but such planning becomes increasingly important as a proposed collaboration grows in scope and size. Poor management of large scientific collaborations may negatively impact the quality of the science that is produced, whereas effective management has the potential to foster innovation, creativity, and productivity.

Funding agencies currently emphasize evaluation of the technical and scientific merit of funding applications. For team science applications, the merit of the proposed collaboration plan may be equally important to the success of the scientific endeavor.

## Ten Components to Consider in a Collaboration Plan

This poster identifies 10 components that we recommend as the core content for collaboration plans. For each of the 10 components, we highlight information for investigators, funders, and reviewers to consider related to each component, including:

(1) Key elements of the specific component that should be considered and described in a written collaboration plan, and

(2) Related considerations grounded in the empirical and conceptual SciTS literature.

## How to Use a Collaboration Plan: For Investigators, Funders, and Reviewers

Investigators may prepare collaboration plans in order to engage collaborators in a process of planning together for a future collaboration. Written collaboration plans may later serve the function of a roadmap to team functioning throughout the collaboration.

Although some funding agencies are now requiring some documentation of pre-planning for team science funding applications, this practice is still in its early stages. Given the potential added value of collaboration planning to the success of scientific collaborations, we propose that funding agencies consider requiring collaboration plans as part of funding applications, in parallel to research plans. Reviewers can then use submitted collaboration plans to assess the capacity of a proposed team to collaboratively execute its proposed scientific work.

## Future Directions

Future research directions may include study of the impact that collaboration planning has on both the collaborative functioning and scientific success of science teams. Future directions for translational applications include:

- Further elaboration of what goes into an effective collaboration plan, as well as guidelines for implementation;
- Development of agency-specific template language for funding opportunity announcements;
- Development of written guidance and training opportunities for grant application reviewers about how to evaluate the quality of a collaboration plan; and
- Consideration of what is needed to monitor the execution of a collaboration plan.

## Get More Information: Download Our Detailed Guide

We have prepared a detailed document, "How to Plan for Collaboration," that goes into further depth on these 10 components of collaboration planning. It includes more detailed guidance related to each component, as well as citations of the related SciTS evidence.

You can download a publicly accessible copy on the Team Science Toolkit website – a one-stopshop for resources to help support, conduct, and study team-based research. It is available at:

https://www.teamsciencetoolkit.cancer.gov/Public/TSResourceBiblio.aspx?tid=3&rid=3119

