PROJECT SUMMARY

Overview:
The project, EAGER: Understanding and Strengthening STEM Faculty Engagement, the Institutional Environment, and Transformative Research, at Iowa State University will pursue new interdisciplinary research and institutional collaboration that addresses factors affecting the engagement of STEM faculty and the contributions of their work. The evolving role of institutions in supporting broader impacts work will be explored, including how STEM faculty may be supported so they can become engaged more fully in work that has the potential for societal benefit. The project proposes a research study and a workshop, both aimed at bringing together theory, practice, and evidence-driven discussion. It will be guided by two objectives: (1) understanding faculty engagement, and (2) strengthening faculty engagement. These will be considered in relation to institutional environment support and the capacity for transformative research. Key activities will include an integrated analysis of faculty and institutional data, and a holistic envisioning of academic research careers by experts and stakeholders.

The research and collaboration proposed in this project are well-aligned with EAGER. A distinctive exploratory aspect of the research study is the use of statistical modeling to investigate questions that have not been addressed before in large-scale surveys related to faculty satisfaction and retention. Data will be used in new and innovative ways. The research team is using a promising motivational theory framework that is essentially untested in this domain. A rich institutional context is available at ISU to examine department level and central administration level support.

Intellectual Merit:
The project will accomplish two main interwoven activities: (1) designing and conducting a research study using a new model for faculty engagement; and (2) planning and convening a workshop to synthesize recent work encompassing career life balance and broader impacts (BI) infrastructure, share and stimulate promising practices, and develop recommendations for institutional action. The study proposes to better understand what drives faculty to thrive and persist in STEM careers. Self-determination theory (SDT) can be used to understand how the environment can support STEM faculty. According to SDT, people who perceive that they have autonomy, are competent, and experience a sense of belonging or relatedness will be self-motivated to engage in their careers, to be creative, innovative, and productive, and to experience high job satisfaction. Environmental supports can be conceptualized as the extent to which they enhance perceptions of these needs. The SDT framework represents a novel approach to analyze faculty retention. Results of the study will provide scientific knowledge that will either support or fail to support SDT as well as provide a basis for future work. The workshop will be informed in part through progress on the research study and related work by other researchers. Discussion at the workshop will stimulate new thinking and recommendations for institutions.

Broader Impacts:
The main broader impacts outcomes of the project include enhanced infrastructure to support faculty (including their BI work) and full participation and engagement in STEM academic careers by all groups. The project will influence institutional opportunities to enhance faculty engagement, career life balance, gender equality in STEM careers, and BI infrastructure. The use of COACHE data may inform cross-institutional policies and practices to support faculty and potentially benefit hundreds of colleges and universities. Open access to research and workshop results will be provided using Iowa State’s Digital Repository. Research and workshop findings and recommendations will also be widely disseminated via CIRTL Network webcasts and coffee hours. The project will also be of interest to the broader impacts network led by the University of Missouri, in which ISU plays a central role. Institutions having sparser infrastructures and support (such as those in EPSCoR jurisdictions, HBCUs, and HSIs) will be involved in a proactive and collaborative way. Some of these institutions have also participated in COACHE, thus potentially offering new strategies accessible to them.
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Cover Sheet for Proposal to the National Science Foundation

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*Proposers may select any numbering mechanism for the proposal. The entire proposal however, must be paginated. Complete both columns only if the proposal is numbered consecutively.*
1. Introduction and Objectives

In her remarks at the 2014 Broader Impacts Infrastructure Summit, Wanda Ward referenced the work of Diana Rhoten on Women, Science and Interdisciplinary Ways of Working. [37] [29] [30] This is enlightening work that examines complex relationships between interdisciplinary science, diversity in science, transformative research, and academic environments. Rhoten notes that there is little systematic evidence about the relationships. She concludes with these thought-provoking statements:

“… if … interdisciplinary research presents a promising angle by which to engage women and diversify the scientific enterprise, can it or will it be a rewarding career trajectory for women and other underrepresented minorities to follow in the current academic environment? Can and will interdisciplinary work lead those who choose it to find and retain productive and innovative positions?”

