IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Annual Report – Year One

Strengthening the Professoriate @ Iowa State University

Report Period: 1 July 2010 – 30 June 2011

Report Prepared by:
Sharron Quisenberry (PI)
Bonnie Bowen (Co-PI)
Diane Rover (Co-PI)
Megan Heitmann
Sandra Norvell
Chitra Rajan

This material is based upon work supported by the National Science Foundation under Grant No. HRD-0963584. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

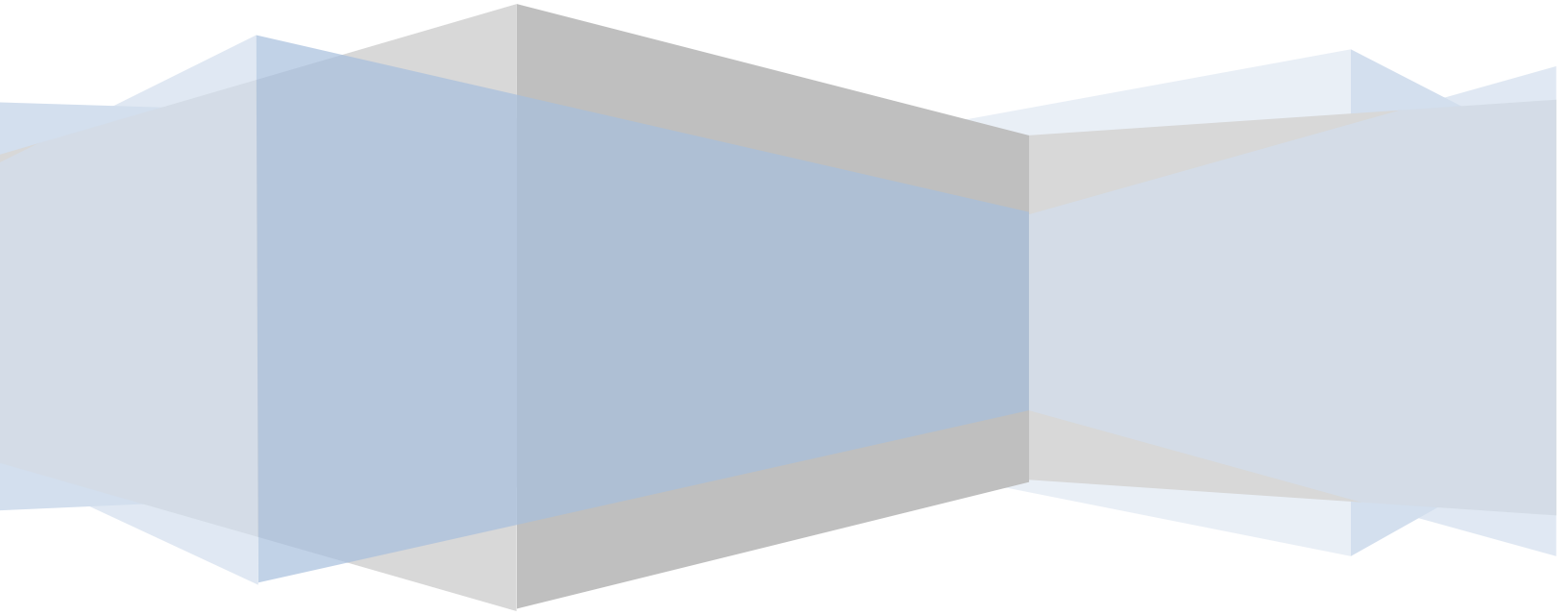


Table of Contents

I. Executive Summary

Strengthening the Professoriate at Iowa State University's (SP@ISU) mission is to support faculty, postdoctoral associates, and advanced graduate students in STEM as they develop broader impact activities for NSF proposals, integrate these activities into their research, and receive professional recognition for broader impacts work through the promotion and tenure process. The goal of SP@ISU is to strengthen the professoriate by enabling professional development in STEM, while promoting and enhancing a diverse community of scholars and learners.

To begin the project, we conducted a needs assessment with ISU faculty and staff to identify opportunities where SP@ISU could provide support to PIs as they prepare NSF proposals. Based on this assessment we developed and began implementing a plan to meet these needs.

SP@ISU has initiated some very innovative programming throughout this first year, and we will build on this throughout the remaining years of our award. We developed web resources that contain information about campus programs, literature to support broader impacts effectiveness, and to promote upcoming events. We have also established a network of experts on campus that we can refer PIs to for assistance in developing a broader impacts plan. We have offered multiple workshops as a means to provide this information to faculty.

Some of SP@ISU's most innovative ideas have come in the area of evaluation. We have partnered with Survey and Behavioral Research Services (SBRS) to provide a central place on campus that can support REU evaluation as well as pool resources from programs across campus to increase the assessment capability of any individual program. Our Internal Assessment Coordinator has been employing Social Network Analysis (SNA) to look at the social structure or relationships between different ISU faculty related to broader impacts initiatives. SP@ISU is also experimenting with the use of summative content analysis of broader impacts plans in proposals that have received NSF funding to help us understand the components of successful plans.

As we enter the second year of our award, SP@ISU will continue to build relationships with our partners in the STEM colleges, ISU internal organizations and departments, and administrators to expand on and develop programming that will foster an understanding and change in the culture, practices, and structure of the university as it relates to broader impacts efforts to enhance capabilities and success of faculty.

II. Participants

A. People

Sharron Quisenberry, Principal Investigator
Vice President for Research and Economic Development
Worked more than 160 hours

Dr. Quisenberry led all program planning and meetings. She represents the program at the highest administrative level to ensure recognition of the importance and cultural changes of broader impacts at the university. She has spoken and presented on behalf of SP@ISU at many university meetings and workshops.

Bonnie Bowen, Co-Principal Investigator
Executive Director – ISU ADVANCE Program
Worked less than 160 hours

Dr. Bowen participated in all program planning and meetings. She also acted as interim director for 2 months. Being in the position of Executive Director of ISU ADVANCE, she has provided a link to broadening participation activities on campus and is integral in the appointment and training of the college Equity Advisors.

Adin Mann, Former Co-Principal Investigator and SP@ISU Director
Worked more than 160 hours

Dr. Mann was an original Co-Principal Investigator and SP@ISU Director on the project before he left the university. He was responsible for setting up the office and procedures for working with faculty. He also set up the website, conducted the initial focus groups to gain baseline data for SP@ISU, and developed the framework for the combined REU Evaluation project.

Diane Rover, Co-Principal Investigator and SP@ISU Director
Professor of Electrical and Computer Engineering
Worked more than 160 hours

In addition to being a Co-PI on the project, Dr. Rover is also the Director for SP@ISU. She is responsible for implementing directives that result from PI Team meetings and Executive Steering Committee meetings. She is also responsible for development and planning of all training opportunities for faculty, evaluation efforts, and SP@ISU events. She also serves as the link to faculty on campus.

Megan Heitmann, SP@ISU Program Assistant
Worked more than 160 hours

Ms. Heitmann provides support to all aspects of the SP@ISU program. She assists in scheduling and providing agendas for meetings, maintaining the website, drafts reports and memos, organizes program workshops, and supports faculty who are preparing proposals.

Elizabeth Hoffman, Chair of the Executive Steering Committee
Executive Vice President and Provost
Worked less than 160 hours

Dr. Hoffman serves as a consultant for the National Science Board so to avoid a conflict of interest she has taken an advisory role on the SP@ISU project. She serves as the chairperson for the Executive Steering Committee and plays an active role in integrating broader impacts recognition into the promotion and tenure process.

Sandra Norvell, PI Team Member
Worked less than 160 hours

As the Grants Officer for the Center for Excellence in Arts and Humanities, Ms. Norvell provides the connection between SP@ISU and Non-STEM faculty on campus. She supports and promotes all program activities to these faculty members. She also participates in all SP@ISU PI Team meetings.

Jason Pontius, Internal Assessment Coordinator
Coordinator of Continuous Academic Program Improvement
Worked less than 160 hours

Dr. Pontius provides access to and assessment of all relevant ISU databases. He has been integral in providing frameworks to assess the culture of Broader Impact efforts on campus. He has also assisted in the development of the program's formal evaluation plan and will work with the External Evaluation Consultant to implement this plan.

Chitra Rajan, PI Team Member
Associate Vice President for Research
Worked less than 160 hours

Dr. Rajan participates in all SP@ISU PI Team meetings and provides support for the campus-wide REU evaluation effort that was created by SP@ISU. She has also helped organize workshops and has spoken on SP@ISU at university meetings.

Equity Advisors

Equity Advisors (EAs) are being established in the five STEM colleges and guide the development of a broader impacts culture among faculty, post doctoral scholars, and students. They also provide a valuable connection between the SP@ISU program and college administration. The EAs who served during the first year of SP@ISU include:

Katherine Bruna, Equity Advisor in the College of Human Sciences
Associate Professor of Curriculum and Instruction
Worked less than 160 hours

Kristen Constant, Equity Advisor in the College of Engineering
Professor of Materials Science and Engineering
Worked less than 160 hours

Susan Lamont, Equity Advisor in the College of Agriculture and Life Sciences
Charles F. Curtiss Distinguished Professor of Animal Science
Worked less than 160 hours

Lisa Larson, Equity Advisor in the College of Liberal Arts and Sciences
Professor of Psychology
Worked less than 160 hours

B. Collaborators

B.1. Mariko Chang, External Evaluation Consultant

Dr. Chang provides the external perspective to SP@ISU activities. She has developed the program's formal evaluation and will work with the Internal Assessment Coordinator to implement this plan.

