

Best Practices

for Developing

Interdisciplinary Research Teams

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Introduction and Background

According to a report from the National Academies, **interdisciplinary research (IDR)** is defined as “*a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or area of research practice*” (NASEM 2004). Funding programs from federal agencies now highlight the importance of interdisciplinary efforts for charting innovative paths to creating new knowledge, finding solutions to complex problems, and creating a new generation of leaders working collaboratively across discipline specific boundaries.

Interdisciplinary Research at ISU

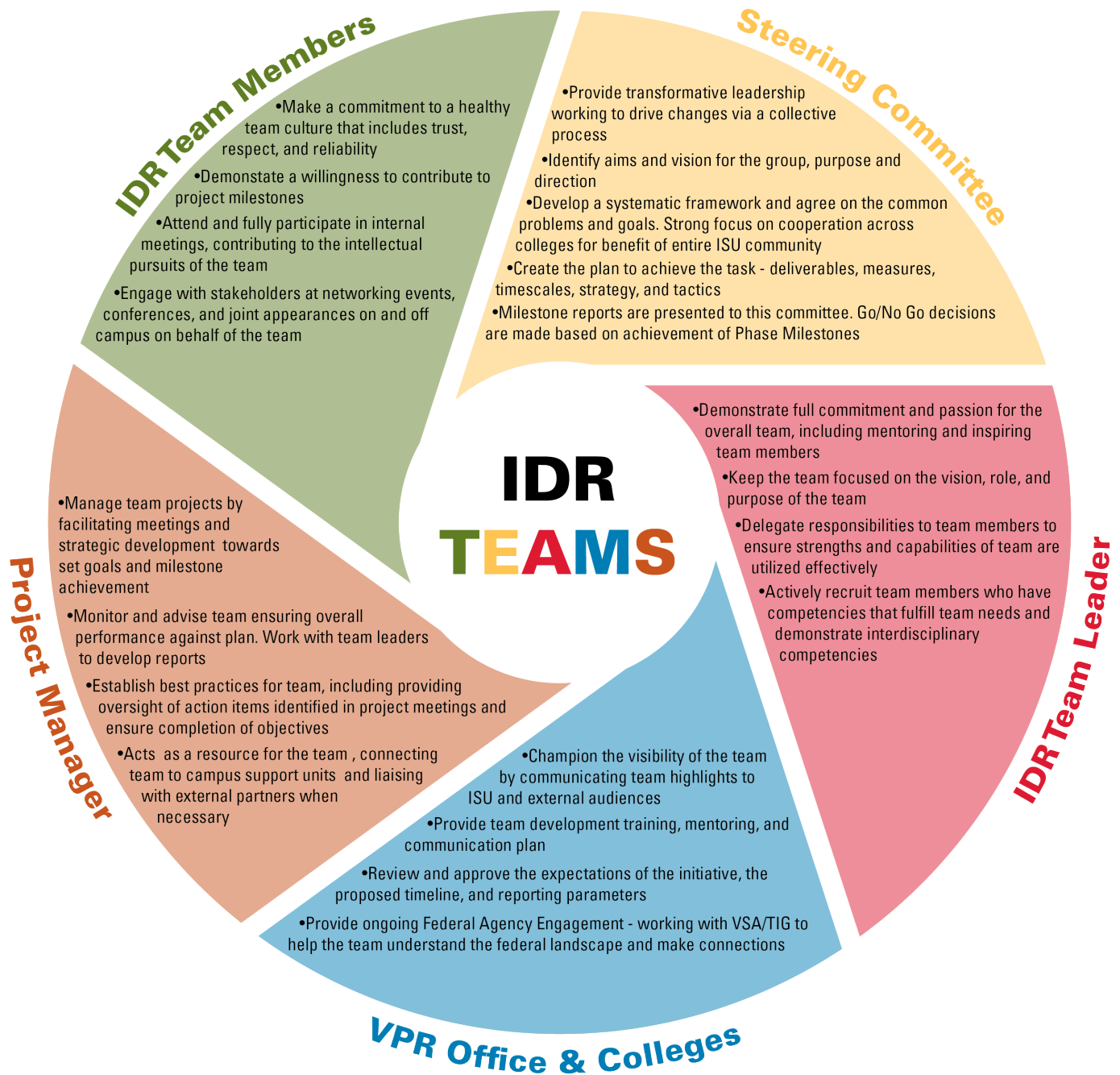
ISU's commitment to fostering interdisciplinary research is embedded in Goal 2 of the FY 2017–2022 [Strategic Plan](#), which is to **Enhance the university's research profile by conducting high impact research that addresses the grand challenges of the 21st Century**. In 2017, Iowa State launched the Presidential Interdisciplinary Research Initiative (PIRI) and the Presidential Interdisciplinary Research Seed Grants program (PIRS) as competitive internal funding program to incentivize researchers to engage in cross-disciplinary programs of national and international importance and further enhance ISU's intrinsically strong collaborative research enterprise. In synergy with ISU's mission to **“Create, share and apply knowledge to make Iowa and the world a better place,”** the interdisciplinary research (IDR) initiative will build on ISU's great strengths in student-centered education, global collaboration, and transformational basic and applied research. It will position Iowa State as a leading institution in addressing a variety of global and local challenges.

