

Institutions Developing Excellent in Academic Leadership–National (IDEAL-N)

Introduction: Present State of Knowledge

Fifty years after the passage of the 1963 Equal Pay Act and the deliberations of the 1963 President's Commission on the Status of Women, women's participation in science and engineering (S&E) remains an urgent topic of national concern (National Academies 2007a, 2007b). Academic S&E disciplines have been especially intransigent to the participation and advancement of women faculty, even as their numbers have grown in undergraduate and graduate enrollment and as advanced degree recipients (Burke & Mattis 2007; Carnes, Handlesman & Sheridan, 2005; Etkowitz, Kemelgor, Neuchatz & Uzi 1994; Moss-Racusin, et al., 2014; National Academies 2007b; NSF 2014a-c; Towns, 2010). Women represent a mere 35% of all faculty in S&E with only a 6% growth in their ranks from 2000 to 2010 (totaled across reported disciplines; NSF, 2014c). Within departments the majority of women fill instructor or assistant professor positions, with just 19% advancing to tenured full professor positions (Burrelli, 2008; Powell, 2007). Minority women constitute a scant 8% of the total S&E faculty, and less than 3% of tenured full professorships (NSF, 2013b). Figures for faculty with disabilities (both women and men) are similarly low at 8% of the total S&E faculty (NSF, 2013a-b).

Recent writings have noted the slow pace of improvement and persistent institutional barriers to change facing women and minorities in S&E (e.g., Bilimoria & Liang, 2012; Burke & Mattis, 2007; National Academies 2007b; Rosser, 2004; NSF *ADVANCE* guide; Stewart, Malley & LaVaque-Manty, 2007). The NSF *ADVANCE* program, instituted in 2001, has sought to remove the barriers through a variety of pioneering, institution-centered awards recognizing that simplistic, ad hoc, or piecemeal solutions cannot eradicate systematic, historical, and widespread gender inequities (Bilimoria, Joy & Liang, 2008). Instead, a comprehensive transformation of the organizational systems, structures, processes, and practices that perpetuate inequity is needed (McCracken, 2000; Meyerson & Fletcher, 2000; Thomas & Ely, 1996).

Institutions Developing Excellence in Academic Leadership–National (IDEAL-N) addresses the national concerns for equitable recognition and promotion of the intellectual talents of *all* S&E faculty members by creating knowledge about, sharing, adapting, and evaluating innovative and sustainable tools, practices and policies that promote gender equity across a national network of 10 partner universities. IDEAL-N provides leadership enhancement and empowerment of senior university leaders through peer support, networking, training and development as well as systematic improvement of the systems, structures, processes and practices related to the recruitment, advancement, retention and leadership of women faculty including URM women and women with disabilities in S&E disciplines. Leveraging the experience gained from Case Western Reserve University's (CWRU) earlier *ADVANCE* IT and PAID projects and insights from evaluating the initiatives and outcomes of comprehensive change at other *ADVANCE* institutions (Bilimoria & Liang, 2012), IDEAL-N will seed and institutionalize organizational change initiatives at each of the partner institutions over a three-year period. IDEAL-N will create a scientific learning community to educate and empower change implementation teams in each university to undertake customized institutional transformation.

IDEAL-N includes two clusters with a total of 10 partner universities: Case Western Reserve University, Bowling Green State University, Cleveland State University, Kent State University, University of Akron and University of Toledo (constituting the Northern Ohio cluster) and Carnegie Mellon University, Duquesne University, Indiana University of Pennsylvania and University of Pittsburgh (constituting the Pennsylvania cluster).

- Bowling Green State University (BGSU) is a strong liberal arts university with focused research programs. With current enrollment at nearly 18,000, the institution continues to offer more than 200 undergraduate majors and programs on the main campus; 9 baccalaureate and 14 associate degree programs at BGSU Firelands. Graduate programs at the doctoral level number 18 and 48 at the master's level. The institution offers nationally and internationally acclaimed programs in the sciences, particularly in chemistry, biology, geology, and environmental programs.

- Case Western Reserve University (CWRU), a private institution with an enrollment of 9,814 students – 60% of whom are graduate students – is categorized as a “very high” research institution under the revised Carnegie classification with a national and international reputation in an array of S&E fields.
- Cleveland State University (CSU), an urban institution with an enrollment of 15,500 students has visible engineering programs and strong programs in cellular and molecular research. The graduate programs in Biology, Chemistry, Physics and Biomedical Engineering have strong research collaboration ties to the Cleveland Clinic.
- Kent State University (KSU), with an enrollment of 22,800 on its Kent campus and 12,000 at its regional campuses, has over 300 programs from associate through doctoral studies. The College of Arts and Sciences has a core of basic science majors and is internationally known for its Liquid Crystal Institute and biological anthropology programs.
- The University of Akron (UA), enrolling over 26,000 students, has a recognized polymer science and engineering college and one of the oldest engineering cooperative education programs. Related to this proposal, UA has constituted a Diversity Council to enhance hiring processes directed to underrepresented faculty and has strong faculty and staff support for our annual Academic Leadership Forum.
- The University of Toledo (UT), is a research institution enrolling over 22,000 students in 11 colleges and over 350 bachelor’s, master’s, and doctoral/professional programs. In addition to its strong natural science programs, the institution has nationally recognized programs in engineering and has become internationally known for its programs in photovoltaics.
- Carnegie Mellon University (CMU), is a global research university with more than 12,000 students, 95,000 alumni, and 5,000 faculty and staff. CMU consists of seven schools and colleges and is rank as one of the top 25 universities in the United States. In addition to strong academic programs, CMU researchers have recently developed a novel method for creating self-assembled protein/polymer nanostructures that are reminiscent of fibers found in living cells. CMU’s School of Computer science has also been ranked one of the best in the world, with researchers working on innovative solutions to global problems.
- Duquesne University (DU) is consistently ranked among the nation’s top Catholic research universities, with more than 10,000 undergraduate and graduate students in 10 schools. Duquesne has been nationally recognized for its academic programs, community service and commitment to sustainability. DU supports research centers in biotechnology, computational sciences, biological systems, and microwave and analytical chemistry.
- Indiana University of Pennsylvania (IUP) is one of the largest universities in the Pennsylvania State System of Higher Education. Founded in 1875, IUP employs more than 760 faculty members and currently has enrolled 12,471 undergraduates, and 2,257 graduate students in 136 undergraduate programs, 57 master’s programs, and 11 doctoral programs. IUP S&E fields combine rigorous study with skill-based coursework in management, policy, or law. IUP emphasizes writing and communication skills, and most require a final project or team experience, as well as real-world internships in a business or public sector enterprise.
- University of Pittsburgh (UP) is one of the nation’s leading public research universities, with more than 13,000 employees, including more than 5,000 faculty members, serve more than 35,000 students through program of 16 undergraduate, graduate, and professional schools on the Oakland campus and on the four regional campuses. The University is among the nation’s more active research institutions, as evidence by its \$642 million in federally funded research expenditures and its standing among the top 5 schools in the amount of National Institutes of Health research allocations.

