

**Purdue's Engineer of 2020
2011-2012 Seed Grant Program
Purdue University**

Project Title: Leadership Case Studies: Developing Leadership Capacity in Undergraduate Engineering Students

Total Budget Requested: \$40,000

Target Attribute(s) to be studied/implemented:

Primary Attribute: Leadership

Secondary Attributes: Recognizing and managing change; Synthesizing engineering, business, and social perspectives

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A. Project Description

Objective and Research Questions

The purpose of this Seed Grant project is to develop, from case-based pedagogy literature (e.g., Richards & Gorman, 2004; Sypher, Russo, & Hane, 2002) and from prior interviews with engineering professionals in industry (Cox, Cekic, & Adams, 2010), real-world, leadership-oriented learning materials that may increase undergraduate engineering students' and faculty's leadership capacities. These cases will be used to facilitate a series of professional development, hands-on workshops for College of Engineering (CoE) faculty about ways that they may integrate leadership scenarios into their engineering courses. Co-sponsored by the Susan Bulkeley Butler Center for Leadership Excellence and held in the Discovery Research Learning Center, workshops will introduce CoE faculty to leadership cases using innovative, multiple learning laboratories and spaces. Piloted case studies will be stored on a password-protected website that will be accessible by all who register on the site and will guide faculty in the implementation of these cases in engineering courses. Members of the research team will assess and evaluate the effectiveness of leadership cases as learning tools in formal and informal engineering environments.

This project will help faculty and students to (1) develop new ways to think about the leadership process; (2) identify multiple ways to incorporate leadership concepts in traditional engineering environments and within engineering curricula via case studies; (3) explore factors that contribute to effective and ineffective leadership within nonacademic environments; (4) self-assess their ideas about leadership, change, and synthesis of engineering, business, and social perspectives; and (5) engage in a community of scholars with interests in the application of leadership in engineering. Research questions ask, "How do engineering students and faculty view themselves within the context of leadership?," "How are engineering faculty incorporating engineering leadership concepts (via authentic engineering cases) in traditional engineering courses?," and "How are engineering faculty and students solving real-world engineering problems whose primary emphases are in engineering leadership?"

Literature to Establish the Need for and Significance of the Proposed Project

Engineering Education Leadership

Despite the role of leadership in the lives of engineers, it continues to be insufficiently addressed in engineering curricula (Graham, Crawley, & Mendelson, 2009), resulting in most universities regarding the development of student leadership skills as a part of informal extra-curricular activities such as involvement in student organizations and clubs. Promoted in the form of minors (e.g., the Engineering Leadership Development Minor at Penn State- www.eldm.psu.edu), formal co-curricular undergraduate degree programs at MIT (<http://web.mit.edu/gordonelp/>) and Iowa State University (<http://www.eng.iastate.edu/leadership/index.asp>), and formal graduate degree programs, leadership is beginning to be incorporated in the curricula for future engineers (Cox et al., 2009; Graham, et. al., 2009; NAE, 2004).

Despite these promising developments in engineering leadership in higher education, several challenges remain. First, the majority of engineering students are not introduced formally to leadership concepts in traditional engineering environments; therefore, many have little to no leadership experience prior to obtaining jobs in industry. Second, faculty face issues related to not having been trained formally to teach leadership to their students; not knowing how to include leadership in an already full curricula (Sageev, Prieto, & Smaczniak, 1992; Pister, 1993; Shuman, Besterfield-Sacre, & McGourty, 2005); not having the time to learn about leadership concepts on their own; not wanting to add new courses to the curricula; and not wanting to develop these courses themselves (Cox, Cekic, & Adams, 2010). Third, engineering industry representatives note disconnects between industry's needs and the professional skills of graduating engineering students (McMasters & Matcsh, 1996; Nguyen, 1998; Sageev & Romanowsky, 2001; Martin, Maytham, Case, & Fraser, 2005). In addition to the concerns of these stakeholders, within engineering education leadership, there are no common instruments developed in the context of engineering for measuring leadership abilities of engineering studies; and there is no shared operational definition of leadership within the context of engineering.

Case Studies in Engineering

The use of case studies for pedagogical purposes is well established in a number of professional fields including law, business, education, and medicine, with the method receiving increasing attention in engineering (Shuman, Besterfield-Sacre & McGourty, 2005). The majority of engineering cases focus on engineering ethics, engineering design, and environmental impact (Martin & Schizinger, 2005; Richards & Gorman, 2004; Shuman et al., 2005, Sankar & Raju, 2005; Raju & Sankar, 2006), not leadership. Cases or case studies are “narrative accounts of situations, problems or decisions usually derived from actual experience” (Richards & Gorman, 2004, p. 1) and are the next best thing to “being there” Sypher (1997). Case studies provide realistic situations that require students to generate and evaluate multiple answers, process key decision points, consider trade-offs, generate evaluation criteria for judging particular solutions and choose and defend specific solutions which simultaneously enables them to practice and develop higher-order cognitive skills including perspective taking, persuasion, communication, decision-making, judgment, and independent thought (e.g., see Sypher, Russo, & Hane, 2000; Mayo, 2002) all of which undergird successful leadership.

Previous research indicates that the organized and strategic use of case studies has been shown to increase significantly students’ cognitive complexity, perspective-taking and persuasive abilities within the course of a single semester. Given their potential to put students in touch with the engineering world of which they will soon be a part without leaving the classroom and their potential to develop skills and abilities necessary for leadership, case studies present a compelling pedagogical strategy for enhancing leadership development. Some of the greatest benefits of case-based pedagogy come when cases are used extensively within a curriculum as this provides students and instructors with the necessary time to develop the skills to fully engage the material (Richards & Gorman, 2004). Thus, investing in the development and dissemination of engineering leadership cases can help provide a resource for students and educators that can ideally further the professional development of up-and-coming engineers.

Prior Work- Engineer of 2020 Seed Grant

A portion of the proposed work is based upon a study conducted with funding from a prior CoE Engineering 2020 Seed Grant awarded to the PI to explore, within academia and industry, the operationalization of leadership, change, and synthesis of engineering, business, and societal perspectives in engineering practice and engineering education (Cox et al., 2009; Cox, Cekic, Adams, 2010). In the first phase of the work, the research team conducted semi-structured interviews with eleven practicing engineers and with twelve academicians representing seven engineering disciplines. Results reveal that engineers working in industry define leadership attributes differently than engineering faculty (Cox, et al., 2009). While there were common elements in their definitions (i.e., vision, communication, and motivation), industry experts focused more on being proactive, taking risks, and focusing on a goal. Both groups also presented diverse examples of situations in which engineers would have to use leadership skills. Several industry experts suggested ways to connect undergraduate students to these experiences, and one of the interviewees in the study emphasized the use of case studies and the need for faculty development in using real-life examples in a classroom setting. As a result of these conversations, the idea of case-based pedagogy for engineering leadership was birthed.