B.2. Presenters at SP@ISU Workshops

Workshop on Developing the Broader Impacts Component of NSF Proposals

- Sharron Quisenberry, Vice President for Research and Economic Development
- Bonnie Bowen, SP@ISU Co-PI, Executive Director ISU ADVANCE
- Adah Leshem-Ackerman, Pre-College Education Director for NSF Engineering Research Center for Biorenewable Chemicals
- Alex Travesset, Associate Professor of Physics and Astronomy
- Malika Jeffries-El, Assistant Professor of Chemistry

NSF CAREER Awards Workshop

- Elizabeth Hoffman, Executive Vice President and Provost
- Sharron Quisenberry, Vice President for Research and Economic Development
- Chitra Rajan, Associate Vice President for Research
- Aaron Sadow, Assistant Professor of Chemistry
- Michael Kessler, Associate Professor of Materials Science and Engineering

NSF Broader Impacts Workshop: K-12 Education and Education Research

- Adah Leshem-Ackerman, Pre-College Education Director for NSF Engineering Research Center for Biorenewable Chemicals
- Connie Hargrave, Director of Science Bound
- Barbara Dougherty, Director of the Center for Excellence in Science, Mathematics, and Engineering Education
- Carol Heaverlo, Outreach Coordinator of the Program for Women in Science and Engineering
- Lora Leigh Chrystal, On-Campus Coordinator of the Program for Women in Science and Engineering

NSF Broader Impacts Workshop: Sampling of Opportunities

- Jean Goodwin, Associate Professor of English and Director of Science Communication @ ISU
- Leslie Hogben, Professor of Mathematics and Director of Diversity for the Mathematics Department
- Michelle Soupir, Assistant Professor of Agricultural and Biosystems Engineering

B.3. SP@ISU Partner Programs

The SP@ISU project collaborates with a number of ISU internal organizations and departments to share information and programming. These programs have worked on collaborative projects, participated in collaboration meetings, and presented at SP@ISU workshops. The SP@ISU partners include:

- Ames Laboratory
- Center for Excellence in Science, Mathematics, and Engineering Education (CESMEE)
- George Washington Carver Internship Program
- ISU ADVANCE
- ISU Honors Program
- Mathematics Department
- NSF Engineering Research Center for Biorenewable Chemicals (CBiRC)
- Office of Community College Research and Policy (OCCRP)
- Preparing Future Faculty (PFF)
- Program for Women in Science and Engineering (PWSE)
- Research Experience for Undergraduates (REU) Programs
- Research Institute for Studies in Education (RISE)
- Science Bound
- Science Communication @ ISU
- Student Enrollment and Engagement through Connections (SEEC)
- Summer Program for Enhancing Engineering Development (SPEED)
- Survey and Behavioral Research Services
- Four TRiO Programs

III. Activities

A. Overview of Project

Strengthening the Professoriate at Iowa State University (SP@ISU) has been funded by the National Science Foundation's Innovation through Institutional Integration (I^3) Program. The overall mission of the I^3 program is to integrate NSF-funded awards within or across institutions

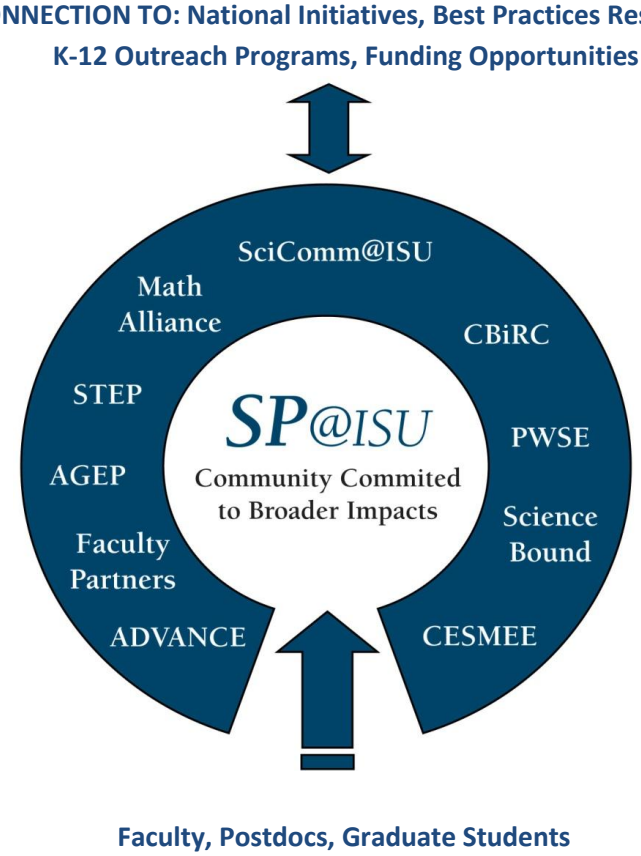
so that the whole is greater than the sum of its parts. The SP@ISU project has been funded for three years, with the possibility of renewal for an additional two years.

SP@ISU is a single point of contact for faculty, postdoctoral associates, and advanced graduate students in STEM to gain knowledge in developing quality broader impacts plans, and facilitates connections between researchers and resources to develop and implement these plans. The goal of SP@ISU is to strengthen the professoriate by enabling professional development in STEM, while promoting and enhancing a diverse community of scholars and learners.

Goals

1. Build on current NSF programs to increase efficiency and effectiveness of ISU programs to broaden participation in STEM
2. Create a clearinghouse of programs, resources, information, and a network of people to assist and guide in the development of a broader impacts culture at Iowa State University
3. Facilitate and enhance the knowledge base needed by faculty to develop well-researched broader impacts plans as part of their research enterprise
4. Develop protocols for assessment and evaluation of a faculty member's broader impacts initiatives for inclusion in the promotion and tenure process

Figure 1. Schematic Representation of Project



B. Project Activities Related to Goal 1

Goal 1: Build on current NSF programs to increase efficiency and effectiveness of ISU programs to broaden participation in STEM

This goal is meant to bring together existing programs on campus that work in areas of broader impactss, with special emphasis on those that work in areas of broadening participation and those that receive NSF funding. To achieve this goal, SP@ISU is facilitating communication and collaboration across partner programs. Possible outcomes for this goal are expansion of programs, collaborations between programs and less duplication in efforts or resources across programs.

B.1. University-wide Program Collaborations

Advisory Council Meeting

In October 2010 we had an initial Advisory Council meeting. This meeting was attended by faculty and staff who work with our partner programs and college administrators. We discussed topics such as: ways to assist faculty and PI groups, the types of partnerships that programs would like with faculty, information website, and areas of potential collaboration among the group. The idea of getting faculty and programs who work with K-12 outreach together to collaborate was generated from this meeting.

K-12 Collaboration Meeting

In response to a need that was identified in the initial Advisory Council meeting, SP@ISU organized a meeting of those faculty and programs on campus who work with K-12 outreach. We convened a meeting in November of 2010 and discussed the following topics:

1. Opportunities for expanding evaluation of the K-12 programs
2. Ways in which the existing programs can collaborate
3. Ways these programs support faculty
4. Additional funding opportunities

This initial meeting was very productive and attended by 21 faculty and staff members who work in this area. It was decided that the next step for this group was to develop a directory of information about these programs and people on campus and continue discussions to find areas of collaboration among the group. Since that time, a directory has been developed and SP@ISU has partnered with the Center for Excellence in Science, Mathematics, and Engineering Education (CESMEE) to organize further meetings with this group.

B.2. Partnerships with Other ISU Programs

Science Communication @ ISU (SciComm@ISU)

SciComm@ISU is a newly developed program that aims to support scientists and engineers who want to become more effective public communicators by deepening their

understanding of the roles expert knowledge can play in democratic decision-making. SciComm@ISU consists of a team of social science and humanities faculty who share a research interest on how science can contribute to policy controversies. Representatives from SciComm@ISU have presented their program at SP@ISU workshops and we have also held collaborative meetings to find areas where our programs can support one another. SP@ISU has collaborated on and provided support to SciComm@ISU's proposal to receive funding. SP@ISU expects SciComm@ISU to be an active partner in our efforts to support faculty.

Preparing Future Faculty (PFF)

PFF supplements departmental graduate preparation by offering new teaching, mentoring, and learning possibilities, which give postdoctoral fellows, Ph.D. students, and master's students further credentialing for a competitive academic job market. Initial collaborative meetings between SP@ISU and PFF in the fall led to PFF's effort to organize and submit a proposal to join the Center for the Integration of Research, Teaching and Learning (CIRTL) network initially started at the University of Wisconsin. The CIRTL mission is to "enhance excellence in undergraduate education through the development of a national faculty committed to implementing and advancing effective teaching practices for diverse learners as part of successful and varied professional careers." SP@ISU will provide the ISU CIRTL project with the link to contact and engage ISU faculty in their efforts to train graduate students to become quality STEM faculty.

