Connecting Across Campus, STEM, and Educational Research Partnerships

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Broader Impacts Summit 2019

Overview

- Experiences with Interdisciplinary Teams
- Crafting Interdisciplinary Teams
- Leveraging the Expertise of Team Members
- Lessons Learned
- Takeaways

Several of Our Projects

Strengthening the Professoriate (SP@ISU)

--Campus Level --

NSF IUSE/Professional Formation of Engineers: REvolutionizing engineering and computer science Departments

(IUSE/PFE: RED)

--Department/Network Level--

NSF Louis Stokes Alliances for Minority Participation (LSAMP)

--Student/Campus/Network Level--

NSF Scholarships in Science, Technology, Engineering, and Mathematics Program

(S-STEM)

--Student/Program Level--

Experiences with Interdisciplinary Teams

- Presenter stories
- Your stories

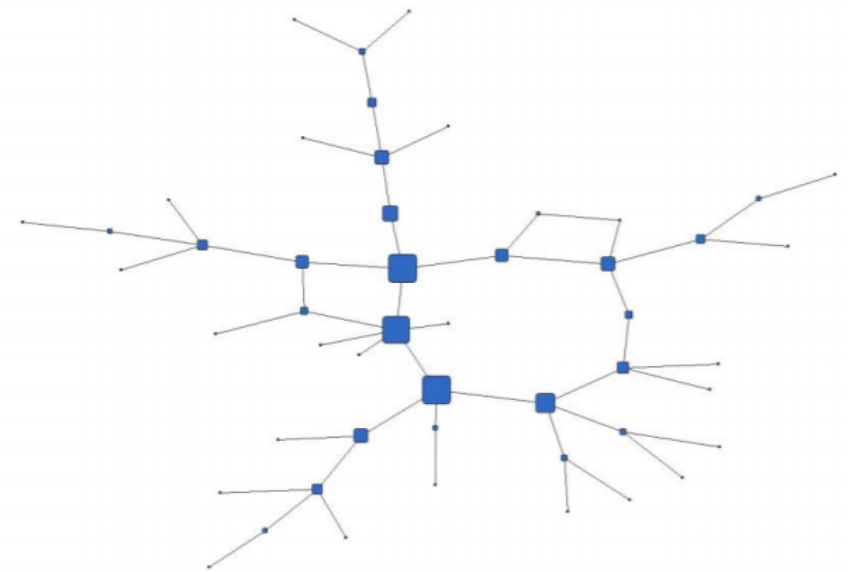Think about your experiences with or observations of an interdisciplinary team.

Think about the stages of teaming (e.g., Tuckman's forming, storming, norming, and performing).

In what ways or where did you encounter hurdles or risks?

Where We Started…

SP@ISU
Strengthening the Professoriate

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Strengthening the Professoriate @ ISU

Home
About
Publications
Information for Faculty
Events
BI Program Catalog
  › All Programs
    Browse by BI Area
BI Evaluation
Resources
STEM-FIT

All Programs

AgDiscovery
Iowa's AgDiscovery program helps teenagers learn about careers in Veterinary Medicine, Animal Science, Laboratory Technology and Wildlife Ecology. Students live on ISU's campus and learn from university professors, scientists who work for the U.S. Government, and local agricultural producers and animal welfare and management organizations.

Alliance for Building Faculty Diversity in the Mathematical Sciences
The Alliance for Building Faculty Diversity in the Mathematical Sciences will consult with ISU researchers/faculty members on best practices for mentoring underrepresented graduate students and postdocs. Opportunities for direct participation, e.g., as a mentor, are available to ISU researchers/faculty in Mathematics and Statistics.

Ames Laboratory
Ames Laboratory has a number of education programs that involve elementary school students through graduate students.

Biotechnology Outreach Education Center (BOEC)
The Biotechnology Outreach Education Center offers hands-on laboratory experiences for students from elementary through college age and adults.

Center for Bioplastics and Biocomposites
A NSF I/UCRC center focused on bioplastics and biocomposites. ISU is the lead institute and Washington State University is a site.