In phase II of the study, interview responses were analyzed using a constant comparative method. This resulted in the development of a 66-item leadership, change, and synthesis survey (See https://purdue.qualtrics.com/SE/?SID=SV_d0eNIy8zYcEuNPm) representing twenty-nine “leadership constructs (e.g., motivation and delegation), twelve “change” constructs (e.g., having people skills and understanding organizational change), and six “synthesis” constructs (e.g., understanding politics and business perspectives). Validation of the tool has occurred using a Q-sort methodology and is ongoing via distribution of the survey to hundreds of undergraduate CoE students.

Plan of Work

Case Development

Ten cases will be developed by the team prior to the faculty workshop and spring 2012. Five cases have been developed partially and have been informed from interviews from Purdue-affiliated industrial respondents in a previous Seed Grant (Cox et al., 2010). Variations of these cases have already been

implemented in a graduate course that the PI teaches, “Leadership, Policy, and Change in STEM Education.” The initial context for a case in chemical engineering is presented below:

“Quentin O’Malley is a chemical engineer responsible for making chocolate chip cookie dough for Chipz Cookie Company. Every 15 minutes, he makes 5,000 pounds of dough. Quentin’s additional responsibility is to make sure that his equipment and technology are working. Downstairs in the plant, another engineer takes Quentin’s dough and turns it into little dough balls. From here, another engineer takes the dough balls and bakes them into cookies. A fourth engineer takes these cookies and puts them in a pack. After 6 hours, two quality engineers appear on the plant floor, and tell Quentin that something is wrong with the process. It turns out that the ingredients of the dough were incorrect. The quality engineers must throw out 120,000 pounds of cookie dough.” (Developed from an interview with a 20-year chemical engineer industry professional)

Five additional cases will be developed based upon additional interviews with professionals affiliated with Engineering Advisory Boards at Purdue and the Office of Professional Practice (OPP). The team will vary the cases by discipline so that a wide variety of users in the CoE can apply the cases. A fully developed case will provide detailed information about the setting, people involved, the problem and its importance within the context of engineering. To analyze the cases, faculty and students will be expected to tell why the problem/issue is important; the risks associated with this problem; ways to address these risks; leadership elements of the case; and ways to assess performance and progress given the suggested solution. A particular focus will be upon the role(s) of leadership in case, especially across stakeholders. All cases will be reviewed by the research team and by practicing engineers affiliated with the CoE’s OPP for appropriateness, language and inclusion of leadership elements in engineering disciplines. All cases will be posted by the research team via a web space that will house relevant literature along with background information and suggestions for using the cases in a variety of contexts.

Leadership Workshop for CoE Faculty

The project team will sponsor a day-long workshop at Purdue’s Butler Center for CoE faculty and will be extended to a small number of engineering faculty within driving distance. On Purdue’s campus, special invitations will be sent to representatives from organizations (e.g., WIEP) so that diverse perspectives of engineering leadership might be explored. Members of OPP, which coordinates the cooperative education programs at Purdue, have joined the project team and have agreed to participate in this project and to use materials in their office since many OPP students must engage in leadership skills to be successful in the companies in which they work.

Pre-Workshop Activities- Prior to the workshop, faculty will be provided several leadership readings along with a simple framework for developing cases within the context of engineering. Drawing upon these materials, workshop participants will be asked to complete and to submit a pre-workshop homework assignment in which they will complete the leadership, change, and synthesis survey mentioned earlier in the proposal.

Workshop Activities- The workshop will consist of an opening session about the state of engineering leadership; a series of collaborative sessions to guide faculty as they pilot the cases developed by the research team; a synthesis of the workshop’s activities; and a final assessment session. The learning objectives of the workshop are that faculty participants will be able to:

- Increase confidence in teaching leadership in current engineering curricula through an introduction to case-based pedagogy using real-world engineering scenarios.
- Build a support network and community with other engineering faculty through engagement in open dialogues about the operationalization of leadership and ways to incorporate leadership themes in undergraduate engineering courses.
- Explore impacts of leadership curricular innovations on student learning

Post-Workshop Activities- Faculty participants will have opportunities to select from multiple incentives (i.e., \$10 gift cards, journal authorship with the research team) to implement leadership cases developed by the research team. Incentives will be given to each faculty member, who, during the semester following the workshop, agree(1) to gather student input (templates will be developed and distributed by the team) to assess the use of case-based learning for leadership development activities in their courses and (2) to administer the leadership, change, and synthesis survey to all students who analyzed the leadership cases. The password-protected web page developed by the project team will store this assessment data. The research team anticipates that the responses from these students about the cases will differ from students who engage in leadership cases within traditional classroom environments.

Assessment and Evaluation of the Proposed Project

Tables 1 and 2 detail both the research team’s assessment plans and the evaluation plan from an external evaluator Rocio Chavela, a Ph.D. Candidate in Engineering Education with extensive experience conducting faculty development projects and evaluating engineering education efforts internationally.

Expected Outcome	Assessment Method
Develop new ways to think about the leadership process	<i>Faculty and Students</i> - Analyze qualitative (i.e., case study analyses) and quantitative (leadership survey) leadership data
Identify multiple ways to incorporate leadership concepts in traditional engineering environments and within engineering curricula.	<i>Faculty</i> - Analyze individual and group cases and the frequency in which the cases were used; follow up with faculty who integrated the case to explore the positive and negative aspects of case implementation
Explore factors that contribute to effective and ineffective leadership within nonacademic environments	<i>Faculty and Students</i> - Examine leadership case analyses from the populations
Self-assess one’s ideas about leadership and reflect upon these ideas in the development of one’s leadership abilities; recognize and manage change; and synthesize engineering, business, and social perspectives	<i>Faculty</i> - Workshop participants complete a leadership survey prior to the workshop <i>Students</i> - Fill out a leadership survey before they analyze leadership cases (Note: This survey was developed from an empirical study funded with a previous CoE seed grant.)
Engage in a community of scholars with interests in the application of leadership in engineering.	<i>Faculty</i> - Participate in a listserv and engage with web resources created for faculty interested in engineering leadership <i>Students</i> - Participate in a discussion board about each case

Table 1. Assessment Plans Associated with Behavioral Outcomes

Goal	Methods	Description/ Timing
Create real-life leadership cases from engineering that may be used as <i>new learning materials</i> in the development of undergraduate engineering students’, graduate engineering students’, and faculty’s leadership capacities.	Documentation review (Summative)	In depth review of a subsample of selected cases (including the reports on representational validity conducted with different stakeholders, and case evaluation forms). (Summer 2011)
	Website monitoring (Formative)	The project website will be monitored periodically, focusing on usability and content updates (including weblog analysis and online intercept surveys). (Starting in Summer 2011 and once per semester thereafter.)
<i>Develop engineering faculty expertise</i> via hands-on workshops and a web-based repository that applies leadership concepts to	Survey (Formative)	Participant post-workshop satisfaction survey addressing overall satisfaction, perceptions, and intentions to apply workshop content into their classrooms. (Fall 2011)

engineering classroom environments.	Interviews (Summative) Fall '12	A representative sample of participants will be interviewed remotely to learn about their experiences in the project. Participants will be purposefully selected to represent two groups: those who decided to integrate the cases into their courses, and those who did not. (Spring 2012)
	Documentation review (Summative)	Review of a representative sample of selected participants' packages (i.e. syllabi, lesson plans, lessons learned from the implementation, and documentation of an engineering education leadership activity). (Spring 2012)
Assess and evaluate the effectiveness of leadership cases as learning tools in formal and informal settings engineering among diverse student and faculty populations.	Website monitoring (Formative)	Review of student and faculty posts on the website during the case implementation period. (Spring 2012- once every month during this period)
	Documentation review (Summative)	Review of assessment reports (including faculty and students survey and interview data). (Spring '12 and beyond)