The project identifies three core roles to lead institutional transformation at each university: a *co-director*, *change leader*, and a *social science faculty member*—these three persons will constitute a multi-level Change Implementation Team at each university. The co-director will be a senior administrator at the Provost’s Office level (see letters of support attached). The change leader will be a department chair or senior faculty leader in an S&E department appointed by the co-director. Each school will identify a

social scientist to help translate social science theory and best practice literature on gender equity to actionable projects within S&E disciplines. IDEAL-N is comprised of four elements: *leadership enhancement training, annual change projects, plenary conferences, and development of an equity index* (described in detail in the Activities section below).

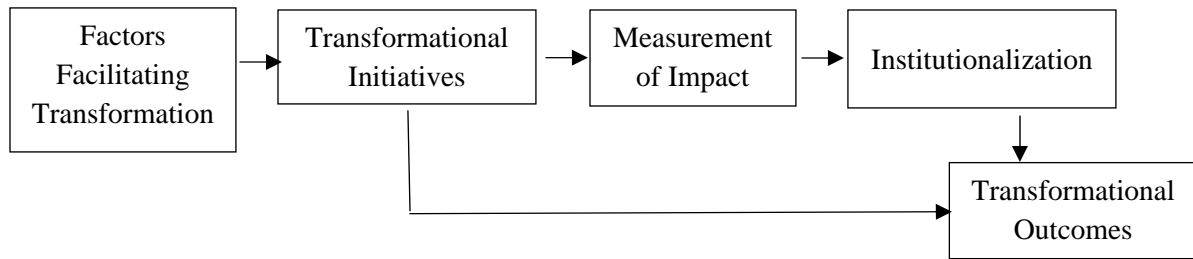
Based on the theoretical frameworks described below, IDEAL-N will build on the leadership development methods and institutional transformation strategies of CWRU's previous NSF *ADVANCE PAID* project, IDEAL (Institutions Developing Excellence in Academic Leadership) which created a regional learning community of academic leaders at partner research universities in Northern Ohio to seed gender equity transformation. These previous IDEAL participant institutions (6 universities) have all made strides toward addressing the issue of gender equity in S&E. While their work is on-going and growing, the addition of the Pennsylvania Cluster (4 universities) will allow us to test the cost-effective replicability of the model, use the knowledge and experience of the original participants to guide and support change in new universities, and provide all partners a learning network in which to institutionalize hands-on projects to affect change for women faculty – including URM women and women with disabilities – to address the national imperative. In taking IDEAL beyond the Northern Ohio region, IDEAL-N, in addition, will pioneer and test the use of innovative technology to catalyze resource efficient collaboration, promote cost- and time-effective learning and communication, and maintain momentum of the project components. Building on CWRU's experience in hosting national, cross-sector meetings on virtual platforms to engage participants, spark discussion and facilitate effective interaction, IDEAL-N will be an experiment to evaluate whether NSF *ADVANCE*'s growing knowledge base about successful institutional transformation can be learned and adapted through more cost- and time-effective training and development methods.

Theoretical Framework

IDEAL-N is based on the idea that an intentionally formed social organization (called a networked improvement community) of research scholars can most effectively address a complex, multi-layered, societal problem (Bryk, Gomez & Grunow, 2011) such as gender equity in S&E. IDEAL-N's learning community model seeks to catalyze change on a large scale by targeting the specific problem of gender equity in S&E across institutions, figuring out what works and under what conditions, defining and measuring outcomes, making changes quickly in project implementation, and then effectively disseminating change models to inform others in the field and promote change at a large scale (CFAT, 2013). The dual (individual and organizational) focus of IDEAL-N provides support to multi-level university leaders to address gender biases while initiating systemic change in instructional settings, human resource practices, policy forums, leadership infrastructures, and more broadly in governance structures (Bilimoria & Liang, 2012; Bryk, Gomez & Grunow, 2011).

Two guiding frameworks underlie IDEAL-N's activities. First, based on the institutional transformation experiences of 19 *ADVANCE* institutions, Bilimoria & Liang (2012) developed a framework of organizational transformation constituting five elements as shown in Figure 1: factors facilitating transformation (e.g., senior administrative support), measurement (e.g., tracking key indicators of equity, diversity and inclusion), transformational initiatives (including individual level and system level initiatives), institutionalization (e.g., creation of new positions, offices and structures), and outcomes (e.g., improvements in women's participation and leadership). The Institutional Transformation Framework was initially developed at CWRU, and was later expanded based on research conducted with the first 19 *ADVANCE-IT* awardees (Bilimoria, Joy & Liang, 2008; Bilimoria & Liang, 2012). Scaling this model to a national scope, Dr. Bilimoria and colleagues have made further refinements based on the successful IDEAL project (2009-2012). IDEAL-N's activities adopt all of these elements to achieve its objectives and enable desired institutional transformation outcomes.