Browse by Area

- Broad Dissemination
- Broadening Participation
- Community College Education
- Faculty Professional Development
- Graduate Education
- Informal Education
- K-12 Education
- Partners Outside of ISU
- Public Engagement
- Research Experience
- Undergraduate Education

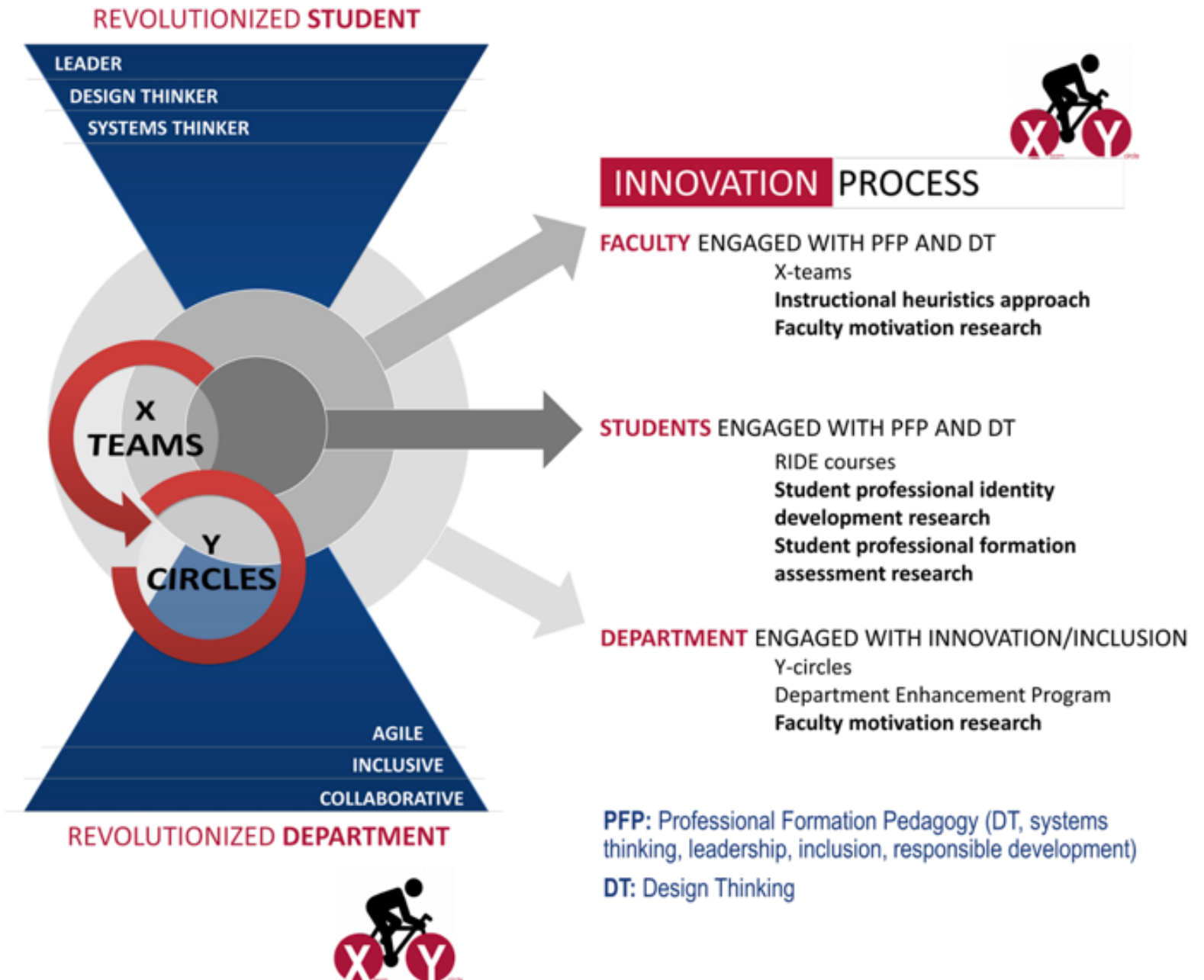[Search programs]

[Browse by BI Area]

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Iowa State University RED/RIDE Project

- IUSE/Professional Formation of Engineers: REvolutionizing engineering and computer science Departments (RED)

  - **Reinventing the Instructional and Departmental Enterprise (RIDE) to Advance the Professional Formation of Electrical and Computer Engineers**

- Five year project (2016-2021)

- Diverse team with members from across campus

  - Electrical and Computer Engineering
  - College of Design
  - School of Education
  - Statistics and Psychology

RIDE Project

REVOLUTIONIZED **STUDENT**

LEADER
DESIGN THINKER
SYSTEMS THINKER

X TEAMS

Y CIRCLES

AGILE
INCLUSIVE
COLLABORATIVE

REVOLUTIONIZED **DEPARTMENT**

INNOVATION PROCESS

FACULTY ENGAGED WITH PFP AND DT
X-teams
Instructional heuristics approach
Faculty motivation research

STUDENTS ENGAGED WITH PFP AND DT
RIDE courses
Student professional identity development research
Student professional formation assessment research