Table 2. Evaluation Plan for Proposed Project

Plan for Dissemination of Findings within the College of Engineering

Materials will be implemented as professional development modules for use by faculty and students in the College of Engineering and by approximately 700 undergraduate OPP students who engage in domestic and global engineering experiences. The web repository of cases, which may be accessed via the College of Engineering website, the OPP, and the Butler Center, will be a venue for faculty, student, and industry stakeholders and will be maintained after the funding period. Additional notices will be distributed to all CoE faculty to let them know that the cases and the leadership survey are available for use in their undergraduate and graduate courses. Publications will be presented at the ASEE annual conference and in peer-reviewed journals such as the *Journal of Engineering Education*, the *International Journal of Engineering Education*, the *Journal of STEM Education*, and the *Journal of Professional Issues in Engineering Education and Practice*. Industrial and academic interview participants will also be sent copies of the findings along with a request to disseminate findings to a larger population within these environments. Each participant will be acknowledged for his/her contribution to the case development and will be asked to sign a form given the team permission to publish their cases. In addition, industrial partners will be approached to sponsor the development of new cases that might be of interest to larger engineering audiences.

In preparation for large-scale future funding opportunities available through NSF's TUES program and Engineering Education Center programs, the research team will extend the cases to include leadership in a variety of STEM disciplines. We anticipate that this will result in the creation of a Purdue-housed repository of leadership curricular materials with emphases in real-world STEM problems.

Intellectual Merit of Proposed Work

Findings provide a way for numerous engineering faculty to engage in reliable leadership cases within the context of engineering, to identify new methods for teaching leadership within the context of engineering, and to develop the leadership abilities of students while they are undergraduates. This project can provide insight into the most effective ways to implement engineering cases within a global society.

Broader Impact of Proposed Work

This study has the potential to reach more than 9,000 students and 350 faculty members at Purdue University. This research also engages a variety of stakeholders (i.e., engineers in industry; engineering faculty, engineers in academia; and undergraduates engineering students) in an empirical study of teaching engineering leadership.

B. Timeline and Implementation Strategy

The duration of the proposed work is 12 months as seen below.

	Sum. '11	F '11	S '12
Case Study Development			
Workshop Planning			
Workshop Implementation			
Workshop Participants' Dissemination			
Create Website to Collect Case Data			
Maintain Website			
Disseminate Materials on Website			
Analyze Workshop and Course Data			
Conduct Assessment with Faculty who Integrate Cases into Course and OPP			
Presentations at National Conferences			
Journal Paper Development			
Prepare Final Report			

Impact of the Work and Subsequent Funding Sought

Results of prior efforts in the initial seed grant are reported below:

Publications

(1) Cox, M.F., Cekic, O., & Adams, S.G., (2010). Developing Leadership Skills of Undergraduate Engineering Students: Perspectives from Engineering Faculty. *The Journal of STEM Education*, 11, 3/4, 22-34.

Preliminary results revealed that engineers working in industry define leadership attributes differently than engineering faculty. While there were common elements in their definitions (i.e., vision, communication, and motivation), industry experts focused more on being proactive, taking risks, and focusing on a goal. Both groups also presented diverse examples of situations in which engineers would have to use leadership skills. Several industry experts suggested ways to connect undergraduate students to these experiences, and one of the interviewees in the study emphasized the use of case studies and the need for faculty development in using real-life examples in a classroom setting. As a result of these conversations, the idea of case-based pedagogy for engineering leadership was birthed.

(2) Cekic, O., Cox, M.F., & Zhu, J. (2010). Industry Participation in the Development of Engineers as Leaders in Work Environments, *2010 Proceedings of the American Society for Engineering Education* (10 pages). Presented among industry representatives at the 2010 ASEE Conference in Louisville, this work explicitly presents ways that higher education might incorporate the three selected attributes in higher education environments. This work has resulted in the PI serving as reviewer for an upcoming book project in engineering leadership and as one of a select group of people consulted about the creation an Engineering Leadership Division in ASEE.

(3) Berkelaar, B. L., Pope, K., Sypher, B. D., & Cox, M. F. (In Press). Inclusive leadership: Helping women negotiate the labyrinth of leadership in higher education. In J. L. Martin (Ed.), *Women as leaders in education: Succeeding despite inequity, discrimination, and other challenges*. Santa Barbara, CA: Praeger.
Work from the previous study was referenced in this book chapter. Explicit information about differences in expectations for faculty and for industry representation related to engineering leadership was presented.

External Funding

With the current proposal team, Dr. Cox has submitted a NSF Course, Curriculum, and Laboratory Improvement grant (Phase II, \$600,000) and a Transforming Undergraduate Education in Science, Technology, Engineering, and Mathematics (TUES) (Type I, \$200,000) grant. Although both grants received high reviews, they were not funded because of the highly competitive nature of these programs. Several of the suggestions from the reviews have been incorporated in the proposed project. The team is confident that external funding will be obtained once the authentic engineering cases are developed in combination with the 66-item leadership, change, and synthesis survey informed from interviews in the prior grant (See https://purdue.qualtrics.com/SE/?SID=SV_d0eNly8zYcEuNPm)

C. Personnel Requirements

Please indicate the portion of FTE that each faculty member will dedicate to the project

Faculty member	Summer 2011	Fall 2011	Spring 2012
Monica F. Cox	1.0	0.10	0.10
Yating Chang	0.25	0.05	0.00
Beverly Davenport Sypher	0.50	0.10	0.10
Eckhard A. Groll	0.25	0.05	0.00

Although no faculty are receiving funding for this project, they are committed to the success of this effort. For this reason, the FTE information is presented above.

D. Budget

The budget worksheet is provided to assist you in developing your budget. You may fill this out and paste it directly into your proposal.

Faculty/Staff Member Funding			
<i>Please indicate the funding (dollars and time) you are requesting for the grant for this project)</i>			
Faculty/Staff Name:	Grant funds requested		
	% Time	Fringe Benefits	\$\$
Monica F. Cox			
Yating Chang			
Beverly Davenport Sypher			
Eckhard Groll			

Subtotal Faculty/Staff Funding		\$ 0.00	\$ 0.00
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Graduate Students

Type of position	Grant funds requested			
	% Time	Insurance + Fee Remit	Fringe Benefits	\$\$
Graduate Staff	0.50 FTE	9,748.55	2021.04	26,081.04

Subtotal Grad Student Personnel		\$9,748.55	\$ 2021.04	\$ 26,081.04
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Undergraduate Student Funding

Please indicate the student resources (funding and time) you are requesting from the grant for this project.

