

# TUEE

Transforming Undergraduate Education in Engineering

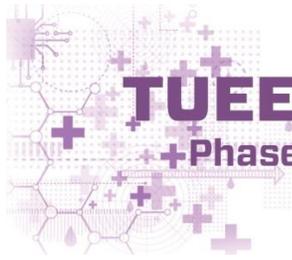
**Phase III: Voices on Women's Participation and Retention**

June 12-13, 2015 | The W Seattle Hotel



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## **TUEE** Transforming Undergraduate Education in Engineering **+ Phase III: Voices on Women's Participation and Retention**

### **Background and Purpose**

This workshop is part of the NSF-funded multi-phase, multi-year *Transforming Undergraduate Education in Engineering* (TUEE) initiative seeking to understand the knowledge, skills, and abilities of next-generation engineering graduates as well as needed changes in curricula, pedagogy, and academic culture in U.S. engineering undergraduate programs. The first phase of the project, *Synthesizing and Integrating Industry Perspectives*, was designed to hear the perspectives of industry. Phase II, *Insights from Tomorrow's Engineers*, involved the voices of students.

Phase III is designed to address the chronic problem of low female participation and success in the U.S. engineering undergraduate programs by convening representatives from academia, professional societies, federal agencies, and industry to develop and refine a national action agenda.

### **Statement of Expectations and Outcomes**

Define a set of recommendations and actions that have the potential for reducing the gender gap in engineering. Our primary focus will be to provide guidance on necessary changes to undergraduate curricula, pedagogy, and academic culture to achieve gender inclusive engineering education.

### **Framework for Workshop Conversations:**

1. We are all part of the problem, we are all part of the solution
2. We should focus on solutions and dialogue rather than debating the data
3. We need recommendations and solutions that are not funding/resource intensive.

# Workshop Agenda

Friday, June 12, 2015

1:30 PM - 2:00 PM	<b>Registration</b>	<b>Foyer</b>
2:00 PM - 2:25 PM	<b>Welcome and Setting the Stage</b> <i>Norman Fortenberry</i> , Executive Director, American Society for Engineering Education <i>Diane Matt</i> , Executive Director, Women in Engineering ProActive Network	<b>Great Room 1B</b>
2:25PM - 2:45PM	<b>Keynote</b> <i>Christianne Corbett</i> , Senior Researcher, American Association of University Women	<b>Great Room 1B</b>
2:45 PM - 3:45 PM	<b>Panel: Discussion Starters</b> Empirical Description of the State of Affairs <i>Clemencia Cosentino</i> , Senior Researcher and STEM Area Leader, Mathematica Policy Research <i>Amlan Banerjee</i> , Senior Research Associate, American Society for Engineering Education Perception of Engineering <i>Lecia Barker</i> , Associate Professor, University of Texas at Austin The Undergraduate Experience <i>Rachelle Reisberg</i> , Assistant Dean for Engineering Enrollment and Retention & Director of Women in Engineering, Northeastern University Promising Practices <i>Daryl Chubin</i> , Independent Consultant	<b>Great Room 1B</b>
3:45 PM - 4:00 PM	<b>Break</b> (Refreshments Served)	<b>Foyer</b>
4:00 PM - 5:30 PM	<b>Breakout Session I</b> Facilitated small group discussion. Breakouts by <i>Discussion Starters</i> themes.	<b>Great Room 1A, Great Room 1B, Studio 1, Studio 2</b>
5:30 PM - 6:00 PM	<b>Break</b>	<b>Foyer</b>
6:00 PM - 8:00 PM	<b>Dinner</b> <b>Report from Breakout Groups</b> Facilitated large group discussion	<b>Great Room 1B</b>