B.3. Combined Research Experience for Undergrads (REU) Evaluation Project

SP@ISU has partnered with Survey and Behavioral Research Services (SBRS) to provide a central place on campus that can support REU evaluation as well as pool resources from programs across campus to increase the assessment capability of any individual program. This project also offers ISU the capacity to create a larger database of students who participate in summer research programs and track them longitudinally. This will result in more reliable data to show the impact of these programs, as well as making longitudinal and aggregated data available to support new proposals. More information regarding this program is in Appendix A.

C. Project Activities Related to Goal 2

Goal 2: Create a clearinghouse of programs, resources, information, and network of people to assist and guide in the development of a broader impacts culture at Iowa State University

To achieve this goal, faculty, postdoctoral associates, and graduate students are increasing their understanding of available literature on broader impacts topics, making connections with programs that have expertise in these areas, and starting to value the importance of broader impacts in their research. Possible outcomes for this goal are educating faculty on where they

can obtain literature on best practices, groups of faculty will vet this literature at study circles, and Equity Advisors will help guide the development of a broader impacts culture.

C.1. Database of Programs on campus

SP@ISU has created a database of programs on campus that work with broader impacts initiatives. This database contains information such as: description of the program, area of broader impacts the program works with, potential for partnerships with faculty, and contact information. This database is categorized according to areas of broader impacts and available to faculty via the SP@ISU website. Currently the database includes many ISU programs, but will grow as we continue to make partnerships with programs on campus.

C.2. Database of Literature

SP@ISU has started a database of literature that supports aspects of broader impacts. As our program continues, and more information is gathered, this database will grow. Faculty have access to this database via the SP@ISU website.

C.3. Network of People

SP@ISU has compiled a network of administrators, faculty, and staff who have expertise in areas of broader impacts. These people have expertise in many areas and have agreed to consult with faculty on their NSF proposals. SP@ISU staff refer faculty members to these experts based on individual consultations. With the new Social Network Analysis project we are working on (see Evaluation Activities) we hope this will point us to even more critical experts in broader impacts work.

C.4. Study Circles

During the fall 2010 semester, SP@ISU conducted two study circles that dealt with Graduate Education. The first was entitled, “Broadening Participation through Partnerships” and included examples and ideas for partnerships with faculty from minority serving institutions and partnerships with these institutions as a whole. The second was entitled, “Broadening Participation through Summer REU Programs” and included background research and examples of best practices to connect REU students to entry into graduate school. Both study circles reviewed current literature pertaining to these topics and were followed by lengthy discussions about what ISU could do to improve in these areas. The combined REU evaluation project (see section III.B.3.) developed out of the discussion at the second study circle. Eight faculty members attended these study circles.

C.5. Equity Advisor Appointment in the College of Human Sciences

An innovation central to the ISU ADVANCE program that is continuing through SP@ISU involves college Equity Advisors (EAs). The EAs guide the development of a broader impacts culture among faculty, postdoctoral scholars, and students. In the current ISU ADVANCE Program (2006-2011), the EAs play a central role in implementing the goals of the ISU ADVANCE Program and are the primary leaders of college-level efforts to transform STEM fields for women faculty and faculty of color. The EAs work with the departments in their colleges to bring about changes in culture, structures, and practices. The EAs provide leadership in the development and implementation of ADVANCE workshops and networking events in colleges and campus-wide. As part of the SP@ISU program, Equity Advisors will

continue their ISU ADVANCE activities and also lead activities to enhance broader impacts. While three colleges (Liberal Arts and Sciences, Agriculture and Life Science, and Engineering) currently had Equity Advisors under the ADVANCE program, the other two STEM colleges (Veterinary Medicine and Human Sciences) are also funding Equity Advisors as a part of SP@ISU. The College of Human Sciences recently appointed a faculty member as their Equity Advisor and it is projected that the College of Veterinary Medicine will appoint an Equity Advisor early in year 2 of the SP@ISU project.

D. Project Activities Related to Goal 3

Goal 3: Facilitate and enhance the knowledge base needed by faculty to develop well-researched broader impacts plans as part of their research enterprise

To achieve this goal, faculty, postdoctoral associates, and graduate students are increasing their knowledge of the broader impacts criteria, gaining skills to develop successful broader impacts plans, and these efforts will be sustained through multiple faculty members with multiple grants. The possible outcomes are increased attendance at broader impacts related workshops, increasing the offering of broader impacts related workshops, more positive evaluation of faculty's broader impacts components of their proposals, and faculty sustaining relationships with programs that have expertise in broader impacts areas.

D.1. Workshop Series

During year 1 of our project, SP@ISU hosted four workshops to provide opportunities for faculty, post-docs, graduate students, and staff to learn more about broader impacts and resources on campus that have expertise in these areas. All of the presentations that were given at these workshops are available on the SP@ISU website. Workshop surveys have been developed and disseminated, results are currently being collected. The presenters and their affiliations on campus are listed in section II.B.2 above.

Fall workshop on Developing the Broader Impacts Component of NSF Proposals (09/29/10)

Increased expectations by NSF for innovation and scholarship in broader impacts plans require faculty to increase collaborations, resources, and scholarship in the development of these plans. This workshop introduced faculty to SP@ISU, reviewed the current expectations at NSF, and presented specific opportunities at ISU to develop strong broader impact plans.

- Sharron Quisenberry, "Institutional Perspective"
- Bonnie Bowen, "What are Broader Impacts and Why are They Important to You?"
- Adah Leshem-Ackerman, "Broader Impact Resources available through CBiRC"
- Malika Jeffries-El, "CAREER Award: Broader Impact partnership with Science Bound"

- Alex Travesset, “CAREER Award: President’s Day Workshops for HS Physics Teachers”

NSF CAREER Awards Workshop (02/24/11)
Recent NSF CAREER grant awardees were recognized. Executive Vice President and Provost Elizabeth Hoffman spoke of the prestige of such an award and two recent recipients spoke of their experiences from idea creation to proposal submission.

- Michael Kessler, “NSF CAREER Proposal: Perspectives from a recent awardee”
- Aaron Sadow, “NSF CAREER Award Strategies and Tips”

NSF Broader Impacts Workshop: K-12 Education and Education Research (03/02/11)
Programs on campus that promote K-12 education and education research presented ways their programs can partner with faculty to develop successful broader impact plans.

- Adah Leshem-Ackerman, “Collaborations with CBiRC Through Broader Impacts”
- Connie Hargrave, “Science Bound”
- Barbara Dougherty, “SP: Center for Excellence in Science, Mathematics and Engineering Education”
- Carol Heaverlo and Lora Leigh Chrystal, “Examples of Broader Impact Collaborations with Faculty Members in Research Proposals”

NSF Broader Impacts Workshop: Sampling of Opportunities (03/08/11)
Faculty that have done extensive work in various areas of broader impacts presented their work and experiences. Topics included: Broadening Participation, Broad Dissemination, and Benefits to Society.

- Michelle Soupir, “Integrating Policy Implications into NSF Broader Impacts: Benefits to Society”
- Jean Goodwin, “Science Communication @ ISU”
- Leslie Hogben, “Links to Diversity Programs in Mathematics”

Table 1. *Information regarding participants of the workshops in February and March of 2011. (Participant information for the September 2010 workshop was not collected.)*

Total Participants	**58**
Participants by Rank	
Professor	2
Associate Professor	8
Assistant Professor	35
Postdoc Associate	7
Graduate Student	2
Staff Member	4
Participants in Non-STEM	10

D.2. Facilitated NSF TUES Webinars

SP@ISU facilitated two NSF TUES webinars in April that we felt would be beneficial to faculty as well as our own program staff.

Project Evaluation Workshop

The goal of this workshop session was to prepare faculty members to work with an evaluator to plan and implement an effective evaluation of an education research or development project. In pursuit of this goal, the session increased the participants' awareness of the role of goals and outcomes in the evaluation process, of the nature of the cognitive and affective outcomes, and of evaluation tools for monitoring these types of outcomes.

Mock Panel Review Workshop

This workshop engaged the participants in a mock panel review of an actual proposal submitted to the Transforming Undergraduate Education in STEM (TUES) Program. Participants read the proposal in advance and prepared an individual review identifying the strengths and weaknesses of the proposal in accordance with the NSF Review Criteria. The participants also rated the proposal in accordance with the NSF Rating System and provided recommendations for improvement. During the workshop session, the individual participants formed into review panels and discussed various elements of the proposal (e.g., Project Summary, Goals and Outcomes, Work Plan, Dissemination Plan, Evaluation Plan, and Broader Impacts) identifying strengths and weaknesses and suggesting ways to strengthen that particular element of the proposal. After this discussion, selected local workshop sites reported their findings to the larger group of participating institutions. Following these reports, the workshop presenter discussed the findings of the NSF/DUE Engineering Program Directors.