Type of position	Grant funds requested		
	Hrs/week	Fringe Benefits	\$\$

Subtotal Undergrad Student Personnel			
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Equipment & Software Funding

Please list all specialized equipment and software required for the project. (Do not include standard computer equipment and commonly-available software, e.g. Microsoft Office, Microsoft Windows). Mark whether any of the equipment or software is provided by the department. (Note that only 10% of the funds can be used to purchase equipment and it needs to be dedicated to the goals of the project.)

Name of Equipment	Funds Requested
Website Development & Maintenance	\$170.41

Subtotal Equipment	\$170.41
Name of Software	
Subtotal Software	\$0.00
Other miscellaneous items (Computer media, cables, etc)	
Subtotal miscellaneous	\$0.00
Other expenses	
Faculty workshop incentives	\$1000
Workshop Supplies and Food	\$2500
External Evaluator	\$ 500
Subtotal other expenses	\$4000

E. Budget Justification

Graduate Student: One full-time graduate student will be hired for the duration of the project. This student will conduct research and will assist with the logistics of the project.

Fringe Benefits are calculated at the standard Purdue University rates.

Consultants: Costs have been added to include consulting fees for the project evaluator (\$500).

Other S&E/Other Operating Expenses: \$170.41 is requested to purchase materials for website maintenance.

Workshop Expenses:

- \$700 has been allocated for a continental breakfast and lunch for the workshop.
- \$1800 is requested to purchase workshop supplies including binders and printing and duplication.
- \$1,000 is requested for participant compensation (\$10 incentives for approximately 1000 participants).

F. References

- Cox, M. F., Cekic, O., & Adams, S. G. (2010). Developing leadership skills of undergraduate engineering students: Perspectives from engineering faculty. *Journal of STEM Education: Innovations and Research*, 11(3-4), 25-36.
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- Sypher, B. D. (1997). Introduction. In B. D. Sypher (Ed.), *Case studies in organizational communication 2: Perspectives on contemporary work life* (pp. 1-10). New York, NY: Guilford Press.
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G. PI Biosketch (1-2 pages following similar format used for NSF grants)

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a. Professional Preparation

Spelman College, Mathematics (*cum laude*), B.S., 1998
University of Alabama, Industrial Engineering, M.S., 2000
Peabody College at Vanderbilt University, Higher Education Administration, Ph.D., 2005

b. Appointments

Assistant Professor, Engineering Education, Purdue University, W. Lafayette, IN, 2005-present

c. Publications

(i) Closely Related:

1. Cox, M.F., Berry, C., & Smith, K.A. (2009). "Development of a Leadership, Policy, and Change Course for Science, Technology, Engineering, and Mathematics Graduate Students." *Journal of STEM Education*.
2. Smith, K., Douglas, T.C., & Cox, M.F. (2009). Supportive Teaching and Learning Strategies in STEM Education. Book chapter in *New Directions in Teaching and Learning: Creating a Culture/Climate that Supports Undergraduate Teaching and Learning in Science, Technology, Engineering, and Mathematics*.
3. Cox, M.F., & Cordray, D.S. (2008). Assessing Pedagogy in Engineering Classrooms: Quantifying Elements of the "How People Learn" Model Using the VaNTH Observation System (VOS). *Journal of Engineering Education*, 97, 4, 413 – 424.
4. Cox, M.F., Zhu, J., Cekic, O., Chavela, R., & London, J. (2010). "Knowledge or Feelings: First Year Students' Perceptions of Graduate Teaching Assistants in Engineering." *Journal of Faculty Development*, 24, 1, 27-34.
5. Cox, M.F., & Harris, A.H. (2010). "Comparison of Pretenured and Tenured Engineering Professors' Pedagogical Practices within Undergraduate Bioengineering Courses." *International Journal of the Scholarship of Teaching and Learning*, 4, 1, 11 pages.

(ii) Other:

1. Cox, M.F., Cekic, O., & Adams, S.G., (2010). Developing Leadership Skills of Undergraduate Engineering Students: Perspectives from Engineering Faculty. Invited paper for the *Journal of STEM Education*.
2. Cox, M.F. (2009). "Operationalization of Innovative and Traditional Pedagogical Practices within Undergraduate Bioengineering Courses." *International Journal for the Scholarship of Teaching and Learning*, 3, 1, 11 pages.
3. Diefes-Dux, H.A., Follman, D., Adams, R., & Cox, M.F. (2006). Community Building and Identity Development through Graduate Coursework in Engineering Education. 2006 Proceedings of the American Society for Engineering Education.
4. Cox, M.F. (2006). VaNTH Observation System Component Assessment. 2006 Proceedings of the American Society for Engineering Education.
5. Cox, M.F. (2007). *A Common Sense Guide to Conducting Engineering Education Research at Minority-Serving Institutions*. Handbook funded by NSF-funded Rigorous Research in Engineering Education and the Center for the Advancement of Scholarship in Engineering Education.

d. Synergistic Activities

1. Assessment & Evaluation Director for Undergraduate Research Programs in Engineering (June 2006-present)- Dr. Cox has interacted with students representing approximately 30 universities and with engineering faculty and student mentors at Purdue to explore the roles of research upon engineering students' intrinsic and extrinsic motivations within Purdue's Summer Undergraduate Research Fellowship (SURF) Program and upon the informal and formal experiences of students.

2. Graduate and Faculty Professional Development Collaborations in Engineering and Engineering Education- Dr. Cox has presented three faculty development workshops in Mexico, and has presented research and outreach workshops at Virginia Tech, the University of Alabama, Rowan University, and the University of Colorado. She has also served as a panelist and/or keynote speaker for the Midwest LSAMP program, Purdue's Black Graduate Student Association, and the NASA MUST program.

3. Undergraduate, Graduate, and Faculty Research Mentorship- Dr. Cox has supervised seven engineering undergraduates (4 women and 3 underrepresented minorities) and 6 graduate students within projects involving the creation of tools to analyze classroom data, the creation of instruments to assess levels of community within students' undergraduate research experiences, and the validation of P-12 assessment tools. Her mentorship interests are extended to the REACH Scholars Program, a retention program of graduate student cohorts in the College of Engineering.