## Saturday, June 13, 2015

7:30 AM - 7:50 AM	<b>Breakfast</b>	<b>Foyer</b>
7:50 AM - 8:20 AM	<b>Day 1 Recap and Pre-workshop Survey Results</b> <i>Teri Reed</i> , Assistant Vice Chancellor of Academic Affairs, Texas A&M University  <i>Brian Yoder</i> , Director Assessment, Evaluation and Institutional Research, American Society for Engineering Education	<b>Great Room 1B</b>
8:20 AM - 8:30 AM	<b>Break</b>	<b>Foyer</b>
8:30 AM - 10:00 AM	<b>Breakout Session II</b> Facilitated small group discussion. Breakouts by sector of influence.	<b>Great Room 1A, Great Room 1B, Studio 1, Studio 2</b>
10:00 AM - 10:45 AM	<b>Report from Breakout Groups</b> Facilitated large group discussion	
10:45 AM - 11:00 AM	<b>Break</b> (Refreshments Served)	<b>Foyer</b>
11:00 AM - 12:30 PM	<b>Breakout Session III</b> Facilitated small group discussion. Breakouts by sector of influence.	<b>Great Room 1A, Great Room 1B, Studio 1, Studio 2</b>
12:30 PM - 1:00 PM	<b>Lunch</b>	<b>Foyer</b>
1:00 PM - 2:00 PM	<b>Overall Discussion of Visions and Actions</b> Facilitated large group discussion	<b>Great Room 1B</b>

## Planning Committee

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### **Rocio C. Chavela Guerra**

Rocio Chavela is Director of Education and Career Development at the American Society for Engineering Education (ASEE). She holds a Ph.D. in Engineering Education from Purdue University, a B.S. and a M.S. in Chemical Engineering from Universidad de las Americas, Puebla in Mexico, where she served as a faculty member for five years. Dr. Chavela is a past graduate fellow of the National Academy of Engineering's Center for the Advancement of Scholarship in Engineering Education. Her current efforts focus on faculty and graduate student development, with particular emphasis on the adoption of evidence-based instructional practices in engineering education.

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### **Daryl Chubin**

Daryl Chubin is an independent consultant living in Savannah, Georgia. From 2004-2011, he was Founding Director of the Center for Advancing Science & Engineering Capacity at AAAS in Washington, DC. Prior to that, he was Senior Vice President at the National Action Council for Minorities in Engineering after nearly 15 years in federal service at the National Science Board, the National Science Foundation, the White House Office of Science and Technology Policy, and the congressional Office of Technology Assessment. He served on the faculty of four universities, achieving the rank of Professor at the Georgia Institute of Technology and, 1991-2010, as Adjunct Professor in Cornell University's Washington Program. Dr. Chubin is the author of eight books and numerous reports and articles on science and education policy and evaluation, and career development. He is also a columnist for MemberCentral, the members-only site at [www.membercentral.aaas.org](http://www.membercentral.aaas.org).

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### **Yolanda Comedy**

Yolanda L. Comedy is the Director of the American Association for the Advancement of Science (AAAS) Center for Advancing Science & Engineering Capacity and independent consultant working on science and technology (S&T) issues including S&T policy; cybersecurity; space commercialization; science, technology, engineering and mathematics (STEM) education and diversity; and business strategy. Comedy obtained her Ph.D. from Indiana University in Political Science and Public Policy. She spent two years leading efforts on global democracy issues for the USAID as an AAAS fellow. Comedy worked for the White House, serving as a Senior Policy Analyst for both the President's Committee of Advisors on Science and Technology and the President's Information Technology Advisory Committee. She then moved to IBM and was worked on initiatives in philanthropy, governmental programs and consulting on issues ranging from education reform, to the impact of advancements in semiconductors and supercomputers, to innovation, and the effect of a global pandemic on business.

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### **Roger Green**

Roger Green received BS, MS, and PhD degrees in electrical engineering from the University of Wyoming in 1992, 1994, and 1998, respectively. During his Ph.D. studies, he also obtained a graduate minor in statistics. He is currently an Associate Professor and Undergraduate Coordinator with the Electrical and Computer Engineering department at North Dakota State University, where he teaches courses and conducts research in signal processing. Since its inception in 2008, Dr. Green has been an active member of the NDSU Advance FORWARD Advocates, a group of male faculty dedicated to effecting departmental and institutional change in support of gender equality. As part of this group, he regularly trains men, at NDSU and other institutions, to better serve as gender equity allies. Dr. Green is the author of a series of advocacy tips, published by the Women in Engineering Division (WIED) of ASEE and available at [wied.asee.org](http://wied.asee.org).

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### **Beth Holloway**

Beth Holloway is the Director of the Women in Engineering Program (WIEP) and the Assistant Dean for Undergraduate Education in the College of Engineering at Purdue University. WIEP develops and administers research-based comprehensive activities and programs to recruit and retain women in engineering from Kindergarten through graduate school. As Assistant Dean, she is responsible for the College's scholarship strategy, retention of undergraduate students, and undergraduate student data. Her research areas include differential retention issues for students across engineering disciplines; engineering admissions practices; and women and leadership, particularly in male dominated careers. Holloway was president of the Women in Engineering ProActive Network (WEPAN) in 2006-07. She is the current chair of the Women in Engineering Division of the American Society for Engineering Education. Holloway received B.S. and M.S. degrees in Mechanical Engineering and a Ph.D. in Engineering Education, all from Purdue University.