Table 2. *Information regarding participants of the NSF Webinars*

Total Participants	**12**
Participants by Rank	
Professor	2
Associate Professor	3
Assistant Professor	4
Postdoctoral Associate	1
Staff Member	2
Participants in Non-STEM	3

D.3. Working one-on-one with faculty and referral to campus programs

A service that SP@ISU provides faculty is assistance with forming a broader impacts plan within their NSF proposal. This assistance includes discussing what areas of broader impacts they might be interested in pursuing, connecting them with programs or faculty on campus who have

expertise in these areas, and providing them with information regarding NSF's broader impacts requirements. During our first year, SP@ISU assisted five faculty members in this way. As our program expands and awareness of our services grows, we anticipate helping more faculty on this basis.

E. Project Activities Related to Goal 4

Goal 4: Develop protocols for assessment and evaluation of a faculty member's broader impacts initiatives for inclusion in the promotion and tenure process

SP@ISU and University Administration are working to develop a clear protocol for faculty evaluation and review, one that values faculty involvement in programs and initiatives that contribute to broader impacts. This new P&T policy will allow ISU to reward a broad range of accomplishment and will continue to give us the tools to attract and retain up-and-coming scientists from diverse backgrounds. The policy will reward quality teaching and outreach in addition to innovative science. The development of new P&T protocols will be informed by the program evaluation. Specific evaluation efforts will be focused on the impact of faculty broader impact plans in order to demonstrate the impact of SP@ISU on the effectiveness of broader impact plans.

E.1. University Administration Support

Evaluation of a faculty member's broader impacts initiatives for inclusion in the promotion and tenure process is a topic that was discussed at length in SP@ISU's two Executive Steering Committee meetings, which the Executive Vice President and Provost chairs, during year 1. A key area for SP@ISU is to foster a broader impacts culture among department chairs. SP@ISU is working with the Associate Provost for Academic Personnel, Dawn Bratsch-Prince, and leveraging department chair training implemented through the ADVANCE Program.

F. Evaluation Activities

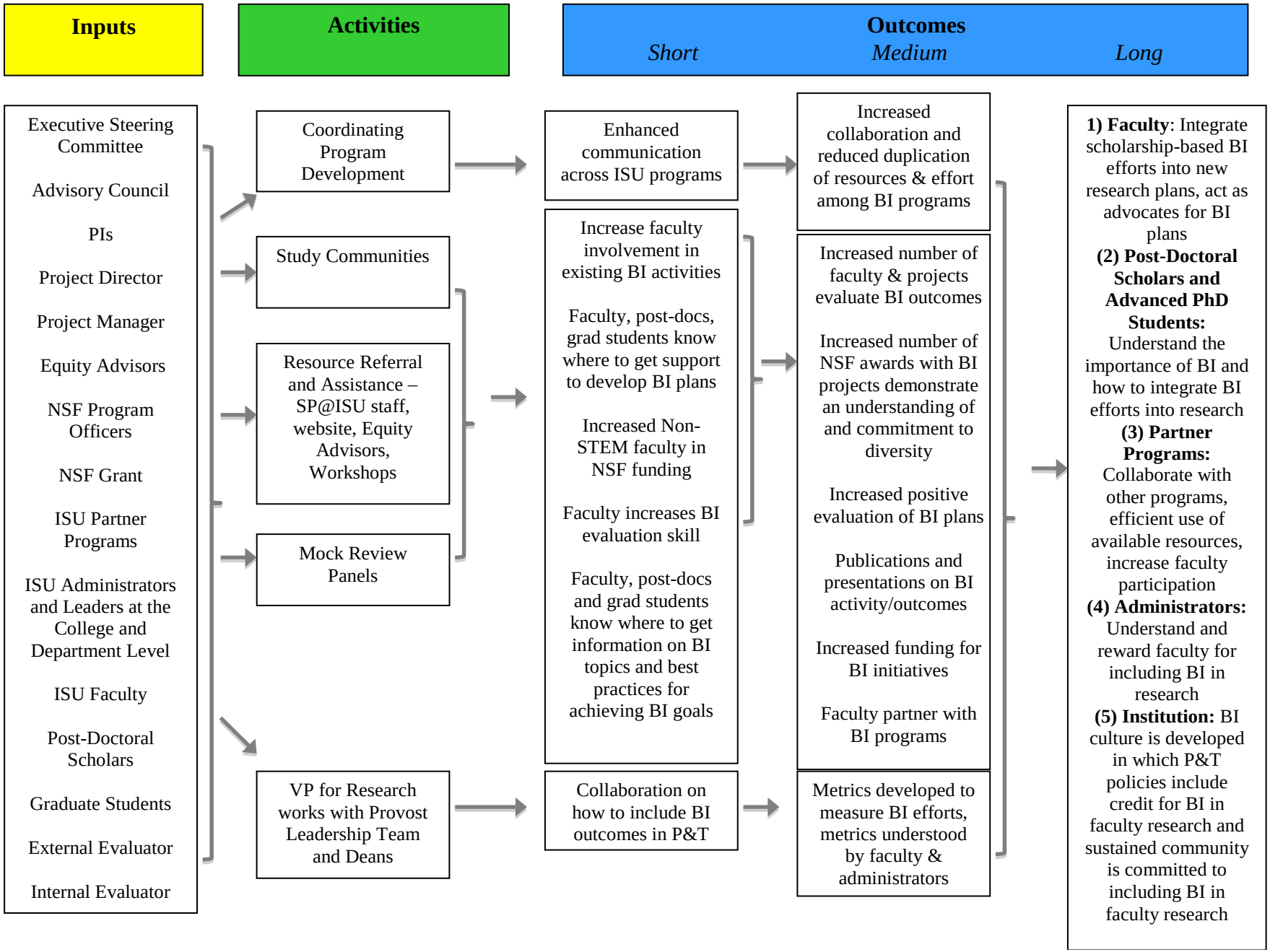
F.1. Development of the Evaluation Plan for SP@ISU

A formal evaluation plan was developed for SP@ISU. The External Evaluation Consultant, Mariko Chang, developed the plan with guidance and input from the PI Team. The full evaluation plan is Appendix B.

F.2. Logic Model

The initial logic model (that appears in the proposal) was developed by Kevin Saunders, the original internal evaluator for SP@ISU. After the program got started, it was expanded on by Adin Mann, SP@ISU's founding Director. After these two people left the program, the final logic model (as seen in Figure 2) was developed by Mariko Chang, External Evaluator, with input from Diane Rover, Jason Pontius, and Megan Heitmann.

Figure 2. SP@ISU Logic Model



F.3. Initial Focus Group Needs Assessment

In September 2010, program stakeholders including: administrators, senior program staff, and faculty took part in a needs assessment activity. The assessment was a series of focus groups with program stakeholders to determine knowledge of current programs, views about broader impact salience, strategies for enhancing efforts across programs, support needs, and attitudes regarding rewards/incentives. In addition, the focus groups provided stakeholders with initial program plans to solicit feedback about ways to enhance program development.

Table 3. *Information regarding the participants for the focus groups*

Total Participants	**31**
Administrators	**1**
Senior Program Staff	**6**
Faculty	**24**
Faculty by Rank	
Professor	9
Associate Professor	4
Assistant Professor	11

F.4. Social Network Analysis

Two outcomes of the Iowa State University SP@ISU project are enhancement of communication across ISU programs related to broader impacts and increased collaboration among broader impacts programs. To help measure these outcomes, SP@ISU is employing Social Network Analysis (SNA) to look at the social structure or relationships between different ISU faculty related to broader impacts initiatives. SNA provides a way to visualize relationships between people and groups that often are not normally apparent. In simplified terms, SNA helps map the different degrees of separation or connection people have with one another.

To address the issue of enhanced communication across ISU programs, we are using SNA to look at ISU faculty PIs and Co-PIs who have received NSF funding. SNA helps us pinpoint faculty who exhibit high levels of connection with other faculty. These highly connected individuals have had success on multiple grants and have worked with a variety of different faculty. They are ideal recipients for targeted information campaigns as they allow for maximized information distribution with a minimal number of contacts.

F.5. Content Analysis

As SP@ISU seeks to improve the ability of our faculty to write effective broader impacts plans, we sought to first understand the components of a successful plan. Toward that end, we are experimenting with the use of summative content analysis of plans in proposals that have received NSF funding. Content analysis is a qualitative methodology that looks at text data for keywords and content categories. If keywords or common phrases can be found in the plans of faculty who had their proposals funded, it may help determine a working definition of broader impacts and how that definition may have changed over time.

Our initial content analysis focuses on the publically available abstracts of NSF funded proposals. If content themes are found related to broader impacts, we may expand the content analysis to look at keyword differences between NSF proposals that were funded and those that were not.

G. Dissemination Activities

G.1. Joint Annual Meeting and Poster Presentation

Members of the SP@ISU PI Team attended the NSF Division of Human Resource Development Joint Annual Meeting in June 2011. The team members who attended were Diane Rover, Bonnie Bowen, and Megan Heitmann. SP@ISU also submitted and presented a poster for the Poster Session.