4. Diversity Efforts- Dr. Cox was selected as an Emerging Scholar for *Diverse: Issues in Higher Education* in 2008. She is co-founder of AaLaNa, a STEM group for underrepresented women faculty at Purdue, and most recently served on the university Faculty Diversity Task Force.

e. Collaborators & Other Affiliations

(i) Collaborators and Co-editors (co-editors marked with *):

Adams, Robin (Purdue); Adams, Stephanie (Virginia Commonwealth); *Beaudoin, Steve (Purdue); Berry, *Carlotta (Rose-Hulman); Black, Suely; Brown, Cordelia (Purdue); Capobianco, Brenda (Purdue); *Cordray, David (Vanderbilt); *Diefes-Dux, Heidi (Purdue); Evangelou, Demetra (Purdue), *Harris, Alene (Vanderbilt); Smith, Karl (Purdue); St. Omer, Ingrid (Kentucky); Yalvanac, Burghan (Texas A&M)

(ii) Graduate Advisors:

David S. Cordray (Co-Chair), John M. Braxton (Co-Chair), Thomas R. Harris, Ellen B. Goldring, Kenneth K. Wong, Alene H. Harris (Ph.D. Committee, Vanderbilt University)

Thomas W. Merritt (Chair), Robert G. Batson, Jenefer Husman (M.S. Committee, U of Alabama)

Total Graduate and Post Doctoral Students Directed: 6

Total Undergraduate Students Directed: 7

Current and Pending COX, MONICA F

1/24/2011

Supporting Agency	Project Title	Total Award	Period Covered	Academic Months	Summer Months	Location
Current						
National Science Foundation	Reinvigorating Engineering And Changing History (reach) Scholars Program	573,597.00	03/15/2009 - 02/28/2014	0.72	0.00	West Lafayette, IN
National Science Foundation	Gse/res: Examining Engineering Perceptions, Aspirations And Identity Among Young Girls	449,953.00	09/01/2007 - 08/31/2011	0.00	0.50	West Lafayette, IN
National Science Foundation	Career: An Examination Of Graduate Educations Role In Preparing Engineering Students For Careers In Academia And Industry	541,507.00	08/01/2008 - 07/31/2013	0.00	0.50	West Lafayette, IN
Norfolk State University	Integrative Graduate Education And Research Traineeships Program In Magnetic And Nanostructured Materials	309,456.00	08/01/2010 - 07/31/2015	0.45	0.00	West Lafayette, IN
Pending						
National Science Foundation	Implementation Of A Multidimensional Assessment Tool To Development The Pedagogical Expertise Of Engineering Graduate Students And Faculty	200,000.00	01/01/2011 - 12/31/2012	0.00	1.00	West Lafayette, IN
University Of Michigan	Nuclear Science And Security Consortium	4,000,000.00	04/01/2011 - 03/31/2016	0.45	1.00	West Lafayette, IN
National Science Foundation	Designing Collaborative Innovation Ecosystems: A Multi-University EHR-ENG STEP Center for Educating Innovation Engineers	150,000.00	07/01/2011 - 06/30/2016	0.00	1.00	West Lafayette, IN

YATING CHANG
Assistant Director, Office of Professional Practice
College of Engineering, Purdue University

Professional Preparation:

- 05/2007 Ed. D. - Higher Education Leadership & Policy, Vanderbilt University
- 05/ 2001 M.S. - Cross-cultural/Social Psychology, University of Oregon
- 05/1999 B.S. - Psychology, University of Oregon
- 05/1999 B.S. - Journalism/Public Relations, University of Oregon

Appointments:

- Assistant Director, Global Professional Practice Program, Purdue University, 2009 - Present
- Assistant Director, Global Engineering Program, Purdue University, 2006 - 2009
- Study Abroad Coordinator, Office of International Programs, Western Kentucky University, 2001 - 2006
- Adjunct Professor, Introduction to Psychology (Lower division), Department of Psychology, Western Kentucky University, 2003 – 2004
- Adjunct Professor, International Public Relations (Upper division), School of Journalism & Broadcasting, Western Kentucky University, Spring 2003
- Teaching Assistant, Group Dynamics, Department of Psychology, University of Oregon, Fall 1999
- Research Assistant, Department of Psychology, University of Oregon, 1998 - 2000
- Overseas Study Assistant, Office of International Programs, University of Oregon, 2000 - 2001

Proposal-related publications:

1. Chang, Y and Hirleman, E. D. (2008). Summary and Recommendations for International Research and Engineering Education. Conference proceeding for 2007 NSF-International Research and Engineering Education Grantees Conference, National Science Foundation, March 2008.
2. Chang, Y. and Hirleman, E.D. (2008), "Proceedings of the International Research and Education in Engineering (IREE) 2007 Grantees Conference: Summary and Recommendations," <https://globalhub.org/resources/135>.
3. Chang, Y., Atkinson, D., Hirleman, E.D. (2008). Impact and Best Practices for International Research and Engineering Education. Conference proceeding for 2008 Global Colloquium, American Society of Engineering Education Conference, October 2008.
4. Chang, Y. and Hirleman, E.D. (2009), "International Research and Engineering Education (IREE): Impact and Best Practices," *Online Journal of Global Engineering Education*, Vol. 4: Iss. 2, Article 1. Available at: <http://digitalcommons.uri.edu/ojgee/vol4/iss2/1>, 2009.
5. Chang, Y. and Hirleman, E.D. (2010), "Proceedings of the International Research and Education in Engineering (IREE) 2008 Grantees Conference: Summary and Recommendations," <https://globalhub.org/resources/2646>.

Other publications:

6. Chang, Y. (2001). The Difference between People with Individual and Collective Thinking in Explaining Group Outcomes. Master Thesis Available in the Graduate School Library, University of Oregon, June 2001.
7. Abe, J. & Chang Y. (2002). Survey: Entry into the Field of International Education. Retrievable from NAFSA Foreign Born International Educators Special Interest Group web site: <http://www.wmich.edu/oiss/fbie/resources.htm> .
8. Chang, Y and Pennywell, J. (2007). Internationalization for Austin Peay State University: A Strategic Plan for the 21st Century. Doctoral Capstone Project Available in the Peabody Library, Vanderbilt University, May 2007.
9. Atkinson, D., Hirleman, D., Groll, E., Chang, Y. (2008). Coherence in Global Engineering Curriculum Design: Going Forward with What Works. Conference proceeding for 2008 Global Colloquium, American Society of Engineering Education Conference, October 2008.
10. Irfanoglu, A. and Chang, Y. (2009). Towards Earthquake Engineering without Borders: Lesson Learned from an Interactive Webcast Earthquake Engineering Course that Includes Study Abroad Experience. Conference proceeding for 2009 American Society of Engineering Education Conference, June 2009.

Synergistic Activities:

- Network Leader, International Educational Leadership Development Network, NAFSA: Association of International Educators, 2008 – Present; Regional Representative, Subcommittee for Under-representation in Education Abroad, NAFSA, 2006 – 2008
- Member, Global Engineering Program Team, Purdue University, 2006 – 2008
- Program Chair, International Research and Engineering Education Conference, National Science Foundation, 2007- 2009.
- Served on the Board of Trustees (2002-06) of the Cooperative Center for Study Abroad, as Fulbright Advisor, and as a Selection Panelist for the national-level scholarship program for International Institute of Education.
- Organized numerous workshops and conferences with National Science Foundation, American Society of Engineering Education, and the Colloquium of International Engineering Education.