### **Diane Matt**

Diane Matt is the Executive Director of (WEPAN), Women in Engineering ProActive Network, a national organization focused on leveraging research and best practices to propel the full inclusion of women in engineering higher education and the workforce. In her role with WEPAN, Matt works with leaders and advocates from 140 universities and with 24 major corporations that are committed to values of diversity and inclusion. WEPAN is a 25-year old organization with a vision of sustainable, systemic inclusion in engineering. WEPAN is known as a thought leader and for undertaking strategic, practical initiatives to advance STEM gender diversity. Ms. Matt brings a deep understanding of the urgency of advancing gender equality in engineering, the organizational and individual barriers to be addressed; cutting-edge insights into successful precedents in bellwether universities and corporations, and the networks of professionals that are in the forefront of this effort.



### **Adrienne Minerick**

Adrienne R. Minerick is an Associate Professor of Chemical Engineering at Michigan Technological University and Faculty Fellow in the Office of Research. She directs the Medical microDevice Engineering Research Laboratory (M.D. – ERL), teaches graduate and undergraduate classes, and is active in chemical engineering educational pedagogy as well as women in engineering programs. She presently serves as the treasurer of the Women in Engineering Division, American Society for Engineering Education's Professional Interest Council I Chair, and is the co-chair of ASEE's Diversity Committee.



### **Teri Reed**

Dr. Teri Reed received her B.S. in petroleum engineering from the University of Oklahoma and spent seven years in the petroleum industry, during which time she earned her MBA. She subsequently received her Ph.D. in industrial engineering from Arizona State University. An advocate for research-informed approaches to engineering education, curricular reform, equity, cultural humility and policy, as well as student recruitment and retention efforts, Dr. Reed has made significant contributions nationally as well as at Arizona State University, the University of Oklahoma, Purdue University, and Texas A&M University where she has spent her academic career. She is a fellow of the American Society for Engineering Education (ASEE), and a member of the Institute of Electronics and Electrical Engineers, and the Society of Petroleum Engineers. She serves as an ABET Engineering Accreditation Council evaluator for ASEE, is the past co-chair of the Undergraduate Experience Council, and chair of the Diversity Committee.



### **Crystal Sayles**

Crystal D. Sayles is a Senior Patent Attorney for Intel Corporation. She currently manages US and foreign patents/patent applications for the System Software Portfolio. Ms. Sayles began her legal career in 1995, with the D.C. law firm of Sterne, Kessler, Goldstein & Fox, P.L.L.C. (SKGF). She remained with SKGF until she joined Intel Corporation (2002). Prior to joining SKGF, Ms. Sayles was a Senior Engineer with The Johns Hopkins University/Applied Physics Laboratory, where she designed and developed hardware and software prototype systems for military and civilian applications. Ms. Sayles received her J.D. from The American University Washington College of Law. She received Master of Science Degrees in Electrical Engineering and Computer Science from The Johns Hopkins University, and her Bachelor of Science degree in Systems Engineering from Boston University. She is admitted to practice law in Maryland, D.C., and Virginia, and before the United States Patent and Trademark Office (U.S.P.T.O.).

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## **Workshop Attendees**

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### **Stephanie G. Adams**

Stephanie G. Adams is a Professor and Head of Engineering Education at Virginia Tech. She previously served as Associate Dean for Undergraduate Studies in the School of Engineering at Virginia Commonwealth University and was a faculty member and administrator at the University of Nebraska-Lincoln. Her research interests include: Teamwork, International Collaborations, Faculty Development, Quality Control/Management and Broadening Participation. She is an honor graduate of North Carolina A&T State University, where she earned her BS in Mechanical Engineering, in 1988. In 1991 she was awarded the Master of Engineering in Systems Engineering from the University of Virginia. She received her Ph.D. in Interdisciplinary Engineering from Texas A&M in 1998. She is the recipient of numerous awards and honors, including the National Science Foundation's prestigious CAREER award. She is a Fellow of the American Society of Engineering Education and serves on the National Advisory Board of the National Society of Black Engineers.