> **JAM11 Poster Presentation**
> Title: Strengthening the Professoriate @ Iowa State University
> Lead Author: Diane Rover
> HRD Program Affiliation: Innovation through Institutional Integration (I^3)
>
> Abstract:
> ***SP****@ISU*'s mission is to support faculty as they develop Broader Impact (BI) activities for NSF proposals, integrate these activities into their research, and receive professional recognition for BI work through the promotion and tenure process. To begin the project, we conducted a needs assessment with ISU faculty and staff to identify opportunities where SP@ISU could provide support as PIs prepare NSF proposals. Based on this assessment we developed a plan to meet these needs. We developed web resources that contain information about campus programs, literature to support BI effectiveness, and promotes upcoming events. We offered workshops as a means to provide this information to faculty.

The poster is Appendix C.

G.2. Participation in QEM Conference

The Quality Education for Minorities (QEM) Network will conduct a workshop focused on Broadening Participation for all Innovation through Institutional Integration (I-cubed) Projects that involved a broadening participation component. The workshop will focus on the plans/outcomes to date of NSF-funded I-cubed projects that elected to focus on the Initiative's Broadening Participation (BP) strand. At the workshop, the BP-focused projects will: (1) share their accomplishments, lessons learned, and experiences regarding challenges they have faced/are facing in project implementation to date; and (2) receive guidance and advice from evaluation experts on strategies they might use to further evaluate the effectiveness of their projects. SP@ISU is sending Bonnie Bowen and Craig Ogilvie to participate in this workshop. Bonnie Bowen will give a presentation on the SP@ISU program at the session entitled, "Accomplishments, Lessons Learned, and Challenges in Implementing an I3 Award with a Broadening Participation Strand." Members from Institutions with 2010 I-cubed start dates are presenting at this session.

IV. Findings

A. Focus Group Findings

After conducting the initial focus groups (as described in section III.F.3) and analyzing the transcripts, the major needs that were established by faculty input were as follows.

- Faculty lack knowledge on Broader Impacts Criteria.
- Faculty do not perceive that broader impacts are uniformly evaluated or valued.
- Faculty lack awareness of programs on campus that work in areas of broader impacts.
- Faculty have an interest in a centralized campus resource for information about and development broader impact plans.

B. Listing of NSF Grants

To identify PIs and Co-PIs who are working on NSF-funded grants or who have submitted proposals to NSF in the past year, SP@ISU worked with the Vice President for Research Office to create a listing of all active NSF awards and those proposals that were submitted to NSF from July 1, 2009 to June 30, 2010. This list was then divided based on large scale proposals and NSF Directorates proposals were submitted to. From this list we have developed an initial database of PIs to contact regarding workshops and developments within the SP@ISU program. We will also use this list to request unfunded proposals from PIs to perform some of our evaluation activities. This list will be updated every year.

C. Social Network Analysis Findings

Social Network Analysis (SNA) will also help us measure changes in collaboration over time. We have used snapshots of NSF grant recipients from 1991-2001 and also from 2002-2011 to look for changes in patterns of connection among faculty. The SNA graphs (Figures 3 and 4) suggest an increase in connectivity among NSF recipients in the last decade as compared to the previous decade. Using this NSF data and other ISU grant data as a baseline, SNA will help us identify a) if there are improvement in faculty collaboration on grants over time and b) determine if faculty who participated in SP@ISU programs exhibit improved levels of collaboration.

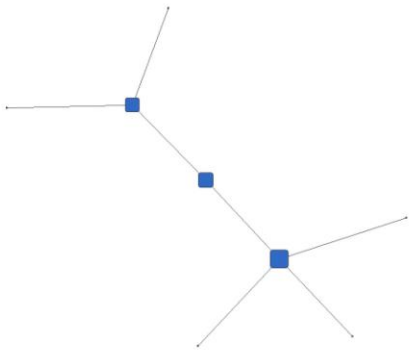


Figure 3. *Social network graph showing the major connections (i.e., main component) between NSF-funded Iowa State University PIs from 1991-2001. Node size reflects the number of times a PI connects pairs of other PIs who would not otherwise be connected (i.e. betweenness). Larger nodes indicate higher levels of betweenness.*

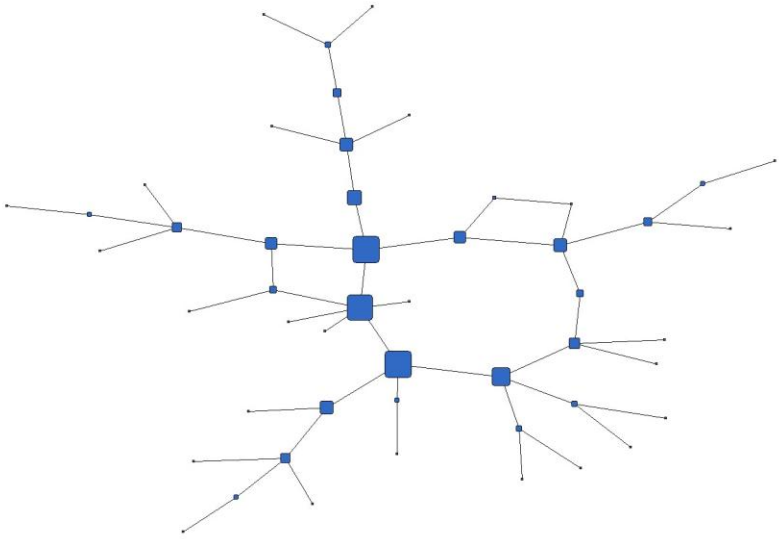


Figure 4. *Social network graph showing the major connections (i.e., main component) between NSF-funded Iowa State University PIs from 2002-2011. Node size reflects the number of times a PI connects pairs of other PIs who would not otherwise be connected (i.e. betweenness). Larger nodes indicate higher levels of betweenness.*

V. Project Training/Development

Faculty and staff involved with the project have increased their awareness and understanding of broader impacts opportunities on campus. This has resulted from networking activities on campus and at national meetings.

VI. Outreach Activities

SP@ISU's outreach activities extend to faculty and programs who are not involved in STEM disciplines. We have included such programs in our database and faculty in our network for STEM faculty to partner with when developing their broader impact plans. This population adds an area of expertise that STEM faculty may not be as strong in. Some non-STEM faculty have attended our workshops and webinars as evidence in Tables 1 and 2. Our hope is that more STEM and Non-STEM faculty will partner to develop NSF proposals.

VII. Contributions

The following table correlates our program goals with the areas we are contributing or plan to make contributions in the future. The sections within the table refer to activities that are described in the report above.

	STEM Discipline	Human Resource Development	Resources for Research and Education	Contributions beyond Science & Engineering
Goal 1: Build on current NSF programs to increase efficiency and effectiveness of ISU programs to broaden participation in STEM	Our efforts to increase collaboration among STEM Programs and NSF-funded programs will contribute to greater participation in STEM. (III.B.1.)		The REU Evaluation project we have started will become a major resource for our University and potentially others as well (III.B.3.)	By cultivating partnerships with programs outside of the STEM fields, we can create greater resources for all ISU faculty to collaborate in new and innovative ways (III.B.2.)
Goal 2: Create a clearinghouse of programs, resources, information, and network of people to assist and guide in the development of a broader impacts culture at ISU		By creating a network of experts, establishing Equity Advisors' relationships with faculty and having faculty study literature through study circles, we can offer more "best practice" research to faculty especially with regards to broadening participation. (III.C.3-5)	By creating a database of campus programs and a database of literature, faculty have access to resources that will assist them expanding their broader impacts efforts (III.C.1-2)	Our evaluation efforts with Social Network Analysis and Content Analysis will have many applications beyond just science and engineering. (III.F.4-5)
Goal 3: Facilitate and enhance the knowledge base needed by faculty to develop well researched broader impacts plans as part of		The workshops, webinars and one-on-one consulting contribute are providing faculty with resources to improve their knowledge on broader impacts efforts as well as connect them with programs on campus that have expertise in working with all areas of broader impacts. (III.D1-3)		

their research enterprise				
Goal 4: Develop protocols for assessment and evaluation of a faculty member's broader impacts initiatives for inclusion in the promotion and tenure process		Incorporating broader impacts work into the P & T process will provide faculty with recognition for their work and contribute to strengthening the professoriate at Iowa State. (III.E.1.)		

VIII. I^3 Matrix

The following table correlates the sections of the Annual Report with the areas that the Innovation through Institutional Integration (I^3) Program would like us to report on. The matrix was received by our PIs at the I^3 meeting in November 2010. To learn more about these activities, please refer to the sections of the report above.