Figure 1
Institutional Transformation Framework (adapted from Bilimoria & Liang, 2012)



Second, IDEAL-N activities are guided by the stages of change model for creating and sustaining gender equity in an academic setting (Carnes, Handelsman & Sheridan, 2005). The model (see Figure 2) works at the institutional level to describe the process and barriers related to changing cultural norms. Each stage is marked by a level of consciousness about the problem and the university's role in perpetuating or changing it. Importantly, the model allows flexibility as each university responds to the particular challenges and opportunities of its developmental stage. The model is generative and dynamic—for instance, once an action is implemented to address gender equity (e.g., a faculty climate survey), it often requires successive implementation in the maintenance phase as well as suggests further actions to bring about deeper changes (e.g., the findings of a climate survey may spark leadership training for deans and department chairs or spur the development of a sponsorship program for URM women faculty). A key element of the IDEAL-N proposal is the inclusion of past IDEAL participants from the Northern Ohio cluster. These universities are in the action and maintenance phases, and as part of the IDEAL-N networked improvement community will become mentors for the universities in the Pennsylvania cluster that have not participated in NSF *ADVANCE* opportunities to date. The Northern Ohio universities will model a generative approach by continuing to identify new change projects and engage in systematic data collection/dissemination of their initiatives. By leveraging the past experiences in *ADVANCE-IT* and IDEAL, and fostering peer support systems, IDEAL-N will intentionally implement a developmental stage change model for gender equity transformation.

Figure 2
Diversity Stages of Change Model (from Carnes et al, 2005)



Grounded in these two guiding frameworks, IDEAL-N incorporates several effective intervention components, design elements and outcomes which are key to promoting and sustaining diversity in S&E academic fields (Bilimoria & Liang, 2012; Moss-Racusin, et al., 2014). Each of the IDEAL-N elements (leadership development program, annual change projects, plenary conferences, and gender equity index) incorporates active learning and evaluation. All elements are grounded in research on gender equity and provide tangible avenues for both individual and institutional change.

Context & Data

IDEAL-N partners conform, in general, to the national averages for gender participation in S&E. Based on their development needs, partner universities have tailored their IDEAL-N participation to particular S&E departments, including biological sciences, computer and information sciences, engineering, mathematics, physical sciences, learning sciences, and social, behavioral and economic sciences. The faculty composition of the IDEAL-N departments at each university is outlined in the tables below.

Table 1. Female Faculty in S&E Departments ^c

University	Tenure ^a		Tenure Track		Total (T+TT) N	Non-Tenure Track ^b	
	Female (Male)	Female % (Male %)	Female (Male)	Female % (Male %)		Female (Male)	Female % (Male %)
BGSU	12 (73)	14 (86)	8 (8)	50 (50)	20 (87)	29 (22)	57 (43)
CWRU	69 (257)	21 (79)	52 (62)	46 (54)	121 (319)	177 (389)	45 (55)
CSU	31 (88)	26 (74)	5 (16)	24 (76)	36 (104)	10 (14)	41 (59)
KSU	31 (141)	18 (82)	17 (36)	21 (79)	48 (177)	34 (44)	44 (56)
UA	23 (105)	18 (82)	14 (43)	25 (75)	185	11 (10)	52 (48)
UT	42(194)	18 (82)	19 (22)	46 (54)	60 (216)	38 (63)	38 (63)
DU	14 (42)	25 (75)	22 (50)	31 (69)	36 (91)	8 (8)	50 (50)
IUP	18 (56)	24 (76)	4 (16)	20 (80)	22 (72)	11 (6)	65 (35)
UP	56 (246)	19(81)	29 (70)	29 (71)	85 (316)	64 (88)	42 (58)

Note: ^a Board-approved full-time faculty in all departments included in IDEAL-N, inclusive of all professors, associate professors, and assistant professors.

^b Includes all full-time instructors and faculty at other ranks not hired to a tenured or tenure-track position

^c CMU data gathered for Mellon College of Science/College of Computer Science total faculty, excluding institutes total faculty 56 (female) and 255 (male) or 18% and 82% respectively.

Table 2. Female Faculty and Chair Position ^a

University	Full Professor			Endowed Chair			Dept. Chairs		
	All	Female	URM	All	Female	URM	All	Female	URM
BGSU	43	5	0	0	0	0	8	1	0
CWRU	156	21	2	63	12		23	6	1
CSU	44	7	4	1	0	0	8	1	1
KSU	71	7	2	^b	^b	^b	8	1	1
UA	308	91	25	23	3	0	46	15	6
UT	105	21	8	2	0	0	23	2	1
DU	21	1	1	2	0	0	7	1	1
IUP	^b	^b	^b	0	0	0	49	^b	^b
UP	176	30	4	33	4	0	15	3	0

Note: ^a Data not available in format for CMU

^b Data not reported or not captured in format enabling disaggregation

Table 3. Female Senior and University Leadership ^a

University	Deans & Associate Deans (N)			University Presidents & Provosts (N)			Vice, Associate, Deputy Provosts (N)		
	All	Female	URM	All	Female	URM	All	Female	URM
BGSU	4	1	1	2	1	0	8	5	2
CWRU	9	3	1	2	1	0	2	1	0
CSU	7	3	0	2	1	0	²	²	²
KSU	7	2	2	2	0	0	4	2	1
UA	21	6	1	2	0	1	2	0	0
UT	11	6	0	2	0	0	9	6	1

CMU	25	6	4	2	0	1	1	0	0
DU	6	0	0	2	0	0	4	1	1
UP	11	1	1	2	1	0	8	4	1

Note: ^a Data from IUP not reported or not captured in format enabling disaggregation

Current and Past Activities and Initiatives

Below is a summary of the results of CWRU's previous NSF *ADVANCE* projects.

(1) *IDEAL-Institutions Developing Excellence in Academic Leadership* (NSF # HRD-0929907, 9/1/2009 to 8/31/2012, \$921,244). This NSF *ADVANCE* PAID project led by Dr. Lynn Singer (PI) and Dr. Diana Bilimoria (Co-PI) created a leadership development partnership among five public research universities in the northern Ohio region and CWRU to disseminate *ADVANCE*-related knowledge and seed gender equity change in S&E at these institutions. Outcomes across the six universities included increases in the number of tenure-track women faculty in S&E disciplines across the six universities (from 211 to 225.5) during a time of a general decline in tenure-track faculty numbers in S&E (from 898 men to 829.5 men), increases in the numbers of women in faculty and administrative leadership positions (from 9 to 12 endowed chairs and from 9 to 16 department chairs in S&E), 25 out of 62 participants (56 change leaders and 6 co-directors) were promoted or appointed to roles of leadership within their institutions during or after their participation in *IDEAL*, 8 conference presentations and posters at national and international meetings, implementation and institutionalization of a number of gender equity initiatives at each university, and continued collaboration of the partner universities beyond *IDEAL* including submission of an NSF Alliances for Graduate Education and the Professoriate proposal.