DEPARTMENT ENGAGED WITH INNOVATION/INCLUSION
Y-circles
Department Enhancement Program
Faculty motivation research

PFP: Professional Formation Pedagogy (DT, systems thinking, leadership, inclusion, responsible development)

DT: Design Thinking

Crafting Interdisciplinary Teams

- Connecting with colleagues
  - ➢ Seeking out the right colleagues, with the right expertise/connections
  - ➢ New faculty, new ideas/perspective, "new normal"
  - ➢ Using pre-existing networks (Example: CIRTL)

- Reaching out **early**, not just as an add-on
  - ➢ Building cohesive proposal
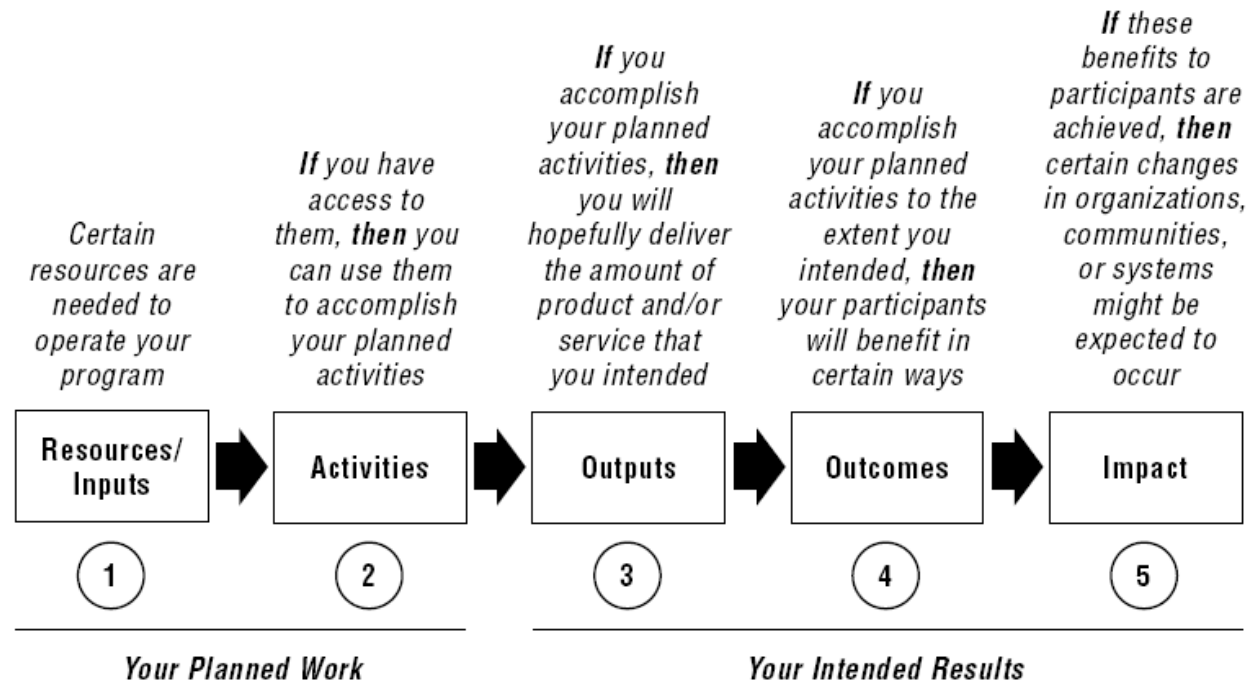 - ➢ Addressing issues from multiple perspectives
  - ➢ Honoring time, input

Crafting Interdisciplinary Teams

- Valuing colleague expertise in their area; listen
  - ➢ Expertise: change, identity, STEM, URMs, etc.
  - ➢ Experience: institution(s), network, program officer, Dear Colleague Letters, industry, etc.
  - ➢ Discipline: STEM, education, social sciences, etc.

- Think carefully about objectives, how to keep project fully integrated
  - Use of logic models
  - Shared vision of project proposal from collaborators

Crafting Interdisciplinary Teams

- Importance of logic models
- Shared vision
- Explicit steps, actions

Certain resources are needed to operate your program

If you have access to them, **then** you can use them to accomplish your planned activities

If you accomplish your planned activities, **then** you will hopefully deliver the amount of product and/or service that you intended

If you accomplish your planned activities to the extent you intended, **then** your participants will benefit in certain ways

If these benefits to participants are achieved, **then** certain changes in organizations, communities, or systems might be expected to occur