	Broadening Participation	**Integration of Research and Education**	**Research and Evaluation**
Major Innovations: innovative programming, policies, and practices	III.C.4. Study Circles III.C.5. Equity Advisor Appointment in the College of Human Sciences	III.C.1. Database of Programs on campus III.C.2. Database of Literature III.C.3. Network of People	III.B.3. Combined REU Evaluation Project III.F.4. Social Network Analysis III.F.5. Content Analysis
Nature of institutional integration and new synergies created		III.B.1. University-wide Program Collaborations III.D.1. Workshop Series	
Other impacts expected to benefit the scientific or STEM education enterprise, build human capacity, or contribute to the larger society		III.B.2. Partnerships with Other ISU Programs	
Sustainable elements		III.E.1. University Administration Support	
Summary - Major findings to date, highlight of most exciting aspect of work to date	I. Executive Summary	I. Executive Summary	I. Executive Summary
Key "players" and partners to date	II.B.3. SP@ISU Partner Programs III.B.1. University-wide Program Collaborations III.B.2. Partnerships with Other ISU Programs		Survey and Behavioral Research Services (SBRS) Internal Assessment Coordinator

Appendix A

Evaluating the Effectiveness of STEM Enhancement Programs

An inadequate supply of workers who are qualified for employment in STEM fields presents a serious challenge to the long-term health of the US economy. The NSF has led a national effort to meet this challenge with the REU program comprising one component of this ambitious effort. Currently, NSF supports hundreds of REU Sites and thousands of REU Supplements. Each REU Site is required to conduct its own evaluation. However, the current evaluation approach has the following limitations: 1) the evaluation information collected at each site is not consistent across sites, 2) the typically-used evaluation designs, such as post-only or pre-post designs, are inadequate and provide limited or misleading information regarding program quality, effectiveness, and the extent to which stated NSF REU goals have been achieved, 3) the PI at each site often lacks the necessary resources to conduct a useful evaluation, and 4) potentially useful evaluation data at each site is currently not being collected, managed, and made accessible to other researchers for multi-site statistical analyses and program evaluation for STEM related educational research.

A comprehensive and unified REU evaluation system is proposed. This system will serve as a methodological model for the evaluation of other STEM enhancement programs. The main features of the proposed evaluation system are use of: 1) standardized online surveys given immediately after REU program completion combined with annual follow up surveys, 2) matched comparison groups of college students who have not participated in REU programs, and 3) recently developed statistical methods to statistically equate REU and comparison groups to approximate the causal effects of REU participation.

The online surveys and the data they produce will be managed by the Survey and Behavioral Research Services (SBRS) center at ISU. This center has experience and expertise in questionnaire design, online surveys, longitudinal data collection and management, program evaluation, and statistical reporting. A master database containing end-of-program and follow-up information from REU participants and comparison groups will be maintained by SBRS and this database (which will not contain any personal identifiers) will be accessible to any researcher interested in conducting REU or STEM research. SBRS will produce site-specific evaluation reports based on end-of-program and follow-up information for the PIs that include comparisons with non-REU and URA student groups.

After the evaluation system has been implemented and refined at ISU, a second phase will invite PIs from other universities to use the ISU REU evaluation system so that they may receive evaluation reports for their own REU and also have access to the master database for their REU and STEM research purposes. Other universities also will be invited to contribute names of their matched non-REU undergraduates to the comparison group database which will allow more detailed sub-group comparisons (e.g. by sex, minority status, class standing, discipline, type of university, etc.) for all REU Site and Supplement evaluations and future STEM research.

The benefits of the proposed evaluation system are numerous: the evaluations will be based on a multiple-group longitudinal design which is a much stronger design than the typically used post-only or pre-post designs; the PI's burden of program evaluation is greatly reduced and the PI will have access to a much richer data set for more detailed and informative evaluation analyses; the standardized surveys will allow detailed comparisons across specific REU sites to determine what types of activities are most effective for certain types of students; and the availability of the master database will provide a valuable data repository that will increase in size over time and provide valuable information for future STEM and REU research.

Appendix B

EVALUATION PLAN – STRENGTHENING THE PROFESSORIATE AT IOWA STATE UNIVERSITY (SP@ISU): A CAMPUS NETWORK TO ENABLE STRONG SCIENCE AND DIVERSE COMMUNITIES

Submitted by:
Mariko Chang, PhD
mchang19@gmail.com
978.844.3529

April 10, 2011

Table of Contents

I. Project Overview

Strengthening the Professoriate at Iowa State University (SP@ISU) has been funded by the National Science Foundation's Innovation through Institutional Integration (I3) Grant. The overall mission of the I3 grants is to integrate NSF-funded awards within or across institutions so that the whole is greater than the sum of its parts. The SP@ISU project has been funded for three years, with the possibility of renewal for an additional two years.

SP@ISU seeks to strengthen university-wide and faculty efforts to develop rigorous and effective activities that will strengthen Broader Impact (BI) programs and develop tools so that faculty efforts that support Broader Impacts are recognized in a rigorous manner in the Promotion and Tenure process. The following BI Criterion are the focus of SP@ISU:

1. How well does the activity advance discovery and understanding while promoting teaching, training, and learning?
2. How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)?
3. Will the results be disseminated broadly to enhance scientific and technological understanding?

The program goals include:

1. Build on current NSF programs to increase efficiency and effectiveness of ISU programs to broaden participation in STEM
2. Create a clearinghouse of programs, resources, information, and network of people to assist and guide in the development of a Broader Impact (BI) culture at Iowa State University
3. Facilitate and enhance the knowledge base needed by faculty to develop well-researched BI plans as part of their research enterprise
4. Develop protocols for assessment and evaluation of a faculty member's BI initiatives for inclusion in the promotion and tenure process

To achieve these goals, the SP@ISU Program will implement the following program elements:

1. Coordinating Program Development: SP@ISU Program Office will facilitate communication and collaboration across partner programs
2. Create a clearinghouse of programs, resources, information, and network of people to assist and guide in the development of a broader impact culture at Iowa State University
3. Provide referral and assistance to faculty, post-docs, and advanced graduate students with developing BI statements and research, providing access to literature on BI, and connecting him/her to an appropriate ISU program. Office staff and a program website will help disseminate information and make referrals
4. Equity Advisors will provide a link between the SP@ISU program and leadership of the colleges. Equity Advisors will help disseminate information and best practices and assist with the implementation strategies and activities of the SP@ISU Project
5. Form Study Communities to investigate topics related to BI.
6. Hold workshops to educate and assist faculty in developing strong BI initiatives in their own proposals.
7. Mock Review Panels will be held to give faculty experience evaluating BI proposals and improve their ability to develop their own BI plans.
8. Work with university administrators to create metrics and assessment tools so that a

faculty member's contributions to broadening participation will be included in promotion and tenure reviews

II. Logic Model

The process of program evaluation is often displayed using a program "logic model." The logic model is a conceptual representation of the relationship between inputs, activities, and desired outcomes. Inputs include the resources mobilized to support the project and include financial resources as well as personnel who contribute to the project. Activities consist of efforts undertaken by the project to achieve the desired outcomes. Outcomes are divided into short-term, medium-term, and long-term.

The logic model guiding the evaluation is presented in Figure 1 on page 8.

III. Evaluation Activities

As the external evaluator, Dr. Mariko Chang will provide both formative and summative evaluation to assist the SP@ISU project team with the successful implementation and evaluation of project activities.

The following major questions (based on the program goals) will be addressed by the evaluation:

1. Are programs within the SP@ISU network working towards increased collaboration and reducing the duplication of efforts and resources?
2. Do faculty, post-docs, and advanced graduate students have an increased understanding of (1) the available literature on BI topics, (2) best practices for achieving BI goals, and (3) report a university climate that values BI goals?
3. Do faculty members, post-docs, and advanced graduate students have an increased understanding of BI criteria?
4. Do faculty develop well-researched BI plans as part of their research enterprise?
5. Are BI efforts sustained by the university through multiple faculty members with multiple grants?
6. Are BI metrics being integrated into ISU's promotion and tenure process?
7. Is the project being implemented effectively and according to schedule?
8. Are best practices and findings being disseminated?

Methods of Evaluation:

Observation: Possible observation of program activities, such as mock review panels, workshops, or study communities. The goal of the observations will be to assess and refine the evaluation plan and provide formative information to the project team to facilitate the success of the project.

Interviews and/or Focus Groups: To obtain specific feedback on the process and outcomes of the project, Dr. Chang will conduct interviews and/or focus groups with numerous stakeholders, including senior staff of involved programs, administrators, Equity Advisors, STEM faculty (early, mid-career, senior), post-docs, and advanced graduate students. Some interviews may be digitally recorded (with participant permission and IRB approval) and transcribed but to assure the anonymity of those interviewed, ISU will not have access to the digital recordings or transcripts.

Workshop Surveys: Workshops will be evaluated using participant surveys that will measure satisfaction with topic and format, the extent to which information was useful, and general feedback to inform the development of future workshops. The surveys may be conducted by the internal evaluator, but results will be made available to Dr. Chang

Mock Review Panels: In addition to providing BI review experience that should increase faculty members' ability to develop strong BI components for their own research proposals, Mock Review Panels might be used to determine if faculty ability to evaluate BI plans improves over the course of the grant.

Expert Review Panel: A panel of 4-5 BI experts will compare faculty reviews of BI from the Mock Review Panels with their reviews to track improvement in faculty ability to review BI proposals. The Expert Review Panel may also review BI proposals submitted to NSF by ISU faculty over the course of the grant to evaluate faculty improvement in BI plans over time.

Content Analysis: Content analysis of BI plans in proposals will be conducted to evaluate characteristics (terms, phrases, number of disciplines, etc.) that are associated with funding decisions. Content analysis may also be used to track how BI proposals change over time and provide a metric to quantify faculty BI efforts.