(2) *Academic Careers in Engineering and Sciences (ACES)* (NSF # SBE-0245054, 9/1/2003 to 8/30/2008, \$3.5million). Led by Dr. Lynn Singer (PI) and Dr. Diana Bilimoria (Co-PI), major accomplishments achieved at CWRU through this award included the creation of several new positions, two new endowed chairs for women S&E faculty, and an assistant director of women faculty leadership in the Center for Women. *ACES* initiatives resulted in the creation or revision of university faculty policies including automatic pre-tenure extension and work release policies. Additionally, women serving as S&E department chairs increased from two to six; women S&E faculty holding endowed chairs increased from eight to 15; S&E tenure stream women faculty increased from 72 to 78 (an increase of 3%); and the number of women faculty at the professor rank in S&E increased from 22 to 27. Five journal articles, five book chapters, nine refereed conference papers/symposia, and 27 presentations/posters authored/co-authored by Dr. Bilimoria emerged during and after *ACES*.

(3) *Institutional Transformation to Advance Gender Equity Lessons from a National Program of Change in Higher Education* (NSF # HRD-0914839, 4/1/2009 to 3/31/2010, \$73,300). Dr. Diana Bilimoria (PI) investigated the gender equity and inclusion outcomes of the first 19 universities that received *ADVANCE* Institutional Transformation awards. A journal article (Bilimoria, et. al, 2008) and a monograph, "Gender Equity and Institutional Transformation: Advancing Change in Higher Education" (Bilimoria & Liang, 2012) were published and nine conference presentations/posters and five invited university talks of this project have occurred to date.

Commitment and Sustainability

Each of the 10 partner universities is committed to sustainable efforts to promote gender equity in S&E. Provosts at each partner institution have engaged with *IDEAL-N*'s PI and Co-PIs and are eager for *IDEAL-N* to move forward. Letters of commitment from the Provosts at each institution, indicating full participation, are included as Supplementary Information. Each partner commits to identifying a Change Implementation Team consisting of three individuals responsible for participating in *IDEAL-N* trainings and conferences: a site co-director, a change leader, and a social science faculty member. Universities in each cluster will allow their personnel to travel (to a central location within their cluster's geographic area) to attend leadership development sessions and plenary conferences via Telepresence. The provost and S&E deans at each university will attend the annual plenary conferences. Working directly with the

external evaluator, each university commits to evaluating their change projects and to identifying successful initiatives to sustain.

Activities Description

The goal of IDEAL-N is to seed and institutionalize gender equity transformation at leading research universities by creating a networked improvement community that is empowered to develop and leverage knowledge, skills, resources and networks to transform academic cultures and enhance equity and inclusion at partner universities.

IDEAL-N Objectives

Objective 1: Create a learning community of senior university administrators and S&E faculty at research universities who are informed about the factors responsible for the underrepresentation of women in academic S&E and committed to transforming institutional cultures in S&E disciplines.

- Strategy: CWRU will adapt its earlier successful IDEAL project to create a national learning community of senior administrative leaders and S&E faculty among partner universities through an annual leadership enhancement program held via Telepresence. IDEAL-N will build capacity at each university to address the institutional factors that slow women's advancement in S&E, including unconscious and systemic factors that preferentially disfavor and accumulate disadvantage for underrepresented groups, and develop effective initiatives to remedy these.

Objective 2: Catalyze institutional transformation at partner institutions by implementing and sustaining customized annual change initiatives, appropriate to the university's stage of change, which are aimed at improving workforce participation, workplace climate, and career progression of women faculty in S&E.

- Strategy: A multi-level Change Implementation Team at each partner institution will identify, lead, implement and sustain annual change projects, and present their activities and results to the learning community. Each institution's change projects will directly impact the S&E departments included in their IDEAL-N participation as well as directly or indirectly impact the larger university. The annual change projects will cumulatively contribute to significant institutional transformation around an issue identified as important for S&E transformation at that university (e.g. recruitment, advancement, climate, resource equity, etc.).

Objective 3: Annually assemble the senior administrative leadership of partner universities to disseminate best practices from ADVANCE institutions, exchange national institutional research, policies and practices, and discuss change initiatives.

- Strategy: To strengthen institutional capacity, IDEAL-N will hold three plenary conferences via TelePresence, attended by Change Implementation Teams and their university's senior administrative leadership (provosts and deans), to focus on the issue of gender equity in S&E, engage with national experts, and learn from each institution's transformational efforts.

Lessons Learned

The previous IDEAL project demonstrated that the development of a learning community of academic leaders is instrumental in seeding gender equity transformation at universities. Thus, IDEAL-N will create intra-cluster and cross-cluster communities of academic leaders for the sharing of knowledge, ideas, best practices, resources and support among the universities. Similarity in institutional goals was a factor deemed important for learning community success by the participants in the earlier IDEAL project. Thus, while the leadership development methods and institutional transformation strategies employed in IDEAL-N are applicable to a variety of higher education institutional types, for purposes of the present proposal only research universities (very high, high and doctoral granting) constitute the IDEAL-N partnership. To maximize the usefulness of IDEAL-N programming activities to institutions and expand the national reach of ADVANCE goals and initiatives, the Pennsylvania partner institutions will be universities who have not previously received NSF ADVANCE funding. To make the best use of the resources available and to scale the project appropriately to a larger learning and adaptation network of 10 universities, IDEAL-N will primarily employ technology-supported, cost-effective methods.