Collaborators & Other Affiliations: (last 48 months): Prof. J.H. Bøhn, Virginia Tech; Prof. Deba Dutta, UIUC; Prof. D. Ebert, Purdue; Prof. T.S. Fisher, Purdue; J. M. Grandin, U. Rhode Island; Prof. E. Groll, Purdue; Prof. W. Hong, Chinese Program, Purdue; Prof. E.D. Hirleman, Purdue; Dr. B. Jesiek, Purdue; Dr. D. Atkinson, Purdue; Prof. A. Irfanoglu, Purdue; Prof. Abe, J., Western Michigan University; Prof. J. Pennywell, Purdue University - Calumet

Graduate Advisor (M.S. & Ph.D): Holly Arrow, University of Oregon; John Braxton, Vanderbilt University

**Current and Pending
CHANG, YATING**

1/24/2011

Supporting Agency	Project Title	Total Award	Period Covered	Academic Months	Summer Months	Location
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Current

No Current Support at this Time

Pending

BEVERLY DAVENPORT SYPHER

Associate Provost and Susan Bulkeley Butler Chair for Leadership Excellence
Professor of Communication
Purdue University * 100 Hovde Hall * West Lafayette, IN 47906-1073
Voice: (765) 494-9709 Fax: (765) 496-2031
e-mail: bdsypher@purdue.edu

(a) PROFESSIONAL PREPARATION:

Ph.D. The University of Michigan, Communication/Organizational Behavior
B.A., MA Western Kentucky University, Communication/Journalism

APPOINTMENTS:

2002-present Associate Provost for Special Initiatives; Professor of Communication, Purdue
2007- present Susan Bulkeley Butler Chair for Leadership Excellence, Director of the Susan Bulkeley Butler Center for Leadership Excellence
2005-2007 Director of the Discovery Learning Center, Discovery Park, Purdue
2001-2002 Senior Fellow, Office of the Provost, Virginia Polytechnic University;
1994-2001 Divisional Dean for Social Sciences, Professor of Communication, University of Kansas
1993-94 Vice Chancellors Fellow, Office of Academic Affairs, University of Kansas
1988 Chair; Associate Professor, Dept. of Communication, University of KY 1987
1987 Distinguished Visiting Fellow, Chisholm Institute of Tech., Melbourne, Australia.
1981-87 Assistant Professor, Department of Communication, University of Kentucky
1980-81 Instructor, Department of Business Administration, University of Kentucky

(b) RESEARCH AREAS:

organizational communication; organizational assessment; quality of work life; leadership; learning outcomes; assessment of learning; student success; diversity; digital media and learning

(c) PUBLICATIONS (selected)

- (1) Sypher, B.D. & Lutgen-Sandvik, P. (2009). *Destructive organizational communication*. New York: Routledge Press.
- (2) Sypher, B.D., Abel, S.A., Cox, M., Reed-Rhodes, T. & B. Berkelaar (2009). *Developing engineering faculty as leaders of academic change. A report from the workshop to advance on campus engineering faculty leadership programs. An NSF funded partnership with the Center for the Advancement of Scholarship on Engineering Education*.
- (3) Sypher, B.D. & M.J. Gill (2009) Workplace incivility and organizational trust. In Lutgen-Sandvik, P. & Sypher, B.D. *Destructive organizational communication*. New York: Routledge Press, 53-75.
- (4) Sypher B.D. (2005) Reclaiming civil discourse in the workplace. *Southern Speech Communication Journal*. 69, 3, 257-269
- (5) Sypher B.D., Russo, T. & Hane, A.C. (2002) Developing persuasive ability in college students. *American Communication Journal*, 5, 3, <http://www.acjournal.org/>.
- (6) Sypher, B.D. (Ed.) (1997 and 1991). *Case studies in organizational communication. Volumes I and II*. New York, Guilford Press.

(7) Sypher, B.D., Whitten, P. & Shuler, S. (1997). Making sense out of creativity and constraints. In B.D. Sypher (Ed.) *Case studies in organizational communication 2* (pp. 11-31). New York: Guilford Press.

(8) Sypher, B.D. (1991). A message-centered approach to leadership. In J.A. Anderson (Ed.) *Communication Yearbook 14* (pp. 547-600), Newbury Park, CA: Sage Publications.

(9) Sypher, B.D., Sypher, H.E., Housel, T.J. & Booth, R. (1990). The role of communication in automating IBM/Lexington. In B.D. Sypher (Ed.) *Case studies in organizational communication* (pp. 254 - 268), New York: Guilford Press.

- **Over 20 years experiences in conducting leadership and management training programs and workshops for university, industry, and government leaders.**
- **Over 100 technical reports on organizational assessments, student and faculty success, underrepresented populations, learning outcomes, learning assessments, curriculum design, organizational assessments, external program reviews, university research profiles, etc.**

(d) SYNERGISTIC ACTIVITIES

1. Principal lead/Senior Consultant along with Dr. Kamyar Haghighi in planning and designing a national conference on *Developing Engineering Faculty as Leaders of Change*. Norman Fortenberry (PI).

2. Awarded Techpoint's 2008 *Mira Award for Outstanding Contributions to Technology* in the State of Indiana for Serious Games initiatives at Purdue University.

3. (April 2007); organized Serious Games Research Forum (October 2007).

4. *Discovery Learning Center Director*: Oversight responsibility for \$30 million in external funding to identify, develop, and nurture interdisciplinary teams and projects that focus on discovery, learning, and engagement especially in the STEM disciplines

5. *PI or Co-PI for some \$18 million* in grants from the Department of Education and the National Science Foundation to design, implement, and evaluate programs to increase the success of underrepresented populations.

6. *Government and industry contracts* to assess corporate and public communication practices; to design, deliver, and evaluate workplace learning programs; and to develop systems for evaluating corporate educational programs.

7. Consultant, David & Lucile Packard Foundation and Bill and Melinda Gates Foundation awards to design and evaluate entertainment education programs.

(e) COLLABORATORS & OTHER AFFILIATIONS

Non-Purdue Collaborators P. Whitten, Michigan State University; C. Clemens, corporate; G. Doolittle, U. Kansas Medical Center; M. McKinley; Caitlin Kelleher, Washington University in St. Louis; Robert Levy, Paws, Inc.

Graduate and Postdoctoral Advisors: D. O'Keefe, Northwestern; W. Coleman, U. of Michigan; **Thesis Advisor and Postgraduate-Scholar Sponsor:** directed 32 dissertations and theses.