Other Sources of Data:

Program Documentation: Records of participation will be kept for all program elements, including information on participants' gender, faculty rank, race, and department when applicable.

University Documentation: Documents pertaining to tenure and promotion review will be made available to Dr. Chang to assess the integration of Broader Impacts metrics into promotion and tenure review processes.

Documentation of BI initiatives in research proposals: The internal evaluator will collect information on the BI initiatives in faculty research proposals, such as the amount of funding received, NSF evaluation of BI initiatives in proposals, number of faculty connections to Minority-Serving Institutions, involvement of Non-STEM faculty in STEM-funded projects, number of BI efforts sustained by multiple faculty members with multiple grants, and faculty collaboration on BI efforts.

Other Institutional Data: Department-level data on STEM faculty demographics (such as number of faculty by rank and sex) will be provided to Dr. Chang by ISU's Office of Institutional Research

or the internal evaluator. The data will be used to measure the scope of participation in program activities across the university.

Table 1 (see page 8) outlines the program goals, program elements, major evaluation questions, possible outcome measures, and methods of evaluation that will be undertaken to provide both formative and summative project evaluation.

Additional Contributions:

In addition to the program outcomes elaborated in the proposal, it is likely that the program will facilitate other positive contributions (i.e., spillover) that are not part of the original goals. Some possible contributions include:

- Underrepresented Minorities (URM)/female students more likely to be mentored by faculty participating in SP@ISU
- URM/female students more likely to be recruited by faculty participating in SP@ISU
- Decrease in feelings of isolation for faculty engaged in BI initiatives
- Improved opportunities for STEM faculty to network
- Faculty develop new research collaborations
- Department and university climate improves for faculty involved in BI initiatives
- Integration of BI research or initiatives into teaching/education
- Increased faculty awareness of NSF-funded programs and other university programs with goals to broaden participation in STEM

IV. Timeline of Evaluation Activities

Year 1

January-April 2011:

Conversations with Project Leadership and Internal Evaluator to assist with the completion of project logic model, evaluation plan, evaluation methodology, reporting timeline, identification of internal data necessary for evaluation, and discussion of data collection instruments and protocols. Planning of initial on-site meeting of external evaluator with Project Leadership and meetings or focus groups with stakeholders to conduct a needs assessment. Collaboration with internal evaluator on the collection of baseline indicator data will be discussed.

May-August 2011:

Continued communication with project leadership and internal evaluator regarding program implementation and the collection of baseline data by the internal evaluator.

September-November 2011:

Formative evaluation, including a multi-day visit to ISU to collect additional data using interviews and focus groups with senior staff of each organization within the SPISU Network, SP@ISU project leadership, STEM faculty, post-docs, and advanced graduate students.

December 2011:

External evaluator provides first annual report.

Years 2-5:
Evaluation for Years 2-5 will involve the same basic structure, except the evaluation in Year 5 (if funded) will be far more extensive. Formative evaluation will occur in earlier years and summative evaluation will occur in Year 5. In years 2-3, evaluation will contribute to the goal of securing funding for Years 4 and 5.

January-May:
On-site meeting with SP@ISU leadership and internal evaluator to develop additional evaluation materials and protocols for that year, including additional data collection to be conducted by the internal evaluator.

September-December:
Multi-day site visit to ISU to conduct evaluation of that year, including focus groups and interviews with each partner program, STEM faculty, post-docs, and advanced graduate students.

December:
External Evaluator provides annual report to SP@ISU team.

V. Breakdown of Tasks: SP@ISU Staff, Internal Evaluator, and External Evaluator

SP@ISU staff is responsible for the following:

1. Maintain records of the following:
   - ISU faculty and staff participating in SP@ISU broader impact programs
   - URM students recruited and mentored by SP@ISU faculty
2. Provide internal and external evaluator with faculty examples (ISU or otherwise) that exemplify outstanding integration of Broader Impacts into their work.
3. Disseminate workshop surveys at different SP@ISU events (in paper form or web link).
4. Write the SP@ISU annual report to NSF incorporating substantial contributions by the internal and external evaluators.

Internal evaluator will provide:

1. Content analysis of BI terms and phrases used in NSF grant proposals, in cooperation with the Research Institute for Studies in Education (RISE). Where possible, BI statements will be compared across the following groups:
   - proposals that received funding versus those that did not
   - proposals that received annual funding above the median amount versus below the median
   - successful proposals that included PIs from multiple disciplines versus those that did not
   - successful proposals with PIs from both STEM and non-STEM disciplines versus those with only STEM PIs
2. Analysis of workshop surveys (in close collaboration with the SP@ ISU). Survey results will be provided in a timely manner to SP@ISU staff and the external evaluator to allow for adjustments in response to feedback.

3. Work with the SP@ISU staff and external evaluator to create a series of metrics, guided by NSF grant BI content analysis, to quantify ISU faculty BI efforts. Such measurable activities may include:
    - Campus presentations of applied research or applications of research (e.g., brown bag lunch presentations, ISU CELT seminars (Center for Excellence in Learning and Teaching))
    - Work with groups at all education levels (e.g., serving on a local science center board, extension office, guest lecturing or mentoring students at a K-12 institution, presenting to Preparing Future Faculty (PFF) students)
    - Significant involvement with ISU grants programs (e.g., ADVANCE, STEP, PFF) that promote broader impacts (as measured by committee or advisory board membership or inclusion in "Key Personnel" on ISU IRB applications).
    - Presentations at local and national conferences identified as promoting Broader Impacts (as defined in collaboration with SP@ISU staff)
    - Presentation/discussion of research in venues intended for a general public (e.g., articles or opinion pieces in newspapers, magazine articles, appearances on television or radio shows)
    - Planning conferences or presenting research at conferences outside one's academic discipline (e.g. student success conferences, diversity conferences)
    - Providing testimony or policy briefs related to research to local, state, or federal government agencies and/or officials.
    - Publication of work in journals that emphasize scholarship of teaching and learning or student learning outcomes.
    - Participation in or coordination of programs that promote student research (e.g., Research Experiences for Undergraduates (REU))
4. Work with external evaluator to provide an analysis of faculty collaboration on BI efforts (including changes in collaboration over time) using SP@ISU participation records, BI metrics, and faculty grant and publication data.
5. Serve as liaison between the external evaluator and the ISU Office on Institutional Research (IR) to provide department-level demographic data on ISU STEM faculty.

The external evaluator will provide:

1. Observation of program activities (e.g., mock review panels, workshops, or study communities) to provide formative information and help assess and refine the evaluation plan.
2. Conduct interviews and/or focus groups with numerous stakeholders to obtain specific feedback on the process and outcomes of the project.
3. Review and analyze results from workshop surveys.
4. Review results of content analysis.
5. Analysis of ISU STEM faculty department-level demographic data to measure the scope of participation in program activities across ISU.
6. Work with SP@ISU staff and internal evaluator on the creation of metrics to measure faculty BI efforts.
7. Work with internal evaluator to provide an analysis of faculty collaboration on BI efforts (including changes in collaboration over time) using SP@ISU participation records and feedback from interviews and focus groups.

8. Work with SP@ISU staff and internal evaluator to create a series of metrics, guided by NSF grant BI content analysis, to quantify ISU faculty BI efforts.
9. Provide the SP@ISU team with formative evaluation to assist with planning, efforts, measurement, and effectiveness of program activities and goals.
10. At the end of the grant term, provide a summative evaluation to evaluate the effectiveness of activities and whether program goals have been achieved.
11. Annual report of external evaluation activities.

Table 1. SP@ISU Program Goals, Program Elements, Possible Outcome Measures, and Methods of Evaluation.

Program Goals	Program Elements	Major Evaluation Questions	Possible Outcome Measures	Evaluation Methods
Build on current NSF programs to increase efficiency and effectiveness of ISU programs to broaden participation in STEM	Coordinating Program Development	Are partner programs working towards increased collaboration and reducing the duplication of efforts and resources?	Programs report coordinating resources Programs report less duplication in efforts or resources across programs Reported expansion of programs New collaborations between programs Programs report increase in sustainability	Interviews and/or Focus groups -directors of partner programs -SP@ISU staff/director
Create clearinghouse of programs, resources, information, and a network of people to assist and guide in the development of a BI culture at ISU	College Equity Advisors Study Communities -study available literature on BI topics, including best practices	Do faculty, post-docs, and advanced graduate students have an increased understanding of (1) the available literature on BI topics, (2) best practices for achieving BI goals, and (3) report a university climate that values BI goals?	Number of Study Community participants Faculty, post-docs and students report knowing where to get information and resources pertaining to best practices for achieving BI goals Study Community participants, other faculty, post-docs, and students find the information and literature on BI topics useful and informative Faculty, post-docs and students report a department and university climate that values BI goals. Study Community participants develop plans based on the literature and vetted by members of the study group	Interviews and/or Focus Groups -STEM faculty - Non-STEM faculty -Post-Docs -ABD grad students -Equity Advisors -Study Community participants -SP@ISU team Surveys of BI Study Communities Possible observation of Study Community groups
Facilitate and enhance the knowledge base needed by faculty to develop well-	Training the Next Generation of Faculty Resource, Referral, and Assistance	Do faculty, post-docs, and advanced graduate students have an increased understanding of BI criteria?	Number of faculty, post-docs, and graduate students participating in workshops and Mock Review Panels Faculty, post-docs and students report	Interviews and/or Focus Groups -STEM faculty -Non-STEM faculty -Post-Docs