“… it cannot be considered ethical or even practical to draw women into science using interdisciplinary research as the lure, if simultaneously systems of work, evaluation and promotion are not reformed to reward them for taking up the challenge.” [30]

These inspire even deeper reflection when combined with the broader impacts for societal benefit of scientific research grants. Broader impacts (BI) work is inherently interdisciplinary. It adds another dimension, not only for women in science but for all STEM faculty, to consider in efforts to understand and strengthen faculty engagement. The proposed EAGER research study and workshop are aimed at bringing together theory, practice, and evidence-driven discussion about factors affecting the retention of STEM faculty and the contributions of their work. Toward this end, Iowa State University is uniquely positioned to lead an EAGER project at the intersection of complex issues. This project will draw on synergistic outcomes of NSF-supported programs: ISU ADVANCE and Strengthening the Professoriate (SP@ISU) (see section 5). The project will be guided by two objectives: (1) understanding faculty engagement, and (2) strengthening faculty engagement. Objective 1 will be met through accomplishments of both the research study and the workshop. Objective 2 will follow from recommended actions taken in response to study and workshop findings. The objectives will be considered in relation to institutional environment support and the capacity for transformative research. An expected outcome of the research is a model resulting from the exploratory analysis that will help inform decisions about institutional support for STEM faculty. Ultimately, this is expected to lead to institutional actions and policies that strengthen the STEM research enterprise. We anticipate that the broader impacts of the project will influence institutional opportunities to enhance faculty engagement, career life balance, gender equality in STEM careers, BI infrastructure, and attainment of transformative research that benefits society.

EAGER Rationale
The research and collaboration proposed in this project are highly aligned with EAGER expectations. A distinctive exploratory aspect of the research study described below is the use of statistical modeling to investigate questions that have not been addressed before in large-scale surveys related to faculty satisfaction and retention. Existing COACHE survey data (see research plan) will be used in new and innovative ways, potentially benefiting all institutions using the survey. The research team is using a promising motivational theory framework that is essentially untested in this domain. A rich institutional context is available at ISU to examine department level and central administration level support. The SP@ISU experience, the expertise of team members, and the proposed workshop will stimulate creative thinking and approaches.


2. Project Activities

The two-year EAGER project will pursue its objectives through two main interwoven activities.

1. The project will design and conduct a research study using a new model for faculty engagement.
2. The project will plan and convene a workshop to synthesize recent work, share and stimulate promising practices, and develop recommendations for institutional action.

Key activities will include an integrated analysis of faculty and institutional data, and a holistic envisioning of academic research careers by experts and stakeholders. Specific questions will be investigated in the research study and the workshop, as described in the plans below.

2.1 Research Plan

Examining STEM faculty job satisfaction is helpful to address STEM faculty engagement and retention. Institutions including Iowa State University and their administrators have invested in measuring faculty satisfaction across a range of domains and comparing their faculty members’ satisfaction to other faculty in the institution’s peer group and against national norms. The Collaborative on Academic Careers in Higher Education (COACHE) faculty job satisfaction survey is one tool that has been widely used by hundreds of colleges and universities across the United States to examine faculty satisfaction. [17]

However, we posit that an institution needs to be better informed with data-driven results to increase administrators’ understanding of what drives faculty to thrive and persist in STEM careers. Self-determination theory of motivation can be used to understand how the environment can support STEM faculty to be fully engaged in their scientific endeavor, persist in their faculty roles over many years, and experience high levels of job satisfaction. [19] [33] According to SDT, people who perceive that they have volitional autonomy, are competent, and experience a sense of belonging or relatedness [3] will be self-motivated to engage in their careers, to be creative, innovative, and productive, and to experience high levels of job satisfaction and well-being [33]. Moreover, SDT asserts that the environment plays a crucial role in supporting one’s autonomy, competence, and sense of belonging.

This SDT model is particularly timely for understanding STEM faculty retention in an environment of increased competition and scarcer resources. STEM faculty members’ sense of volitional autonomy, or their ability to freely choose the key components of their job (e.g., research topics, classes taught, or type of university service), is vulnerable as they try to compete for grant funding and help students learn amidst increasing student enrollment and needs. Various expectations affect volitional autonomy in how faculty fulfill their job responsibilities. Their perceived competence is challenged as they are asked to generate more research grants and scholarship, teach more classes with more students, and provide more institutional service, often with the same or fewer resources available. Perceived competence is also challenged as faculty members find their classrooms more diverse with little multicultural training in how to amend their teaching strategies so everyone is successful. Faculty sense of belonging or relatedness relies on frequent positive interactions with at least a few people invested in one’s welfare over time. This sense of belonging may relate to what faculty label as collegiality or the sense of fit in their department(s). University faculty do receive various types of support, but institutional support often is not viewed as consistent with the objective of increasing faculty members’ perceived competence, autonomy, and relatedness. For example, a female STEM faculty member may be particularly energized by university resources that help her translate the broader impacts in her research grant into greater benefit in the larger world. These resources may also help her reach across disciplines, thereby increasing her network and sense of belonging.