**Current and Pending
SYPHER, BEVERLY D**

1/24/2011

Supporting Agency	Project Title	Total Award	Period Covered	Academic Months	Summer Months	Location
Current						
National Science Foundation	Midwest Crossroads Alliance For Graduate Education And The Professioriate (agep)	3,309,470.00	10/01/2004 - 03/31/2011	0.45	0.00	West Lafayette, IN
National Science Foundation	Louis Stokes Alliance For Minority Participation Indiana - Phase II - Amendment 3	2,544,580.00	05/01/2007 - 04/30/2012	0.45	0.00	West Lafayette, IN
National Science Foundation	Mass Spectrometry Analysis By Surface Ionization, A Fast Cooperation	40,194.00	05/01/2007 - 04/30/2012	0.45	0.00	Calumet, IN
Pending						

Eckhard A. Groll, Dr. Eng.
Professor of Mechanical Engineering
Director of the Office of Professional Practice

Purdue University
School of Mechanical Engineering
140 S. Martin Jischke Drive
West Lafayette, Indiana 47907

Phone: (765) 496-2201
Fax: (765) 494-0787
e-mail: groll@purdue.edu
http://me.www.ecn.purdue.edu/ME/Fac_Staff/groll

(i) PROFESSIONAL PREPARATION

- 02/94 German "Doktor-Ingenieur" (Doctorate) in Mechanical Engineering
University of Hannover, Hannover, Germany
- 11/89 German "Diplom-Ingenieur" (Master Degree) in Mechanical Engineering
Ruhr-University of Bochum, Bochum, Germany
- 10/86 German "Diplom-Vorprüfung" (Bachelor Degree) in Mechanical Engineering
Ruhr-University of Bochum, Bochum, Germany

(ii) APPOINTMENTS

- 08/08 – present Director, Office of Professional Practice, Purdue University, W. Lafayette, IN, USA
- 09/07 – 07/08 Interim Director, Office of Professional Practice, Purdue U., W. Lafayette, IN, USA
- 04/07 – 07/07 Guest Professor, University of Karlsruhe, Karlsruhe, Germany
- 08/05 – present Professor of Mechanical Engineering, Purdue U., West Lafayette, IN, USA
- 07/05 – 07/08 Director of Global Initiatives, Cooperative Education and Professional Experiences in the
School of Mech. Eng., Purdue U., West Lafayette, IN,
- 01/03 – 07/03 Guest Professor, University of Karlsruhe, Karlsruhe, Germany
- 08/00 – 07/05 Associate Professor of Mech. Eng., Purdue U., West Lafayette, IN, USA
- 07/94 – 07/00 Assistant Professor of Mech. Eng., Purdue University, West Lafayette, IN, USA
- 12/91 – 06/94 Faculty Research Assistant, University of Maryland, College Park, MD, USA
- 01/90 – 11/91 Research Engineer, University of Hannover, Hannover, Germany
- 03/89 – 10/89 Project Engineer, Hoechst AG, Technical Examination, Frankfurt, Germany
- 01/88 – 12/88 Research Assistant, Texas A&M University, College Station, Texas, USA
- 04/87 – 12/87 Research Assistant, Ruhr-University of Bochum, Bochum, Germany

(iii) PUBLICATIONS

(a) Education-related publications:

- Allert, B.I., Atkinson, D.L., **Groll, E.A.**, and Hirleman, E.D., "Making the Case for Global Engineering: Building Foreign Language Collaborations for Designing, Implementing, and Assessing Programs," (MS#1009), Online Journal for Global Engineering Education, Vol. 2, Issue 2, 2007.
- E.D. Hirleman, D. Atkinson, **E.A. Groll**, J. Matthews, L. Xu, B. Allert, W. Hong, A. Albers, S.L.K. Wittig, Z.Q. Lin, and L.F. Xi, "GEARE: A Comprehensive Program for Globalizing Engineering Education," paper 2004-1195, pp. 1-10, *Proc. 2004 ASEE Annual Conf.* (2004).
- E.D. Hirleman, D. Atkinson, **E.A. Groll**, J. Matthews, C. Krousgrill, G. Chiu, P. Meckl, A. Bajaj, L. Xu, B. Allert, W. Hong, A. Albers, N. Burkardt, Z. Q. Lin, L. F. Xi, S. L. K. Wittig, and K. Iyer, "Global Engineering Education via Integrated Study and Work Abroad", *Proceedings of International Conference on Engineering Education, ICEE 2006*.
- E.A. Groll**, C.M. Krousgrill, P. Meckl, and E.D. Hirleman, "Experiences with multinational and multi-semester design team projects", *Frontiers in Education 2006*, Conf. Proc. (CD), Paper 1016, San Diego, CA, 2006.
- E.A. Groll**, and E.D. Hirleman, "Undergraduate GEARE Program: Purdue University's School of ME Contribution to Educating Globally Sensitive and Competent Engineers," *ASEE – Global Colloquium on Engineering Education*, Istanbul, Turkey, October 1-4, 2007.

(b) Research-related publications:

- Robinson, D.M., and **Groll, E.A.**, "Efficiencies of Transcritical CO₂ Cycles with and without an Expansion Turbine," *Int'l J. Refrigeration*, Vol. 21, No. 7, 1998, pp. 577-589.
- Chen, Y., **Groll, E.A.**, and Braun, J.E., "Modeling of Hermetic Scroll Compressors: Model Validation and Application," *Int'l J. HVAC&R Research*, Vol. 10, No.3, July 2004, pp. 307-329.
- Li, D., and **Groll, E.A.**, "Transcritical CO₂ refrigeration cycle with ejector-expansion device," *Int'l J. Refrigeration*, Vol. 28, No. 5, 2005, pp. 766-773.

Kim, J.-H., and Groll, E.A., "Feasibility study of a bowtie compressor with novel capacity modulation," Int'l J. Refrigeration, Vol. 30, No. 8, 2007, pp. 1427-1438.

Bertsch, S.S., Groll, E.A., and Garimella, S.V., "Refrigerant flow boiling heat transfer in parallel microchannels as a function of vapor quality," Int'l J. Heat and Mass Transfer 51 (2008), pp. 4775-4787

(iv) SYNERGISTIC ACTIVITIES

Since joining Purdue, Prof. Groll has been the principal investigator (PI) or Co-PI on 77 research grants and 39 educational grants with a total budget of \$7 million from various agencies, including the Air Conditioning and Refrigeration Technology Institute (ARTI), the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), the California Energy Commission (CEC), the Cooling Technologies Research Center (CTRC) at Purdue University, the National Science Foundation, the U.S. Army and U.S. Air Force, and twenty HVAC&R companies. Since joining Purdue, he has graduated sixteen doctoral students and twenty-six master students. He advised 38 undergraduate project students, 38 visiting scholars or visiting research associates, and 5 post-doctoral researchers. Currently, he advises 6 Ph.D. students, 4 master students, and 1 visiting scholar. He has authored or co-authored 66 archival journal articles and 113 conference papers. He has been the co-author of 2 handbook chapters and the editor or co-editor of 7 conference proceedings. He has given 45 invited lectures and seminars, and 4 keynote lectures. He serves as the Regional Editor for the Americas for the International Journal of Refrigeration. He has organized and chaired 8 international conferences on topics of Refrigeration, Air Conditioning, Compressors, and Natural Working Fluids. In addition, he was Program Co-Chair of the 2003 Int'l Congress of Refrigeration in Washington, D.C. Prof. Groll's leadership in higher university administration has been recognized through his participation in the CIC-ALP (Academic Leadership Program) during 2009-2010 and his naming of an ACE (American Council on Education) Fellow for 2010-2011. Prof. Groll has received numerous awards for his teaching excellence including his induction into Purdue's Book of Great Teachers in 2008, his induction as a Fellow of the Purdue Teaching Academy in 2005 and the 2005 Charles B. Murphy Award for outstanding undergraduate teaching at Purdue University. Prof. Groll's achievements in research have been recognized with his naming of Purdue University Faculty Scholar in 2007, becoming ASHRAE Fellow in 2006, the 2003 B.F.S. Schaefer Outstanding Young Faculty Scholar Award, and the 1997 ASHRAE New Investigator Award.