Focal Populations

(1) Change Implementation Team: IDEAL-N will focus on a Change Implementation Team of senior university administrators and S&E faculty, including a social science faculty member, who will lead the change initiatives, access needed resources, engage faculty colleagues, facilitate processes, coordinate and synergize across diverse activities and foci, and have the authority to initiate modifications in institutional policies and structures. The Change Implementation Team will consist of three roles at different levels in the university—Co-Director, Change Leader, and Social Scientist. *Co-Directors* will be situated in the provost’s office and have both the formal authority and informal influence to engender wide-scale university transformation. The Co-director has the ability to bridge disciplines or offices to support the Annual Change Project (for example: requesting the assistance of a Diversity Officer, including legal and human resources departments, or standardizing data collection efforts among departments). *Change Leaders* will be department chairs or senior faculty in S&E disciplines. These individuals are situated in the departments in which change is sought. Additionally, a *Social Science Faculty Member* will assist in translating gender equity research, best practices, and ideas from within the university’s own feedback system (e.g. climate surveys) into actionable steps and projects. Collectively, university Change Implementation Teams will form the networked improvement community within and across geographic clusters to transform academic cultures and enhance gender equity and inclusion in academic S&E. Change Implementation Team members will remain constant throughout the three year duration of the IDEAL-N project to provide leadership stability for the projects to be undertaken. Each Change Implementation Team will select and empower other administrators and faculty at their university to engage in IDEAL-N’s transformational activities at their university.

Each institution’s Change Implementation Team will attend four *Leadership Enhancement Program* annually over the three-year duration of the project. Each Change Implementation Team will be responsible for developing *Annual Change Projects* with customized plans and actions for improving and institutionalizing gender equity, diversity and inclusion on their respective campus. Change Implementation Teams will also attend the annual *Plenary Conferences* where they will present their annual change projects.

IDEAL-N proposes to support these positions by providing a stipend to individuals identified in each role: co-directors at \$2,000 annually, change leaders at \$2,650 annually, and social science faculty at \$2,650 annually for a total of \$7,300 per university annually and \$65,700 per year across the 9 partner universities (see Budget Narrative for more information). These stipends are intended to encourage prioritization of the annual change projects by the Change Implementation Team.

(2) Provosts and Deans. A second population of vital interest to IDEAL-N is the senior institutional leadership of the partner universities. This group, consisting of each partner institution’s provost and associates as well as S&E deans and associates, is essential for providing resources and facilitating changes in policies. Provosts and deans across the partner institutions will meet annually in a plenary conference to engage with Change Implementation Teams and national experts and discuss effective gender equity practices.

Innovation Through Technology

IDEAL-N sets itself apart through the innovative, cost-effective use of Cisco’s TelePresence platform. IDEAL-N envisions cluster universities gathering within their geographic area for the leadership enhancement sessions and plenary conferences, and then connecting virtually across the clusters. Universities in each cluster will host their geographic partner universities for these sessions. TelePresence is a form of advanced video conferencing technology that enables people to meet face-to-face without being in the same room. Far more advanced than traditional distance learning platforms or other web-based platforms (e.g. WebEx), high-definition video enables individuals from around the globe to collaborate while saving time, travel costs and meeting resources, and reducing their carbon footprint. Remote sites are able to interact with each other for presentations, question-and-answer sessions, as well as in more collaborative discussion formats. Additionally, CWRU also hosts a web-based platform which would enable participants unable to meet with their clusters to join via their computers as active participants. This technology is pliant and able to interface with hardware and software on each campus. The system uses a standard ten digit telephone number to easily connect with other Cisco TelePresence

sites, Jabber desktop users, and other web-based video systems. The use of this technology to conduct IDEAL-N activities magnifies both in-person networking within each local cluster as well between the clusters.

Activities

(1) Leadership Enhancement Program. Leadership development sessions for the Change Implementation Team members will be conducted annually in four, half-day sessions spread over the year. All sessions will be held virtually through the use of TelePresence meeting technologies. Participants within each cluster would congregate in a cluster location to enable face-to-face discussion and engagement while connecting cross-cluster via TelePresence. The sessions will consist of instruction, skill training, peer group exchange, networking, and group cohesion. Each session will build on previous sessions and on the needs of individuals and the cohort. TelePresence and web sharing of reading materials will be used between sessions to continue the exchange of information, knowledge, and discussion of emergent issues. All program materials will be shared electronically, further reducing program costs and allowing for uniform materials to be used in the sessions. Illustrative topics follow:

- The NSF *ADVANCE* program and its impacts.
- Why so few? Why so slow? Women's progress in academic S&E.
- Best practices in faculty recruitment and retention.
- Promoting faculty engagement and development.
- Leading toward a level playing field: Creating equity through faculty policy changes.

(2) Annual Change Projects. Annual change projects focused around a key institutional transformation theme will be implemented at each institution in each of IDEAL-N's three years. At IDEAL-N's start, each Change Implementation Team will select a transformational theme/issue/need relevant to their campus to improve gender equity in their institution. Change Implementation Teams also will identify the S&E departments that will be engaged with the annual change projects. The annual change projects will vary in complexity and scope, but they will directly address the transformational theme within the IDEAL-N departments selected, and directly or indirectly address the larger institution. Examples of *institutional transformational themes* chosen in the previous IDEAL project at the six Northern Ohio universities included: "Building Intellectual Community & Collegiality", "Exploring Leadership by Participation", "Enhancing Collegiality and Inclusion in S&E", "Enhancing the Climate for Scholarly and Collegial Community", "Faculty Hiring that Makes a Difference", and "Creating a Climate for Successful Retention, Tenure, and Promotion". Examples of annual change projects completed over the three years of the previous IDEAL project include:

- Undertook a faculty climate survey and implemented climate survey based workshops.
- Undertook faculty focus group studies.
- Hosted faculty development sessions including distinguished speakers.
- Conducted implicit bias discussion and training of S&E search committees.
- Conducted interviews of search committee chairs and candidates/recent hires, collected hiring data, and conducted analyses of applicant pools and hiring results.
- Piloted "launch committees" for newly hired STEM faculty.
- Proposed, planned, and received commitment from the Provost for creation of a university-wide Faculty Development Center.
- Piloted a mentoring program including peer advising teams and speed mentoring.
- Collected STEM faculty potential retiree data and proposed recommendations for university wide strategic hiring initiative.
- Created a listserv of STEM future faculty, to be populated across all the IDEAL universities, to facilitate enhanced diversity in applicant pools for faculty searches in STEM.
- Surveyed department chairs and directors about past practices implemented to support underrepresented groups in S&E.
- Integrated S&E diversity principles into university strategic planning process and outputs.
- Worked with faculty senates to focus on issues affecting women faculty.