Best Practices for Building IDR Teams

Referred to as “Team Science,” collaborative interdisciplinary programs bring together investigators from a range of disciplines to develop new perspectives and create new possibilities to tackle problems that may only be tractable at the interface of disciplines. Teams may be small (a few individuals) or large (10 or more). Regardless of the size, working in a team requires an alliance of shared values, commitments towards a common goal, and addressing various challenges unique to interdisciplinary science. This short “Best Practices” guide has been developed to help build healthy and high functioning teams at Iowa State University. These best practices established by Bennett, Gadlin, and Levine-Finley in *“Collaboration and Team Science: A Field Guide”* (2010), and used here with permission, will provide guidance on developing a team structure, building a shared vision, defining short- and long-term research strategies, and collaborating with multiple researchers and stakeholders. To this end, five interactive organizational areas at ISU have been identified and their roles summarized (Figure 1):

- Establishing a Steering Committee
- Selecting an IDR Team Leader
- Selecting IDR Team Members
- Enlisting a Project Manager for Administrative Support
- Engaging with the office of the VPR as necessary

Figure 1. Interdisciplinary Research Teams Organizational Areas and Roles



Steering Committee—Roles and Responsibilities

A steering committee is an advisory committee usually made up of high-level stakeholders and/or experts who provide guidance on key issues such as purpose, project goals, ISU policy and objectives, budgetary control, marketing strategy, resource allocation, and decisions involving large expenditures.

Provide transformative leadership working to drive changes via a collective process.

- All members must set aside college-level and self-serving interests to guide and lead on behalf of the IDR team—meeting collaborative goals and holding a collective vision of the team’s success, with no individual research agenda asserting priority.

Identify aims and vision for the group, purpose, and direction.

- Team must agree upon goals and work with the team leader to develop the strategic plan.
- Team must develop shared language that will facilitate communications between team members from different disciplines.

Create the plan to achieve the task.

- Strategize for critical path success by breaking overarching vision into a specific process of action-oriented research tasks that include the following:
 - Deliverables
 - Objective and subjective measurement of progress
 - Timescales/timeline
 - Tactics to enable progress towards strategic goals

Develop a systematic framework and agree on the common problems and goals, roles, and credit assignment. Strong focus on cooperation across colleges for the benefit of the entire ISU community.

- Develop a [collaborative agreement](#) as a systematic guiding document that elucidates the following:
 - Overall goals
 - Who will do what within the team
 - Authorship/credit process
 - Contingencies and communications plan
 - Conflict of Interest process
- Focus on support and cooperation. Be available to offer tactical guidance for navigating obstacles that threaten to block a team’s success, particularly in cross-college or cross-disciplinary communications.
- Develop a forum where multiple perspectives and approaches are embraced within the team. Encourage constructive criticism within the team to solve problems utilizing approaches and methods evolving from different disciplines.