Resources/Inputs → Activities → Outputs → Outcomes → Impact

1   2   3   4   5

Your Planned Work   Your Intended Results

Logic Model Example

Resources	Activities	Outputs	Outcomes	Impacts
• NSF funding • PI team (ISU, DMACC, KCC) • Leadership team (ISU, DMACC, KCC) • Faculty mentors (ISU, DMACC, KCC) • Peer mentors (ISU, DMACC, KCC) • Graduate assistants (ISU) • Research team (ISU) • ECPE Department chair and External Advisory Board • ISU Research Institute for Studies in Education (RISE) (external eval.) • ISU programs/resources: PWSE, LC, CELT • ISU offices: Financial Aid, Institutional Research, Registrar • ISU College of Engineering: Engineering Student Services, Engineering Career Services • ISU Digital Women student organization	• Meetings of various team members • Meetings with external evaluator • Coordination and management of the project • Website development and maintenance • Implementation and integration of scholarship application and review processes • Management of scholar information • Design and implementation of the scholar student experience based on PWSE and ECPE activities and enhancements (see ECSEL Student Experience) • Promotion and adoption of inclusive teaching practices • Promotion of and preparation for industry and research internships for rising sophomores and juniors as part of the ECSEL Experience	• Scholarships • ISU scholar database • DMACC scholar database • KCC scholar database • Scholar portfolios • Scholar recognition (e.g., news articles, social media) • Website and web analytics • Dissemination through presentations and publications • Data briefs • Reports • NSF S-STEM online database • Academic advising guidelines • ECSEL experiential learning kits • Recruiting and outreach marketing materials • Training and professional development resources • Research datasets	**S-STEM Student Outcomes** • Degrees granted in electrical, computer, and software engineering • Students transferring from an associate to a baccalaureate degree program • Students successfully completing the Engineering Basic Program • Doubling the enrollment of women in ECSE majors (240), including transfers • 1-year (86%) and 2-year (80%) retention rates for female students in ECSE majors • 6-year graduation rate (55%) for female students in ECSE majors **Other Student Outcomes** • Increased student motivation, satisfaction and retention • Increased professional identity as an ECS engineer	• Outcomes lead to impacts on students, faculty, department culture, institutions, disciplines, and research knowledge base **Broader Impacts** • Expanding opportunities for low-income academically talented students with financial need • Increased partnerships with community colleges, industry, diversity programs, and researchers to broaden participation of women in ECS engineering majors • Development of a diverse workforce in ECS engineering fields • Improved education pathway through the community college into baccalaureate ECS engineering programs • Increased understanding

Logic Model Example

Logic Model

Iowa-Illinois-Nebraska LSAMP: IINSPIRE – A STEM Partnership for Innovation in Research and Education
5+ Year Alliance (2016-2021)

Resources	Activities	Outputs	Outcomes	Impacts
• NSF funding • PI team • Alliance Office • Steering Council (Campus Directors) • Governing Board • Faculty mentors • Peer mentors • Graduate assistants • Research team • Institutional offices, programs, resources at each alliance member (institutional	**Student Academic/Professional Development (Objective 1)** • Design, implementation and evaluation of the IINSPIRE student experience on each campus, including academic support, social integration, and professional development • Undergraduate research experiences • Design and implementation of undergraduate research	• Enrollment and graduation data • Number of activities/events • Number and demographics of participants • Number of STEM students transferring from 2-year to 4-year institutions. • Number of students completing the research certificate. • NSF WebAMP online	**LSAMP Program/Student Outcomes (Objectives 1, 6)** • Doubling the number of STEM degrees granted to URM students • Increased individual student retention and progression to baccalaureate degrees for URM groups • Successful transfer of URM students from 2-year to 4-year institutions in STEM programs • Increased access to high quality undergraduate	**Overall Impacts** • Outcomes lead to impacts on students, faculty, department culture, institutions, disciplines, and research knowledge base. **Broader Impacts (Objective 6)** • Expanding opportunities for URM students in undergraduate and
(SERC) • Center for Integrating Research, Teaching, and Learning (CIRTL) Network	members • Coordination and management of the project • Website development and maintenance • Alliance annual conference • NSF annual reporting • Dissemination of effective practices and research findings • Partnering with industry, community and professional organizations, and campus programs to support the IINSPIRE student experience		• Placement in STEM jobs and graduate programs **Research Outcomes (Objectives 3, 6)** • Increased scientific knowledge about the development of science/engineering identity by participants • Increased scientific knowledge about persistence in STEM majors based on SCCT **Other Program Outcomes**	• Capacity building in STEM research to support innovation and economic development • Integration of research and education to improve STEM teaching and learning