- Compiled annual NSF *ADVANCE* Indicator data.
- Created websites for IDEAL projects.
- Created a promotional video about the value of diversity in recruitment activities.
- Prepared and submitted two *ADVANCE* IT proposals, an *ADVANCE PAID* proposal and an *ADVANCE* Catalyst proposal.

We expect that the range of change projects that will be implemented in IDEAL-N will approximate the breadth exhibited in the previous IDEAL project. Building on experiences and insights regarding the timing and structure of supports needed for institutional change from the earlier IDEAL project, IDEAL-N will systematically support Change Implementation Teams in leading a 3-year institutional transformation project, conducted in annual change projects.

(3) Plenary Conferences. Building on another extremely successful element of the previous IDEAL project, three plenary conferences will be held during the early summer of each year of IDEAL-N. These conferences will gather together senior academic leaders from the partner institutions, Change Implementation Team members, and national experts on academic leadership and gender equity to exchange knowledge and craft solutions to effect academic change. Each plenary conference will be designed around a topic vital for establishing campus-wide cultures characterized by gender equity and inclusion, such as “Developing a Family-Friendly Academic Work Environment”, “Faculty Engagement and Development”, and “Creating Effective Search, Recruitment, Hiring, and Start-Up Practices”. Each conference will feature national experts, especially from NSF, who will present the latest scholarship and institutional best practices on the topics. In addition, the conferences will be used to present the results and recommendations of the change projects at each institution, and therefore exchange ideas and best practices inter-institutionally. The plenary conferences thus will be an important opportunity to facilitate dialogue among members of the learning community. These conversations will further disseminate leadership knowledge and build broad, powerful alliances to effect academic change. IDEAL-N Plenary Conferences will be hosted by CWRU via TelePresence. Conference planning will be handled by the IDEAL-N program director.

(4) Development of a Gender Equity Index. Based on the research and experience of previous *ADVANCE* projects, as well as from the literature on promoting gender equity in academic S&E, IDEAL-N proposes to develop a *Gender Equity Index* to serve as an assessment and benchmarking tool for academic institutions. The criteria for this index will include best practices to promote gender diversity, equity and inclusion, with a special focus on disabled and URM women faculty. Extant indexes for educational programs and colleges (e.g., <http://www.usnews.com/rankings>), LGBTQ campus climate index (e.g., www.campuspride.org), and rankings of diversity in corporations (e.g., <http://www.diversityinc.com/the-diversityinc-top-50-companies-for-diversity-2014/>) provide varied and useful models since a Gender Equity Index does not currently exist for academic institutions. The Gender Equity Index would be a simple way for universities to track their progress over time and compare themselves to national averages by university type. For example, the Index could include items noting the percentages of women and women URM faculty in S&E, existence of implicit bias training, availability of mentorship programs for women faculty, existence of work-life integration policies, etc. Development of the Gender Equity Index would be a collective project of the IDEAL-N learning community during its first year. IDEAL-N envisions that each partner university would pilot the Index, and provide in-depth feedback to support the tool’s development. Once refined, the Gender Equity Index would be made available to other universities nationally and internationally, potentially as a web-based tool or app.

Workplan: IDEAL-N Program Elements

The Provost of each institution will select a Change Implementation Team to lead their IDEAL-N project over the three-year duration. The team will select an institutional transformational theme relevant to advancing women faculty in S&E in their universities, identify the S&E departments/disciplines to be engaged, empower and lead faculty colleagues, collect data and conduct annual change projects, engage their university’s senior administration to provide resources and supports for successful implementation of the annual change projects, assist in the evaluation of the outcomes of their projects, and assist in

documenting and publicizing IDEAL-N initiatives and outcomes on their campuses. Change leaders will attend IDEAL-N's Leadership Enhancement Program and the annual Plenary Conferences. The implementation structure for IDEAL-N in each partner university is as follows:

First half of Year 1:

- Determine institutional transformation theme
- Determine S&E disciplines/departments targeted for change
- Determine goals, objectives and actions for the overall institutional transformation project and for annual change projects
- Collect baseline institutional indicator
- Create a memorandum of understanding with the external evaluator specifying methods and metrics for the external assessment of activities, progress, experiences, impact, outcomes, and sustainability of the overall institutional transformation project
- Mobilize internal resources and supports for project implementation
- Research and select items for the Gender Equity Index

Second half of Year 1:

- Develop the Gender Equity Index
- Increase campus awareness of transformation project (e.g., create a website, announce project in campus newsletters)
- Begin process of university policy review and change
- Conduct an institutional study of the current state of gender equity on campus by administering the Gender Equity Index and other data collection (climate survey, faculty focus groups)
- Collect Year 2 institutional indicator data
- Present outcomes, findings and accomplishments at Year 1 Plenary Conference

Year 2:

- Based on data obtained from the institutional study conducted in Year 1, design, seed, implement and institutionalize at least one change project that addresses the institutional transformation theme (e.g., implement a mentoring program, launch a career development workshop series for mid-career women faculty, implement search committee training, conduct a department chair leadership development workshop)
- Seek synergies across campus in implementation of the Year 2 change projects
- Continue process to review and institute policy changes
- Evaluate and publicize outcomes of Year 2 change projects, and implement recommendations
- Collect Year 2 institutional indicator data
- Present outcomes, findings and accomplishments at Year 2 Plenary Conference

Year 3:

- Implement the final Gender Equity Index
- Design, seed, implement and institutionalize at least one additional change project to advance the institutional transformation theme
- Seek synergies across campus in implementation of the Year 3 change projects
- Obtain institutional support for project sustainability (e.g., create new positions or structures)
- Determine sustainability and future actions needed
- Collect final institutional indicator
- Evaluate cumulative three-year transformation outcomes
- Present outcomes, findings and accomplishments at Year 3 Plenary Conference

Knowledge Building

The overall goal of the knowledge-building activities is to enable replication and adaptation of the IDEAL-N model. Each element (leadership enhancement program, annual change projects, plenary conferences, and development of a gender equity index) of the IDEAL-N program will be assessed by the IDEAL-N PI, Co-PIs and Project Director during implementation. These formative assessments will

allow IDEAL-N to rapidly cycle through Plan, Do, Study, and Act cycles (CFAT, 2011) so that real-time improvements can be made to activities and knowledge shared among the partners. Following the PDSA model, the goal of IDEAL-N is not only to determine what gender equity practices work, but also to determine what works for different populations under what conditions.