Milestone reports are presented to the steering committee. Go/No Go decisions are made based on achievement of phase milestones.

- Require quarterly reports to the committee for all projects.
- Additional milestones/success highlights may be shared in a timely manner as they arise, but they should always be included in quarterly reports.

IDR Team Leader—Roles and Responsibilities

A team leader is someone who provides guidance, instruction, direction, and leadership to a group of other individuals (the team) for the purpose of achieving a key result or group of aligned results.

Demonstrate full commitment and passion for the overall team, including mentoring and inspiring team members.

Brief Description of Responsibilities (Bennett 2010)

The leader must have strong scientific and interpersonal communication skills. These skills are critical and required to keep the group interacting, cohesive, and on course. Communication includes both the subjects for discussion and the logistical strategies for effective interactions. The leader must ensure that the team outlines roles and responsibilities, commitment of resources, and how credit for participation in team efforts will be shared and assigned. The importance of learning each other's scientific languages cannot be understated. Ensure the team remains focused on the vision, role, and purpose of the team.

The team leader must be able to clearly and decisively communicate, share information with team members, and articulate the team's vision. He or she must be prepared to model a collaborative approach to science and motivate other members to do so as well. A team leader must also support and empower team members, assign roles and delegate responsibilities, and manage team members' expectations.

The team leader must foster mutual respect among the members, the desire to share data and credit, a willingness to continually challenge each other to advance the project while containing conflict, and the development of a dynamic process that evolves its priorities and vision over time.

Are you ready to lead a team (Bennett 2010)?

- Am I able to clearly and decisively communicate and share information with team members?
- Am I prepared to clearly articulate the team's shared vision to team members and stakeholders?
- Am I prepared to model a collaborative process and inspire team members to achieve our shared goal?
- Am I willing to support team members at all levels and assign roles and responsibilities?
- Am I willing to manage team members' expectations?
- Am I prepared to select team members who will thrive in the team's culture?

Delegate responsibilities to team members to ensure strengths and capabilities of the team are utilized effectively.

Define roles and responsibilities for team members. Be sure to create and model an environment of psychological safety. According to the Team Science Field Guide, consider the following in building a team (Bennett 2010):

- Bring together members with diverse backgrounds and experiences to promote mutual learning.
- Make sure each person understands his or her roles, responsibilities, and contributions to the team's goals.
- As a leader, establish expectations for working together; as a participant, understand your contribution to the end goal.
- Recognize that discussing team goals openly and honestly will be a dynamic process and will evolve over time.
- Be prepared for disagreements and even conflicts, especially in the early stages of team formation.
- Agree on processes for sharing data, establishing and sharing credit, and managing authorship immediately and over

the course of the project.

- Regularly consider new scientific perspectives and ideas related to the research.

Actively recruit team members who have competencies that fulfill team needs and demonstrate interdisciplinary competencies.

- Develop a recruiting plan.
- Follow these steps when bringing on new team members (Bennett 2010):
 - Develop interview questions that require the candidate to articulate his or her interest and experience in working on a research team.
 - Ask for examples of how the candidate has successfully contributed to a team and what challenges he or she encountered.
 - Inquire about candidate's capacity to collaborate and function as a supportive member of a team when checking his or her references.

IDR Team Members—Roles and Responsibilities

A team member is a person belonging to a specific group of people involved in attempting to achieve a common goal.

Make a commitment to a healthy team culture that includes trust, respect, and reliability.

Are you ready to participate on a research team (Bennett 2010)?

- Can I thrive as a member of a highly collaborative research team? To what extent? What would it take?
- What would I gain? Do I have anything to lose?
- Am I willing to share data and credit with team members?
- Am I willing to accept constructive feedback and training from team members?
- Am I willing to provide constructive feedback and training to team members?
- Can I openly discuss issues and concerns with team members?