The SDT framework represents a novel approach to conceptualizing faculty retention. Iowa State has implemented several building blocks that could be viewed within the model shown in Figure 1. First, the latest COACHE survey was conducted in the spring of 2013 and for the first time included all faculty ranks. The COACHE data can be applied to test the applicability of the SDT framework using the methods described below. Second, ISU recently concluded a 5-year NSF Institutional ADVANCE grant whereby efforts were directed toward transforming the climate in nine focal STEM departments across
three colleges. These departments did an intensive self-examination of their culture based on broad participation internal focus groups (with an 86% rate of faculty participation). Subsequently an action plan was developed and implemented to address unique departmental concerns. This effort currently is in the process of being institutionalized by integrating it with academic program reviews. This collaborative transformation process in the nine departments may have impacted key constructs in the model such as retention, satisfaction, and sense of belonging. Finally, ISU has implemented an NSF funded program, SP@ISU, that has provided instrumental grant support to STEM faculty by helping them strengthen the broader impacts component of their research. SP@ISU may have increased faculty members’ perceived competence and may have increased the level of institutional support for grants.

**Research Activities**

We propose to use existing COACHE data available at Iowa State to examine the model. We expect that:

a. Environmental supports, specifically department chair support, support for work/life balance, and administrative grant support, will indirectly predict faculty job satisfaction and intentions to leave the university through the mediation effect of faculty needs (perceived autonomy, competence, and relatedness).

b. Faculty needs (perceived autonomy, competence, and relatedness) will directly predict faculty job satisfaction (positively) and intentions to leave the university (negatively).

We plan to examine the results of the prediction models specified in a. and b. separately for groups of faculty identified by gender, ethnicity, rank, and job designation (e.g., STEM vs. non-STEM, tenure-eligible vs. tenured).

We also propose to compare the nine ISU ADVANCE focal departments against the institution’s non-focal departments, to address the role of the various components of the model. We expect that faculty in the focal departments, compared to non-focal STEM departments, will be more satisfied, will have a greater sense of belonging or relatedness, and will report fewer intentions to leave the university. We will use a second faculty satisfaction survey used in AAU institutions called the Association of American Universities Data Exchange (AAUDE) that was collected at ISU in the fall of 2011 to cross validate using data on similar constructs.

**Data.** Two datasets will be used to address the research questions listed above. These include the COACHE data and the AAUDE data. The COACHE survey was administered to 695 ISU faculty in the spring of 2013 including 114 non-tenure track faculty, 134 tenure track faculty, and 447 tenured faculty across all 8 colleges. All STEM colleges were represented. 395 respondents (57%) were STEM faculty.
Responses to the AAUDE survey were received from 796 faculty; of the AAUDE respondents, 418 (52.5%) were in STEM disciplines.

**Data Analysis.** The psychological model provides a framework that informs the data analysis. We have posited that environmental supports, specifically chair support, work/life balance, and grant support affect the outcomes of faculty satisfaction and intentions to leave both directly and indirectly mediated through perceived autonomy, competence, and relatedness. Using COACHE data, we will use Structural Equation Modeling in the form of Confirmatory Factor Analysis to establish the latent structures linking the measured variables available in the dataset and their underlying constructs. For example, we postulate that chair support is the latent construct underlying the responses to the following six specific items: My department chair’s: (a) Pace of decision making; (b) Stated priorities; (c) Communication of priorities to faculty; (d) Ensuring opportunities for faculty to have input into departmental policy decisions; and (e) Fairness in evaluating my work; and (f) For all of your work, how satisfied are you with the recognition you receive from your department head or chair?

Heretofore COACHE results have been presented only in a descriptive way that examines domains of satisfaction. Previous presentations have not addressed a multivariate approach nor have they provided interpretations of the results from a rigorous conceptual grounding in well-established psychological theory. We will estimate a structural equation model elaborating relationships among three sets of variables. We will use AMOS, version 21, to estimate a complex multivariate model relating the three environmental variables of chair support, work/life balance, and grant support to faculty satisfaction and intentions to leave, taking into account the mediating effects of perceived autonomy, perceived competence, and perceived relatedness as measured through indirect effects. We will mitigate the limitations of preexisting data by adding internal faculty-level institutional data on grants activity and other metrics of faculty productivity to supplement the COACHE findings.