Additionally, IDEAL-N will develop a matrix of all the project activities undertaken to begin to disaggregate types of interventions and targets for change to begin to determine variations in performance across projects and identify and more finely tune potential impacts.

Knowledge building through dissemination of results and research findings will be prioritized. IDEAL-N will document and share on a website: 1) curricular materials produced or assembled, including reading lists or links for the leadership development sessions and inter-sessions; 2) information on experts and speakers used in the leadership development program or plenary conferences; 3) evaluation instruments and summaries of the results; and 4) annual reports describing project activities, progress, and results. Interactive communication between and among change leadership teams will occur through cyberspace connectivity throughout the year. As with previous NSF *ADVANCE* projects at CWRU, it will be a priority to present the initiatives and results of IDEAL-N at national conferences relevant to the advancement of women and minority faculty in S&E, including NSF *ADVANCE* PI Meetings and NSF HRD JAM Conferences, and conferences of relevant associations such as AAAS, AWIS, WEPAN and the Academy of Management, and to publish these in appropriate scientific publication outlets.

Project Management

Table 3 provides the proposed IDEAL-N annual timeline for all years.

Table 3: Annual Timeline

Year 1	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Hire staff												
Develop Website												
Collect Baseline Data												
Select IT Theme and S&E Depts.												
Develop MOU & Design Evaluation Metrics												
Years 1, 2, 3 and 4												
Leadership Development Sessions												
Change Project Implementation												
Develop, implement and refine Gender Equity Index												
Plenary Conference												
Advisory Board Meeting												
Prepare Annual Report												

IDEAL-N Personnel

PI, Lynn Singer, PhD (Deputy Provost, Vice-President for Academic Affairs, and Professor of Epidemiology and Biostatistics, Psychology and Pediatrics, CWRU) was the PI of CWRU's earlier *ADVANCE* IT and PAID projects. Dr. Singer will work with the senior leadership of the partner institutions and with the IDEAL-N Co-PI and Project Director to lead and oversee all proposed elements. Dr. Singer will chair the three plenary conferences. She will oversee the annual reporting to NSF.

Co-PI, Diana Bilimoria, PhD (KeyBank Professor and Chair of Organizational Behavior, CWRU) was a Co-PI of the *ADVANCE* IT and PAID projects at CWRU. Dr. Bilimoria will oversee the design and implementation of the leadership development program and the planning of the plenary conferences. Dr. Bilimoria will teach in the leadership enhancement program and coordinate other instructors as needed.

She will chair annual meetings of the Advisory Board. She will oversee internal and external evaluation efforts, and engage in dissemination and outreach activities.

Co-PI, Deanne Snively, PhD (Dean, College of Natural Sciences and Mathematics, IUP), will teach in the leadership enhancement program and coordinate with other instructors as needed. She will attend and assist in leading the annual meetings of the Advisory Board, will help oversee internal and external evaluation efforts, and engage in dissemination and outreach activities.

Project Director will be responsible for all day-to-day planning, activities and evaluation of the leadership development program and the plenary conferences, including participant registration, facilities and workshop logistics. The project director will track expenditures and contract terms, implement assessment surveys and evaluation, and assist with annual reporting to NSF and the production of resources for the leadership development program including teaching materials, participant materials and web-based resources.

External Evaluator, Mary Wright, PhD, Director of Assessment and Associate Research Scientist at the University of Michigan's Center for Research on Learning and Teaching, has agreed to conduct the external evaluation of IDEAL-N as described in the project evaluation section above. Her C.V. is included in the Supplemental Documents.

Advisory Board

A project Advisory Board will be established comprising of the IDEAL-N PI, Co-PIs, and selected individuals noted below:

- Dr. W. A. "Bud" Baeslack, Provost, CWRU
- Dr. Abigail Stewart, Professor of Psychology and Women's Studies, University of Michigan
- Dr. Kelly Mack, Executive Director, Project Kaleidoscope, Association of American Colleges and Universities
- Lev Gonick, Chief Executive Officer, OneCommunity

IDEAL-N's Advisory Board will meet annually to provide oversight for the overall project, help prioritize goals, provide advice on strategies, share information about institutional capacities and priorities, and discuss progress on institutional transformation at the partner universities (see Letters of Support Attached).

Project Evaluation

Because of the large number of institutions in this partnership, innovative cost-effective summative evaluation methods are needed to assess the outcomes and impact of the change interventions at each institution. While it would be cost-prohibitive for an external evaluator to visit each of the 10 partner universities for an initial site visit (for determination of evaluation metrics and creation of a memorandum of understanding about the evaluation parameters), a final site visit (for qualitative evaluation of outcomes and progress through interviews and focus groups with participants) and analyses of indicator data as undertaken in the earlier IDEAL project, IDEAL-N proposes to accomplish these same goals using the methods outlined below.

First, following the first leadership development session in Year 1, each Change Implementation Team will obtain baseline data on the counts and percentage of women and men faculty, including URM faculty, by rank and tenure status within their IDEAL-N departments, as well as counts and percentages of women and men in administrative leadership positions (endowed chairs and department chairs). IDEAL-N will provide templates for this baseline data collection to each Change Implementation Team ahead of time. Data on these indicators will be collected by the Change Implementation Team in each of the subsequent years of IDEAL-N. Assessment of changes in the workforce participation of women faculty, including URM women faculty, by rank and tenure status, and women in leadership positions in the targeted departments will be conducted by the external evaluator by comparison of the baseline year data with final year data for each institution and across the IDEAL-N partnership. These data also will be used for summative assessment of program impact, by comparing intervention constituencies or program

types (e.g., changes in female vs. male faculty composition, or changes in junior faculty composition for universities with hiring initiatives vs. those with other IDEAL-N programs).