Demonstrate a willingness to contribute to project milestones.

Team members must be willing to not only make individual contributions to the team and project, but also be willing to assist other members of the team in achieving the larger project goals.

Team members are responsible for timely reporting, meeting attendance, and participation.

Attend and fully participate in internal meetings and contribute to the intellectual pursuits of the team.

- Team members have been invited because of what they can bring to the project. Team members have the responsibility to attend meetings and contribute on a regular basis.

Engage with stakeholders at networking events, conferences, and joint appearances on and off campus on behalf of the team.

IDR Project Manager—Roles and Responsibilities

A project manager is the person responsible for leading a project from its inception to execution. This includes planning, execution, and managing the people, resources, and scope of the project. A project manager will launch new teams and lend support to existing teams.

Utilizing a team of project managers, the Grants Hub will assist the VPR-supported IDR teams in all areas of project management.

Manage team projects by facilitating meetings and strategic development towards set goals and milestone achievement.

- Work with the IDR leader and steering committee to identify the project scope, the project goals, and the project deliverables of the team.
- Work with the team to develop the team's overall mission.
- Work with the team to identify the team's research strengths and weaknesses (SWOT analysis and strategic planning sessions).
- Identify and send out funding opportunities that may be of interest to the team.
- Work with the IDR leader and steering committee to identify agenda items for each meeting and create an agenda for each meeting.
- Facilitate meeting scheduling and recording of action items during meetings.
- Manage follow-up of recorded action items to guide teams towards meeting milestones and established goals.

Monitor and advise the team to ensure overall performance against plan. Work with team leaders to develop reports.

- Create a Smartsheet to track the team's projects and progress on achieving goals.
- Create templates and guidance for facilitation of progress reports that can be shared with senior leadership.

Establish best practices for the team, including providing oversight of action items identified in project meetings and ensuring completion of objectives.

- Guide team leaders through establishment of a team charter, which will detail the roles and responsibilities of team members and stakeholders.
- Work with the team to establish a communication plan and a document-sharing plan.

Act as a resource for the team, connecting the team to campus support units and liaising with external partners when necessary.

- Act as a bridge builder and connector, helping teams identify new collaborators who can contribute to a project.
- Assist with the teams' skill building and/or arranging sessions for professional development.
- Provide team information to Assistant Director of ISU Federal Relations to provide to VSA/TIG (Van Scoyoc Associates/The Implementation Group) in advance of meetings.
- Establish connections with other ISU research support units to strengthen the team's competitiveness:
 - Data Management Plan—Library
 - Broader Impacts—Grants Hub
 - Industry Relations—EDIR

VPR Office and Colleges Support

Champion the visibility of the team by communicating team highlights to ISU and external audiences.

- Each VPR-supported IDR Team will have a communication plan. The VPR Office will assist in the dissemination of the products of that plan.

Provide team development training and mentoring plan.

- Utilizing the Grants Hub staff, resources will be available for VPR-supported IDR Teams to build their program. This will include strategic planning and goal setting facilitation, project management, team development, and pre- and post-award services.

Review and approve expectations of the initiative, the proposed timeline, and reporting parameters.

- Resources will be available to assist IDR Teams with all areas of proposal submission, as well as awards.

Provide ongoing Federal Agency Engagement by working with the federal advocacy and consulting firm—VSA/TIG—to help understand the federal landscape and make connections.

- Educate the teams regarding the role of VSA/TIG and how they can assist in the team's strategic success.
- Provide teams with a template for faculty research capabilities/ best-in-class research to share with VSA/TIG to facilitate actionable discussions with clear focus.

References

Bennett M., H. Gadlin, and S. Levine-Finley. 2010. Collaboration and Team Science: A Field Guide. Bethesda, MD: National Institutes of Health. https://ccrod.cancer.gov/confluence/download/attachments/47284665/teamscience_fieldguide.pdf.

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