researched BI plans as part of their research enterprise	-Website -Office staff -Equity Advisors -Workshop Series -Mock Review Panels		knowing where to get BI information and resources to assist with the development of BI plans as part of their research enterprise Faculty, post-docs, and students use the information and assistance of the program and find it useful Review of BI merit in proposals improves Number of research proposals with BI initiatives funded Amount of external funding for projects with BI initiatives Increased positive evaluation of BI plans from NSF ISU Faculty are strong reviewers of BI criteria	-ABD grad students -SP@ISU team -Equity Advisors -Mock Review Panel participants Surveys of Workshop/Mock Review Panel participants Possible observation of Workshops and Mock Review Panels Documentation of Expert Review Panel assessment of BI plans written by ISU faculty Content analysis of BI terms and phrases in proposals
		Do faculty develop well-researched BI plans as part of their research enterprise?	Faculty report working with a developed BI emphasis rather than pulling together a plan for each proposal. Faculty report integration of research with BI initiatives Faculty partner with other successful BI efforts/programs on campus Number of faculty connections to Minority-Serving Institutions (related to their BI initiatives) Number of conference presentations on BI activity/outcomes	Records of BI initiatives in research proposals Information received from faculty members submitted research proposals Faculty activity reports (presentations and publications on BI activity outcomes)

		Are BI efforts sustained by the university through multiple faculty members with multiple grants?	Number of scholarly publications on BI activity outcomes by STEM faculty Increased involvement of Non-STEM faculty in STEM funded research as BI experts Number of BI efforts sustained by multiple faculty members with multiple grants Faculty collaboration on BI efforts Faculty intention to sustain BI efforts across projects and/or over time	
Develop protocols for assessment and evaluation of a faculty member's broader impact initiatives for inclusion in the promotion and tenure process	Vice President for Research will work with Provost Leadership Team and Deans regarding P&T	Are BI metrics being integrated into ISU's P&T process?	Assessments tools and metrics have been developed to quantify a faculty member's contributions to broadening participation BI outcome measures part of yearly activity measures across ISU ISU develops new or revised policies, guidelines, and practices for P&T that include credit for broader impacts in faculty research Faculty understand of how BI will be evaluated by the university Those conducting faculty evaluations understand how BI will be measured and incorporated into the evaluation Faculty and administrators report institutional commitment to and valuing of participation in BI activities	Interviews and/or Focus Groups -Faculty -Equity Advisors -VP for Research and other university administrators -SP@ISU team Review of P&T documentation and policies

			University administration commitment to sustainability of BI metrics as an integral component of the P&T process	

Appendix C

IOWA STATE UNIVERSITY

NATIONAL SCIENCE FOUNDATION
INNOVATION THROUGH INSTITUTIONAL INTEGRATION

Strengthening the Professoriate @ Iowa State University

Iowa State's Broader Impacts Resource • http://www.spisu.iastate.edu

What is SP@ISU?

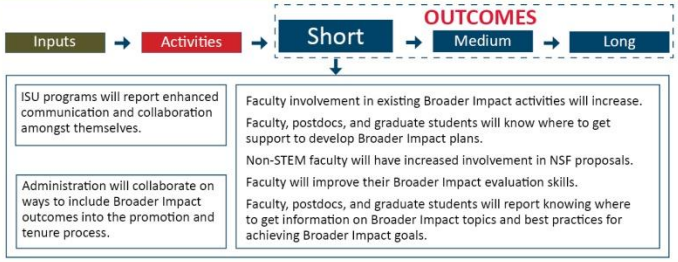
SP@ISU is a single point of contact for faculty, postdoctoral associates, and advanced graduate students in STEM to gain knowledge in developing quality Broader Impact plans, and facilitates connections between researchers and resources to develop and implement these plans. The goal of SP@ISU is to strengthen the professoriate by enabling professional development in STEM, while promoting and enhancing a diverse community of scholars and learners.

- Build on current NSF programs to increase efficiency and effectiveness of ISU programs to broaden participation in STEM
- Create a clearinghouse of programs, resources, information, and network of people to assist and guide in the development of a Broader Impacts culture at Iowa State University
- Facilitate and enhance the knowledge base needed by faculty to develop well-researched Broader Impacts plans as part of their research enterprise
- Develop protocols for assessment and evaluation of faculty Broader Impacts initiatives for inclusion in the promotion and tenure process

What are Broader Impacts and Why are they Important?
"Proposals submitted to the National Science Foundation are evaluated through use of two merit review criteria, which all proposals must address explicitly. Experience shows that while most proposers have little difficulty responding to the criterion relating to intellectual merit, many proposers have difficulty understanding how to frame the broader impacts of the activities they propose to undertake." NSF Merit Review Broader Impacts Criterion: Representative Activities

http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf

Logic Model



Partnerships & Activities

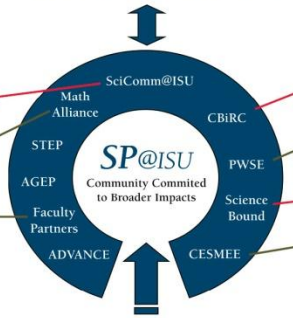
SP@ISU held a series of workshops to inform faculty, postdocs, and graduate students of Broader Impact opportunities and resources on campus. The first workshop recognized recent NSF CAREER grant awardees and highlighted the process of attaining such an award. Two additional workshops highlighted SP@ISU partners and informed faculty of resources they may utilize.

NSF Broader Impacts Workshop: Sampling of Opportunities
Presenters: Faculty who have done extensive work in various areas of broader impacts. Topics included Broadening Participation, Broad Dissemination, and Benefits to Society.

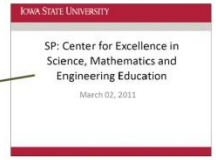
NSF CAREER Awards Workshop
Recent NSF CAREER grant awardees were recognized. Executive Vice President and Provost Elizabeth Hoffman spoke of the prestige of such an award and two recent recipients spoke of their experiences from idea creation to proposal submission.

A schematic representation of SP@ISU as a gathering place to connect with external resources through NSF-funded and other campus programs with a goal of fostering and maintaining a broader impacts culture.

CONNECTION TO: National Initiatives, Best Practices Research, K-12 Outreach Programs, Funding Opportunities



Faculty, Postdocs, Graduate Students



NSF Broader Impacts Workshop: K-12 Education and Education Research
Programs on campus that promote K-12 education and education research presented ways their programs can partner with faculty to develop successful Broader Impact plans.

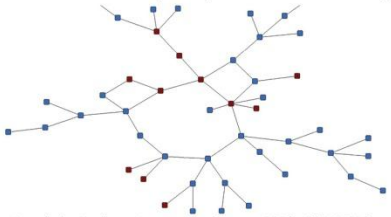
Evaluation

Focus Groups to Assess Faculty Needs
In the Fall of 2010, SP@ISU conducted a series of focus groups with program stakeholders (including program administrators and all levels of faculty in STEM) to determine their knowledge of current programs, their views on Broader Impacts, and their strategies for enhancing efforts across programs.

Major Needs Established by the Focus Groups Included:

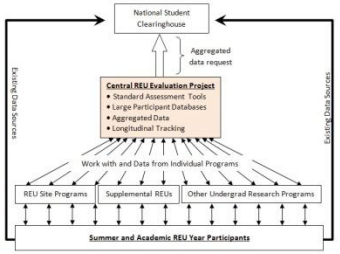
- Faculty lack awareness of existing programs on campus
- Faculty lack knowledge on Broader Impacts criteria
- Faculty want a centralized campus resource for developing Broader Impact plans

Social Network Analysis: Importance of Statistics Faculty



A graph showing the major connections between NSF-funded ISU PIs from 2002-2011. Red nodes indicate ISU faculty from the Department of Statistics. Consider how many blue nodes would no longer be connected to the main component if the red nodes were removed. *The names associated with the nodes have been removed for anonymity*

Combined REU Evaluation Project
SP@ISU has partnered with Survey and Behavioral Research Services (SBRS) to provide a central place on campus that can support REU evaluation as well as pool resources from programs across campus to increase the assessment capability of any individual program. This project offers ISU the capacity to create a larger database of students who participate in summer research programs and track them longitudinally.



PI Team
Sharron Quisenberry, PI
Bonnie Bowen, Co-PI
Diane Rover, Co-PI
Chitra Rajan
Sandra Norvell
Megan Heitmann

Evaluators
Jason Pontius, Internal
Mariko Chang, External

College Equity Advisors
Kristen Constant, Engineering
Lisa Larson, Liberal Arts and Sciences
Susan J. Lamont, Agriculture and Life Sciences
Katherine Bruna, Human Sciences

Grant No. HRD-0963584, July 2010 - 2015
This material is based upon work supported by the National Science Foundation under Grant No. HRD-0963584. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

June 2011