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| COMPONENT | CONSIDERATIONS |
|---|---|
| **1 Rationale for Team Approach & Configuration** | |
| ✔ Justify **why a team approach** is necessary to meet the **research objectives.**<br>✔ Describe **why the team configuration** meets the proposed research objectives (e.g., how each team member uniquely contributes). | ✔ As the number of **collaborators increases**, so do the **potential challenges**.<br>✔ For **interdisciplinary teams**, the disciplines must be "scientifically ready" for collaboration.<br>✔ **Not all research questions are best addressed using a team approach** or require a large, complex, or distributed team.<br>✔ Generally, a team should **not include more researchers than necessary**, but should include **sufficient breadth** to gather the needed scientific expertise. |
| **2 Collaboration Readiness** | |
| ✔ Provide evidence for the collaboration readiness of (1) the **individual** researchers, (2) the **team** as a unit, and (3) the **institution(s) and organization(s)** that are involved.<br>✔ A given project may not have high levels of collaboration **readiness in all of these areas**. A plan may highlight strengths and describe strategies to compensate for any weaknesses. | ✔ **Individual characteristics** may increase success (e.g., interdisciplinary or team orientation, preparation for complexities and tensions of collaboration).<br>✔ **Team history of collaboration**, especially teams with some former collaborators and some new members, may increase success.<br>✔ **Institutional policies, procedures, resources, infrastructure** may influence success (e.g., promotion and tenure policies, research development officers, training for team science). |
| **3 Technological Readiness** | |
| Document the availability and planned use of technological resources to facilitate:<br>✔ **Data sharing and collaborative data analysis** (e.g., data sharing agreements, common data analysis and management software);<br>✔ **Communication** (e.g., video- and teleconferencing, calendaring tools); and<br>✔ **Coordination** (e.g., calendaring, work flow or project management tools). | ✔ **TR includes 3 components:** (1) technology must be available; (2) members must be willing to use the technologies; and (3) members must have the skills to use them.<br>✔ Additional issues may include: **compatibility and interoperability** of systems across collaborators; decisions concerning **whose systems or processes will be used.** |
| **4 Team Functioning** | |
| ✔ Describe **strategies** that will be used to address **key team processes that are essential to effective team functioning.**<br>✔ **Examples of strategies include:** development of cooperative agreements and operating manuals, participation in the Toolbox Project-facilitated workshops (http://www.cals.uidaho.edu/toolbox/), and implementation of team diagnostic surveys for quality improvement. | ✔ Strategies should **take into account the unique characteristics of the team and the scientific work**, such as collaborative history, complexity of the team (e.g., size, diversity, dispersion, task interdependence), phase of the research process.<br>✔ Strategies should be **directly tied to achieving key team processes** (e.g., generating a shared mission and goals, externalizing group cognition, creating shared mental models, generating shared language). |
| **5 Communication & Coordination** | |
| ✔ Describe **ways communication will occur** (e.g., meeting frequency and modality).<br>✔ Describe **strategies to coordinate** day-to-day operations and the achievement of scholarly benchmarks (e.g., work flow, coordination of data). | ✔ **Plans should be specific to your team.** For example, **distance collaborations** increase potential communication and coordination challenges. Communication and coordination styles may vary among collaborators who vary in age, gender, and culture, and for collaborators from different disciplines.<br>✔ **Greater use of coordination mechanisms** leads to more successful outcomes. Direct supervision and face-to-face mechanisms have demonstrated effectiveness. **As team complexity and size increase, so does the need for more coordination.** |
| **6 Leadership, Management, & Administration** | |
| ✔ Describe the **leadership and management approaches** that will be used to address the other components in the collaboration plan, given the **specific team context** that has been proposed (e.g., the individual team members, team characteristics, involved institutions and organizations). | ✔ There are **numerous approaches to leadership** (e.g., hierarchical, heterarchical, transformational, transactional). The most successful outcomes are produced by combining various approaches as appropriate to the context.<br>✔ **Leadership and management are key influences on the success** of a scientific collaboration.<br>✔ More complex team science initiatives require more sophisticated leadership and management approaches. |
| **7 Conflict Prevention & Management** | |
| ✔ **Describe strategies and systems for preventing and managing conflicts** (e.g., processes for inviting and sustaining diverse perspectives, preventing or managing negative forms of conflict, encouraging debate and facilitating productive forms of conflict, and resolving conflict).<br>✔ **Many sources of team conflict can be anticipated**, and strategies should be developed at the outset. | ✔ **Demographic and disciplinary diversity both may lead to conflict**, but the specific areas of conflict, and the ways in which conflicts play out, will vary with the unique combination of types of diversity on the team.<br>✔ **Team members with similar training may underestimate the potential for conflict** as a result of incorrect assumptions about areas of agreement.<br>✔ Subgroups may produce **fault lines**. |
| **8 Training** | |
| ✔ Describe a training plan for team members **at the start of the collaboration and throughout** (e.g., training relevant to team processes, leadership, management, communication, coordination).<br>✔ For **interdisciplinary (ID) teams**, this plan should involve cross-training in multiple scientific areas, and training in ID science competencies (e.g., critical awareness of the strengths and weaknesses of all disciplines, strategies for combining approaches from multiple disciplines). | ✔ **Ongoing, rather than one-off, training is needed** to maintain and build competencies and address evolving needs.<br>✔ Training should be **designed to meet a wide variety of needs**–by career stage, learning style, interests, and practical constraints (e.g., web-based training for distributed teams).<br>✔ **Evidence-based training approaches exist for both individuals and teams** (e.g., team coordination training, team reflectivity training, cross-training). |
| **9 Quality Improvement Activities** | |
| Describe what processes will be put in place to ensure **continuous quality improvement specific to team functioning**, in order to help:<br>✔ **address challenges** as they emerge; and<br>✔ **maintain and enhance the quality** of the ongoing collaboration. | ✔ Teams that engage in systematic and iterative reflection about team performance and subsequently adapt their team objectives and processes show better performance, including higher levels of innovation.<br>✔ For large or complex teams, it may be helpful to involve outside experts to design and implement quality improvement activities.<br>✔ **Options range** from frequent, brief opportunities for reflection about team performance (e.g., pre-briefing and debriefing) to more in-depth activities (e.g., surveys, facilitated discussions/workshops). |
| **10 Budget & Resource Allocation** | |
| ✔ Allocate **funds** in the budget for activities that **facilitate the success** of the team, as identified in **components 1–9**. | ✔ The prior 9 components all require investments of resources that require financial support. It is necessary to **allocate funds** to these activities to **ensure their successful implementation**.<br>✔ **Clear but flexible plans for funds may produce optimal results.** This can be particularly important in larger and more complex initiatives, where there is a greater likelihood for changes to the collaboration over the course of the initiative. |

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