Second, starting with the first leadership development program session and culminating in the third leadership development session in Year 1, each partner university will identify additional customized evaluation methods and metrics to be used for their summative evaluation. That is, in consultation with the IDEAL-N PIs, Project Director and the external evaluator, each Change Implementation Team will build a tailor-made evaluation plan grounded in an appropriate logic model for their institution. A memorandum of understanding (MOU) between each partner university and the external evaluator will be finalized by the third session of Year 1. The external evaluator will attend, via TelePresence, the first session of the leadership development program in Year 1, and follow-up via email and phone, to speak with the Change Implementation Team and assist in the creation of the customized MOUs, a template of which will be provided to the Change Implementation Team. The MOU will specify the data that will need to be annually collected by the Change Implementation Team for the dual purposes of the summative evaluation and collection of compelling evidence for use in institutionalization of initiatives.

Third, two survey instruments will be used to assess satisfaction and outcomes of participants/recipients of annual change projects, and the impact experienced by the Change Implementation Team members and senior university administrators as follows: (a) In coordination with IDEAL-N PIs and Project Director, the external evaluator will design an end-of-IDEAL-N survey that assesses the reported outcomes (institutional and individual), perceived institutional impact, and sustainability of the institutional transformation initiatives. To maximize survey completion, it will be administered at the Year 3 Plenary Conference to all senior university administrators and Change Implementation Team members. (b) Change Implementation Teams will also identify participants in/recipients of change projects (i.e., those targeted by an intervention, such as participants in a mentoring group or attendees in a bias awareness workshop series), and the external evaluator will design an online survey consisting of standard questions based on IDEAL-N objectives that assess their experiences. The online survey will be administered at the end of Years 2 and 3. To encourage response, Change Implementation Teams will send out the survey invitation but online responses will be accessible only to the external evaluator. The external evaluator will synthesize the assessment data received from all partner universities and provide an evaluation report to the PIs about the outcomes of the annual change projects at each partner university and for the group in each of Years 2 and 3.

Fourth, the external evaluator will virtually attend each plenary conference in Years 1, 2 and 3, reconnect with the Change Implementation Teams at the conference, and provide a report to the PIs after each conference about IDEAL-N's overall progress based on their observations and conversations at each conference. These observations will be complemented by post-event surveys of participants' satisfaction with and reported learning from the Conferences. Thus each of the plenary conferences will be used as an opportunity for the external evaluator to directly observe IDEAL-N's operations and to make suggestions about improvement.

The external evaluator's daily fee will be \$1500. The proposed summative evaluation timeline follows (a total of 16.5 summative evaluation days budgeted).

Year 1: Change Implementation Teams provide baseline indicator data, develop an evaluation MOU, and meet virtually with external evaluator. External evaluator attends the first leadership development session (1 day budgeted), follows up with change leaders and PIs via email or phone to refine the MOU as needed (1 day), attends the plenary conference (1 day budgeted), and provides an annual evaluation report to the PIs regarding the MOUs, methods and metrics of the summative evaluation and their observations at the plenary conference (1 day budgeted), for a total of 4 evaluation days budgeted in Year 1.

Year 2: Change Implementation Teams provide Year 2 indicator data, meet virtually with external evaluator at the plenary conference, and send out an online survey to recipients of annual change projects. External evaluator attends the plenary conference (1 day budgeted), holds midway check-in meetings with each Change Implementation Team to discuss progress to the evaluation MOU and needed

adjustments (1.5 days budgeted), designs online survey to assess the experiences and outcomes of recipients of annual change projects (1 day budgeted), analyzes data received from online surveys (1 day budgeted) and provides an annual evaluation report to the PIs about their conversations and observations at the plenary conference (1 day budgeted) for a total of 5.5 evaluation days budgeted in Year 2.

Year 3: Change Implementation Teams provide final indicator data and send out an online survey to recipients of Year 3 change projects. External evaluator attends the plenary conference (1 day budgeted), designs a survey of the impact of IDEAL-N to be completed by each Change Implementation Team and senior university administrators at the plenary conference (1 day budgeted), analyzes data received from the two surveys (1 day budgeted), analyzes baseline and final institutional indicator data for each partner university and for the whole IDEAL-N group (2 days budgeted), and prepares the final evaluation report of the summative evaluation (2 days budgeted) for a total of 7 evaluation days budgeted in Year 3.

The total summative evaluation budget for IDEAL-N will consist of external evaluator fees of \$24,750 (16.5 days).

Intellectual Merit

The proposed project, IDEAL-N, will encourage participating individuals and institutions to review assumptions and practices regarding women's professional roles in S&E disciplines, and provide resources to apply those lessons to transform their academic cultures. It will call for rigorous organizational self-examination and the formation of ameliorative strategies based on evidence. It will create an intercollegiate community of learners, researchers, and leaders to share information and ideas on improving gender participation and equity in academic S&E nationally. IDEAL-N will allow dissemination of ideas and practices from NSF *ADVANCE* institutions and allow further exploration of how to engender effective transformational change in higher education. The creation of a Gender Equity Index for academic institutions as well as journal publications and academic conferences emerging from the project's results will foster greater awareness and generate further study of the factors leading to gender equity.

Broader Impacts

IDEAL-N's proposed three-year program will not only enhance the depth and effectiveness of leadership on each of the respective partner institution campuses, but it will establish a collaborative institutional community of national senior academic leaders to serve as a perpetual resource—a powerful force of cultural transformation and an incubator of innovation (Holly, 2004; see also Cox & Richlin, 2004). The creation of this networked improvement community will benefit not only the practices and policies of individual universities, but additionally will inform the nation's efforts to foster science and technology careers, stimulate and redirect economic development, and reverse the drain of talent from academic S&E. IDEAL-N directly addresses the use and retention of that talent, and specifically anticipates a major national priority: that higher education institutions leverage skills and resources through cooperation and collaboration

Systemic change to achieve equity for women and underrepresented minorities in S&E disciplines must be rooted on individual campuses, but must also propagate among institutions and systems of higher education. IDEAL-N is positioned not only to affect behavior and policy at 10 research universities over a three-year period, but importantly, can position those institutions to stimulate change across post-secondary education throughout the nation. The creation of the proposed collaborative learning community of change agents among leading research universities will further diversify S&E presence across the nation, inform broader efforts to foster science and technology careers and build capacity for a high tech national workforce.