**Research Outcomes**

We expect the results of the study will provide scientific knowledge that will either support or fail to support SDT as well as provide a stepping stone for more studies to conceptualize STEM faculty retention from this vantage point. A distinctive exploratory aspect of this research is the use of statistical modeling to investigate questions that have not been addressed before in surveys related to faculty satisfaction and retention. We propose to blend the results of the COACHE and AAUDE surveys and provide cross-validation of findings. The ISU ADVANCE and SP@ISU initiatives provide a rich institutional context to examine department level and central administration level support. We expect to present an alternative practical means of using COACHE data in an innovative way beyond the standard descriptive COACHE report. This should enable university administrators and other stakeholders to think more holistically about faculty retention based on findings that address faculty members’ underlying motivations to be successful. In essence, the model resulting from our exploratory analysis will provide scaffolding to inform decisions about support for STEM faculty given resource limitations. A conceptual model anchored in motivation theory will also enhance understanding among the larger scientific community.

**Related Work**

The use of self-determination theory as an organizing framework has also been put forth by researchers in Montana State University’s ADVANCE Project TRACS: An Empirical Investigation of Transformation through Relatedness, Autonomy, and Competence Support, http://www.montana.edu/nsfadvance/. Their focus is on cultural transformation through initiatives that affect the three needs. Among these initiatives, they address support for research grants and interdisciplinary research opportunities for women. They do not specifically address broader impacts infrastructure or interrelationships between faculty needs and BI. Thus there are both similarities and differences with our proposed research that will be very useful to
explore; TRACS researchers will be invited to contribute to the proposed workshop. The model in our proposed research will include an emphasis on the creativity and engagement of faculty work, spanning personal, professional, institutional and societal benefits. It will be designed to mine large existing datasets from ongoing established satisfaction surveys such as COACHE in relation to critical motivational factors.

In addition to TRACS, other work addressing the interdisciplinary research aspect will also be reviewed in relation to our study, e.g., [2] [18] [29] [30] [36]

2.2 Workshop Plan
The motivation for the proposed workshop is to promote understanding and strengthening of STEM faculty engagement in relation to the institutional environment and transformative research. In today’s complex, competitive and dynamic academic research environment, there is a need for holistic envisioning of STEM faculty careers from multiple perspectives, including institutional support for career life balance, gender equality in STEM careers, BI infrastructure support, and transformative research that benefits society. Although there have been a number of conferences addressing these topics (see Recent Meetings below), there is a need to explore these topics collectively, guided by emerging research, and focusing on institutional support and action.

The workshop will be informed in part through progress on the research study and related work by other researchers. Effective and promising practices for faculty engagement and institutional support will be shared. The evolving role of institutions in the BI effort will be explored, including how STEM faculty may be supported so they can become engaged more fully in work that has the potential for societal benefit. We anticipate that discussion at the workshop will stimulate new thinking and recommendations for institutional action. There will be continuing discussion via electronic national networks, such as the Center for the Integration of Research, Teaching, and Learning (CIRTL, cirtl.net), in the year following the workshop. The following types of questions will be considered in workshop and CIRTL sessions:

• How can all STEM faculty (including women and underrepresented minorities) become more fully engaged in and rewarded for work that has the potential for broader societal benefit?
• In what ways does the institutional environment support faculty so as to engage them to their full potential?
• To what extent does support through professional societies and funding agencies complement institutional support for faculty?
• What is the influence of NSF research centers in transforming support for faculty?
• How does support for broader impacts work relate to faculty needs?
• What is the relationship between interdisciplinary collaboration, transformative research, broader impacts work, and faculty needs?

Recent Meetings
Most recently, the Broader Impacts Infrastructure Summit was held in Washington, DC, in April 2014. [15] This followed an inaugural summit in 2013. [14] These summits brought together broader impacts support professionals and other stakeholders from a variety of organizations to begin conversations on how to navigate and assist researchers with the broader impacts criterion. In 2008, ISU ADVANCE hosted a conference, “The New Norm of Faculty Flexibility: Transforming the Culture in Science & Engineering.” [35] This conference addressed work-life issues for faculty in STEM fields. The 2014 ADVANCE Program Workshop was held last March. [1] ADVANCE initiatives from around the country were highlighted. The Gender Summit 3 – North America held in November 2013 had as its goal to achieve positive change towards greater diversity in STEM. [20]
Chairperson and Organizing Committee
The workshop chair will be the PI, Diane Rover. She has experience in a variety of conference leadership positions, including serving on the organizing committee for the 2014 Broader Impacts Infrastructure Summit. The workshop coordinator will be Megan Heitmann, also on the BIIS committee. The organizing committee will consist of the co-PIs, senior personnel and consultants.