(v) COLLABORATORS & OTHER AFFILIATIONS

(a) Collaborators and Co-Editors (last 48 months)

Professors Stuart Bolton, James E. Braun, Qinyan Chen, E. Daniel Hirleman, Suresh V. Garimella, W. Travis Horton, Brent Jesiek, Galen B. King, and Steven H. Pekarek, all Purdue University; Prof. Jan Helge Bøhn, Virginia Tech; Prof. Deba Dutta, University of Michigan; Prof. Juan Lucena, Colorado School of Mines; Prof. Jianyi Zhang, Xiamen Fisheries College, China

(b) List of names of graduate and postdoctoral advisors

Prof. Dr.-Ing. Horst Kruse, University of Hannover, Hannover, Germany; Prof. Reinhard Radermacher, University of Maryland, College Park, MD; Prof. Leroy S. Fletcher, Texas A&M University, College Station, TX; Prof. Dr.-Ing. H. Kremer, Ruhr-University of Bochum, Bochum, Germany

(c) Thesis Advisor and Postgraduate-Scholar Sponsor (last 5 years)

Post-Docs Advised: Lorenzo Cremaschi (Oklahoma State Univ., OK), Josef Riha (Guentner, Germany), Liu Fang (Field Diagnostic Services, PA); Ph.D. Advised: Jun-Hyeung Kim (University of Alabama, AL), Bo Shen (ORNL, TN), Daqing Li (UT Carrier, NY), Jason Hugenroth (Invent Therm, LO), Suwat Trutassanawin (Mahidol University, Thailand), Anthony F. Black (Energy Utility, Kansas), Miguel Jovane (Univ. of Panama, Panama), Abhijit Sathe (Parker, NC), Stefan S. Bertsch (NTB, Switzerland); MS Advised: David Bouffard (Maine), Rudy Chervil (Johnson Controls-York, PA), Nathanael L. Grauvogel (U.S. Army), Christopher A. Parker (NREL, CO), Anthony E. Wright (BP, Alaska), Eric S. Lynch (OTC, Purdue); Visiting Scholars Advised: Prof. Tahsin Boyman (HTA Lucerne, Switzerland), Vincent Lemort, (University of Liège, Belgium); Li Yutong (Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong); Prof. Walid Chakroun (Kuwait University, Kuwait), Prof. Yong Li (Shanghai Jiaotong University, China); Dr. Peng Bin (Lanzhou University of Technology, China), Yang Bin (Xi'an Jiaotong University, China), Prof. Cao Feng (Xi'an Jiaotong University, China); Current Advisees: Christian K. Bach (Purdue, IN), Ian Bell (Purdue), Craig Bradshaw (Purdue), Derek Hegenfeld (Purdue), Brett Leonard (Purdue), Jian Li (Xi'an Jiaotong University, China), Margaret M. Mathison (Purdue), Joe Poland (Hill Phoenix, GA), Bryce Shaffer (Purdue), Matthew Vargo (Purdue), Brandon Woodland (Purdue)

Current and Pending Support

(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Eckhard Groll	Other agencies (including NSF) to which this proposal has been/will be submitted. None
------------------------------------	---

Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support
Project/Proposal Title: IREE-S 2011: Educating Globally Competent Engineering Researchers (this proposal)
Source of Support: NSF-EEC
Total Award Amount: \$ 1,084,983 Total Award Period Covered: 01/01/11-03/31/12
Location of Project: Purdue University
Person-Months Per Year Committed to the Project. 1/2 Cal: Acad: Sumr:

Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support
Project/Proposal Title: Organic Rankine Cycle with Solution Circuit for Electronic Waste Heat Recovery
Source of Support: Cooling Technologies Research Center (CTRC) at Purdue University
Total Award Amount: \$ 80,000 Total Award Period Covered: 06/01/10 - 5/31/12
Location of Project: Purdue University
Person-Months Per Year Committed to the Project. 1/2 Cal: Acad: Sumr:

Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support
Project/Proposal Title: Development of a High Performance Cold Climate Heat Pump
Source of Support: U.S. Department of Energy
Total Award Amount: \$ 1,331,435 Total Award Period Covered: 09/01/10-08/31/13
Location of Project: Purdue University
Person-Months Per Year Committed to the Project. 1/2 Cal: Acad: Sumr:

Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support
Project/Proposal Title: 2007 Purdue University Faculty Scholar Award
Source of Support: Purdue University
Total Award Amount: \$ 50,000 Total Award Period Covered: 09/01/06 – 08/31/11
Location of Project: Purdue University
Person-Months Per Year Committed to the Project. 1/2 Cal: Acad: Sumr:

Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support
Project/Proposal Title: Testing of a Prototype Hermetic Carbon Dioxide Compressor
Source of Support: EcoThermics
Total Award Amount: \$ 19,000 Total Award Period Covered: 05/1/09 – 4/30/11
Location of Project: Purdue University
Person-Months Per Year Committed to the Project. 1/2 Cal: Acad: Sumr:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

Current and Pending Support

(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.					
Investigator: Eckhard Groll	Other agencies (including NSF) to which this proposal has been/will be submitted. None				
Support: <input checked="" type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title: IREE: Developing Globally Competent Engineering Researchers					
Source of Support: NSF					
Total Award Amount: \$959,736		Total Award Period Covered: 01/15/2010 - 03/31/2011			
Location of Project: Purdue University					
Person-Months Per Year Committed to the Project.	1/2	Cal:	Acad:	Sumr:	
Support: <input checked="" type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title: Organic Rankine Cycle with Solution Circuit for Waste Heat Recovery					
Source of Support: Herrick Foundation					
Total Award Amount: \$ 149,600		Total Award Period Covered: 01/01/10-12/31/11			
Location of Project: Purdue University					
Person-Months Per Year Committed to the Project.	1/2	Cal:	Acad:	Sumr:	
Support: <input checked="" type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title: Optimizing Refrigerant Distribution in Evaporators					
Source of Support: California Energy Commission - Building Energy Research Grant (BERG) Program					
Total Award Amount: \$ 249,729.12		Total Award Period Covered: 08/01/09 - 07/31/11			
Location of Project: Purdue University					
Person-Months Per Year Committed to the Project.	1/2	Cal:	Acad:	Sumr:	
Support: <input checked="" type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title: Conduction Cooled Electronic/Electrical Modules in Liquid Cooled Cabinets, Phase II: Experimental Analysis					
Source of Support: The Boeing Company					
Total Award Amount: \$ 91,394		Total Award Period Covered: 02/23/10-02/28/11			
Location of Project: Purdue University					
Person-Months Per Year Committed to the Project.	1/2	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title:					
Source of Support:					
Total Award Amount: \$		Total Award Period Covered:			
Location of Project:					
Person-Months Per Year Committed to the Project.		Cal:	Acad:	Sumr:	
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.					