Leveraging Expertise of Team Members

- Involve collaborators across areas of the project
  - ➤ Recognizing and utilizing diverse skills/knowledge throughout the process
  - ➤ Establishing a tone: collaboration, expertise, value

- Acknowledge and utilize perhaps fundamentally differing views on project areas and goals
  - ➤ Working with stakeholders
  - ➤ Anticipating challenges
  - ➤ Providing input on interventions, language

Leveraging Expertise of Team Members

- Acknowledge and amplify each other's work, project goals/successes, and individual goals
  - ➢ Creating clear, valued feedback loops for multiple stakeholders in the project
  - ➢ Meetings, email, social media, other media

- Use project retreats to allow team members to show/share progress in multiple areas

- Provide space in meetings to share upcoming opportunities, dissemination, publications, briefs

Influencing Cultural/Structural Change

- Celebrate milestones and victories of all kinds

- Be patient (but also push the envelope)

- Document early and often, especially around project choices and revisions
  - ➤ Much shifting in multi-year, multi-discipline projects
  - ➤ Capture perspectives from multiple angles
    - ➤ Example: engineering education, social science, psychology, etc.

Overcoming Challenges

- Be prepared for differing viewpoints on process, approach
  - Considering points, valuing expertise
  - Disciplinary socialization is *very* real

- Be flexible, projects change and evolve
  - Collaborators
  - Shifting goals
  - Levers for change

Overcoming Challenges

- Keep the focus on the project's best interest, come back to this often
  - Students
  - Faculty
  - Instructional/structural/equitable change

- Be kind, generous, and willing to connect
  - Share experiences, a meal, etc.

Strategies for Interdisciplinary Teams

Think about your project goals.

If you work with an interdisciplinary team, what is something you've learned about at this summit that may support effective partnering?

If you need to build an interdisciplinary team or bring together diverse/interdisciplinary stakeholders, what connections can you tap into?

Takeaways

Crafting interdisciplinary teams

- Connecting early with colleagues
- Valuing their expertise
- Keeping the project integrated

Leveraging collaborator expertise

- Honoring the expertise of collaborators
- Creating and sustaining feedback loops

Overcoming challenges to influencing cultural/structural change

- Be flexible, prepared for challenges
- Keep a shared focus and sense of connection

REDPAR Tip Sheet

CREATING STRATEGIC PARTNERSHIPS
A Tip Sheet from REvolutionizing engineering and computer science Departments (RED) Participatory Action Research

Creating strategic partnerships with stakeholders, supporters, and collaborators is a key tactic for change management. This tip sheet presents approaches used to create successful partnerships, using research findings resulting from focus group discussions and conference calls with NSF's RED grantees. The quotes from research participants highlight these findings. For more information, contact us at redpar@rose-hulman.edu.

Identify the Motivation for Partnerships*

Teams emphasize a broad range of possible motivations for engaging in partnerships: proactively building connections, diversifying or supplementing the team's skills, finding and cultivating advocates, attracting resources, increasing impact on- and off-campus, and more. Unclear or opaque partnership motivations lead potential partners to wonder at the value and merits of a relationship. By clearly identifying the motivation for the partnership, all potential partners can evaluate that motivation relative to their own needs and abilities to contribute.

→ **TIP:** Engage in project soul-seeking to identify the meritorious reasons for partnering on an effort and inquire about the motivations of the potential partner; being explicit and open is an advantage and helps avoid operating with an unstated agenda.

http://depts.washington.edu/cerse/wordpress/wp-content/uploads/2018/02/REDPAR_Partnerships_Tip_Sheet.pdf

REDPAR Tip Sheet

- ## Identify the Motivation for Partnerships

  - ➢ TIP: Engage in project soul-seeking to identify the meritorious reasons for partnering on an effort and inquire about the motivations of the potential partner; being explicit and open is an advantage and helps avoid operating with an unstated agenda.

- ## Align and Leverage Social Capital and Institutional Capital

  - ➢ TIP: Create a catalogue of the personal and institutional capital and networks "owned" by members of the potential partnership, including that of various team members; this catalogue can reveal possibilities for aligning interests among partners.

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REDPAR Tip Sheet

- ### Establish Partnership Goals and Governance

  - ➤ TIP: Leave no feature of the partnership unstated or assumed; although conflict is inevitable, the more specific partners are about who does what, when, to what ends, and how, the more likely conflict can be productive rather than relationship ending.

- ### Address Struggles with Maintaining Successful Partnerships

  - ➤ TIP: Practice the approach of "assume positive intent" on the part of partners, and use an attitude of inquiry to query the situation to discover how partners are experiencing the struggle.

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