Location and Scheduling
The workshop will be held in either late April or early September of 2015. Three options will be considered for location: (1) in central Iowa, either Ames or Des Moines; (2) the Washington, D.C. area; or (3) co-located with a similar conference. A local venue would provide maximum convenience and knowledge about the area and resources. It would also be centrally located and lower cost. A DC venue facilitates NSF interaction, for both NSF staff and attendees. It would be higher cost. Held jointly, it could immediately precede or follow the 2015 Broader Impacts Infrastructure Summit. ISU Conference Planning and Management will assist the organizing committee in venue selection.

Organization of Meeting, Speakers, and Dissemination Plan
The workshop will be a two-day event with a combination of keynote speakers and concurrent sessions having invited speakers, panels, and interactive discussions. We have compiled a list of potential speakers active in respective communities of practice (refer to Supplemental Documents section). This list will be updated based on research interactions, suggestions from the consultants, and recommendations from NSF and other stakeholders. All meeting information will be posted to the workshop website; other dissemination of workshop results is described in the Data Management Plan.

Recruitment of Speakers and Conference Attendees
Speakers will be selected by the organizing committee, and personal invitations will be extended to each. Attention will be given to include speakers from underrepresented groups. The meeting will invite individuals and institutions from around the country, including those already active in the BI, ADVANCE, and Career Life Balance communities. Institutions that are not yet active in these communities or are in the early stages of providing support on their campuses will be sought out to participate. We expect the primary attendees to be university faculty and administrators and various representatives from government, industry and societies interested in the topics. Meeting announcements will be distributed through several professional networks, including the BI network listserv. Co-PI Schmittmann will help identify channels to invite administrators. We will also use our connections with the Iowa and Missouri EPSCoR projects to involve institutions in EPSCoR states.

Family Resources
ISU Conference Planning and Management services will assist with providing family resources to speakers and participants of the conference. A daycare facility will be identified near the venue, and registrants will be alerted to this service. A private lactation room will also be identified at the venue.

2.3 Broader Impacts
The broader impacts of this work are in the areas of human resource development, institutional infrastructure for faculty and grant support, information infrastructure for model data, and multifaceted integration and dissemination of information. We intend to influence university human resource development policies and practices as they pertain to current and future faculty. We will work with COACHE administrators through Harvard University to link and potentially share data with other institutions to inform cross-institutional policies and practices to support faculty. Hundreds of colleges and universities have participated in COACHE and may benefit from new insights. In addition to typical modes of dissemination, we will provide open access to research and workshop results using Iowa State’s Digital Repository (DR@ISU). As Iowa State is a member of the NSF-funded Center for the Integration
of Research, Teaching, and Learning (CIRTL) Network, we will widely disseminate research and workshop findings and recommendations via network webcasts and coffee hours. Additional dissemination will be leveraged through the broader impacts network led by the University of Missouri, in which Iowa State plays a central role. Further leveraging will come through Iowa State’s linkages with NSF’s network of ADVANCE programs and the national network of Preparing Future Faculty programs. We will reach out to institutions having sparser infrastructures and support (such as those in EPSCoR jurisdictions, HBCUs, and HSIs) to involve them in the workshop and networks. Some of these institutions have also participated in COACHE, thus potentially offering new strategies accessible to them. We also anticipate that the results of the proposed workshop will lead to new ideas and collaboration in the research community.

3. Project Management and Timeline

The project team will consist of the principal investigator, Diane Rover; co-PIs Lisa Larson, Mack Shelley, Sandy Gahn and Beate Schmittman; project coordinator Megan Heitmann; and consultants Bonnie Bowen, Mariko Chang, Nancy Franz, and Susan Renoe. Team members are exceptionally qualified to work on this project, as shown in their biographical sketches. Consultant qualifications are summarized in Supplementary Documents. Team members bring a diversity of expertise, backgrounds and perspectives to the project. Represented among team members are multiple ranks of faculty, tenured and non-tenure-eligible faculty, administrators, staff, STEM faculty, social science and education researchers, internal ISU knowledge, non-ISU affiliations, experience at multiple institutions, and experience across numerous NSF grants.

Rover will be responsible for overall project management and leadership to ensure progress on and completion of project activities. Heitmann will assist the PI with project management and will coordinate workshop planning. Larson will lead the research study and provide SDT expertise. She will be responsible for designing and conducting the study. Shelley will collaborate on the study and provide modeling and policy expertise. He will lead evaluation activities, serving as internal evaluator on the project. Both Larson and Shelley will provide graduate student supervision and training. Gahn will be responsible for institutional data and provide assessment expertise. Schmittmann will advise the project from an administrative perspective and provide key linkages with administrative offices and policies. All principal investigators will meet regularly to coordinate activities. The team members, including consultants, will form a steering committee to plan the workshop. The consultants will also participate as thought leaders during and after the workshop. Each has deep expertise in critical areas of the project and is well-connected nationally with individuals, institutions and communities active in those areas.

The following timeline will be followed and elaborated on as the project proceeds.
Year 1, Fall 2014 (corresponding to a start date in September 2014):
- Management: Develop a complete logic model for the project and a workflow strategy.
- Research: Build the initial conceptual model.
- Workshop: Convene the steering committee, meet with ISU CP&M, and begin planning. Involve stakeholders early in the planning process. Decide on location and date.
Year 1, Spring 2015:
- Research: Examine and interpret the results of the prediction models on COACHE data.
- Workshop: Finalize workshop program. Detailed activities will proceed based on date selected.
Year 1, Summer 2015:
- Management: Complete annual evaluation and reporting.
- Research: Explore the data, add data, and validate the model. Write a data brief.
- Workshop: If held April 2015, then complete post-workshop activities, including a report. If to be held in Sep. 2015, then finalize workshop preparations.
Year 2, Fall 2015:
• Research: Continue to refine the model. Incorporate workshop findings.
• Workshop: If held Sep. 2015, then complete post-workshop activities. Meet with steering committee to plan CIRTL sessions as a follow-up to the workshop.

Year 2, Spring 2016:
• Research: Create institutional support recommendations based on findings.
• Workshop: Continue to disseminate workshop results and offer CIRTL sessions.

Year 2, Summer 2016 (corresponding to an end date in August 2016):
• Management: Complete final evaluation and reporting.
• Research: Write a policy brief.
• Workshop: Write a reflection on discussions held during year 2 including recommendations.

4. Project Evaluation
Evaluation will be conducted following the a-e-i-o-u model, with key evaluation questions organized in a manner that allows for various models of evaluation or methods of data collection. [25] This approach organizes evaluation questions into five areas: (1) Accountability: Did the project team do what it said it was going to do? Were the activities related to the goals and objectives of the project actually completed? (2) Effectiveness: How well did the activities meet the objectives of the project? Were the objectives accomplished, in light of the attitudes, opinions, and knowledge of the participants? (3) Impact: What changes and policy innovations have occurred as a result of the project? How are these changes related to the stated expected outcomes of the project? How have individual and group attitudes been changed? How have individual and group behavior been affected? What forms of institutional change have occurred? (4) Organizational context: Which structures, policies, or events affected the project, based on data collected from interviews with key personnel, focus groups made up of those most affected by the project, or analysis of survey data and project documents. What helped to achieve the goals and objectives of the project? What made it difficult to achieve project goals and objectives? (5) Unanticipated outcomes: What happened that was not planned for or expected? What threats exist to validity and reliability of the project data and how were those threats addressed?

5. Results from Prior NSF Support
HRD 0963584: I3: Strengthening the Professoriate at Iowa State University (SP@ISU): A Campus Network to Enable Strong Science and Diverse Communities, $1,248,727, 7/1/2010-6/30/2015.
Intellectual Merit: SP@ISU (www.spiisu.iastate.edu) supports faculty as they develop BI activities for NSF proposals, integrate these activities into their research program, and document their BI work for the promotion and tenure process.
Broader Impacts: Resources are provided/disseminated locally and nationally, contributing to stronger participation of both STEM and non-STEM faculty, postdoctoral scholars, and graduate students as they engage in broader impacts related to their research.

Intellectual Merit: ISU ADVANCE (www.provost.iastate.edu/isu-advance) utilized a multi-level collaborative effort to produce institutional transformation that aimed to result in the full participation of women faculty in STEM fields in the university.
Broader Impacts: One broader impact of ISU ADVANCE is the implementation of college level Equity Advisor positions and expansion from the original 3 colleges focused on STEM to all 7 colleges at the university; these positions are now funded by the colleges.
References Cited