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### **Lecia Barker**

Lecia Barker is an Associate Professor in the School of Information at the University of Texas at Austin and a Senior Research Scientist for the National Center for Women & Information Technology. Lecia conducts research in attracting, retaining, and advancing groups underrepresented in professional computing and science careers; these studies focus on social climate, identity/belonging, faculty adoption of teaching and curricular practices, and sustainable organizational change. She advises several research and implementation projects intended to advance knowledge about computer science education. She is a co-PI of the NCWIT Extension Services program, which provides customized consulting to support systemic reform of computing and engineering departments. Lecia is currently studying faculty adoption of teaching methods in computer science. Lecia holds a Ph.D. in Communication from the University of Colorado at Boulder, a Master of Business Administration from San Diego State University, and a Bachelor of Arts from the University of Iowa.

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### **Tony Chor**

I have the privilege of being the steward for Amazon's product detail page team. This merry band is responsible for building and operating the platform and customer experience for Amazon's product pages, probably one of the most used pages on the internet. We're off building great new experiences and making it easier for teams around Amazon to deliver innovations even more quickly to our customers. I joined Amazon 1.5 years ago. Previously, I worked at Microsoft for many years on projects from Internet Explorer to Bing to Microsoft Golf. I graduated with a degree in Computer Science from Stanford, before the Internet existed. If I had free time, I would race sailboats, enjoy whisky, and lose to my sons at video games.

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### **Christianne Corbett**

Christianne Corbett is a senior researcher at the American Association of University Women (AAUW) and primary author of *Solving the Equation: The Variables for Women's Success in Engineering and Computing* (2015), and *Why So Few? Women in Science, Technology, Engineering, and Mathematics* (2010). Before coming to AAUW, Christianne worked as a legislative aide on Capitol Hill and as a mechanical design engineer in the aerospace industry. She holds a master's degree in cultural anthropology from the University of Colorado, Boulder, and bachelor's degrees in aerospace engineering and government from the University of Notre Dame.

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### **Clemencia Cosentino de Cohen**

Clemencia Cosentino de Cohen (Ph.D., Sociology, Princeton University), a Senior Researcher and STEM Area Leader at Mathematica Policy Research, is the former director of the Program for Evaluation and Equity Research at the Urban Institute. For over 20 years, her work has focused on studying factors that influence educational and professional attainment, particularly among underrepresented groups (women and minorities). Much of her work centers on large scale research and evaluations of reform efforts to improve the participation of underrepresented groups in education and in the scientific workforce. Examples of her work include national research on women in engineering (2009), the evaluation of the National Science Foundation (NSF) ADVANCE program to foster the careers of women in academia (2012), and the recent impact evaluation of the NSF Bridge to the Doctorate (under review).

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### **Karen E. Crosby**

Karen E. Crosby received her Ph.D. in Engineering Science from Louisiana State University in 2000. She is a Professor of Mechanical Engineering at Southern University Baton Rouge, Louisiana, currently on assignment at the National Science Foundation. Dr. Crosby's expertise is in materials science and engineering mechanics. In addition to technical areas, Karen is dedicated to STEM education research, especially enhancing student retention and learning in engineering through innovative teaching methods and integrating research experiences. Her most recent projects have involved STEM outreach and education, including enhancing and creating academic programs and facilitating global research opportunities in Sustainability, specifically materials and technology for renewable energy applications and next-generation composites. Her years of work have garnered local awards for excellence in teaching and research and national recognition for educational leadership and mentoring. When she is not working, Karen enjoys spending time with family and friends experiencing good food, good music, and traveling.

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### **Catherine Didion**

Catherine Didion is a Senior Program Officer at the National Academy of Engineering. Her portfolio includes projects on engineering education, the technical workforce, and diversity. Didion is Principal Investigator or Co-Principal Investigator of several National Science Foundation grants which focus on education & career pathways of students and researchers in engineering with an emphasis on underrepresented populations. Didion is an internationally recognized expert on issues of education, workforce and equity in engineering. She has worked with the European Commission, the South African Ministry of Science and Technology, the Organization of American States and UNESCO. Didion was named in 2012 one of “100 Women Leaders in STEM.” Her honors include 2014 National Academy of Engineering Staff Award; American Association for the Advancement of Science Fellow; AWIS Fellow; Drucker Foundation Fellow; Texaco Management Institute Fellow; and Certificate of Commendation and Distinguished Service, Embassy of the United States of America, Riyadh, Saudi Arabia.



### **James Dorsey**

Currently, as the Executive Director for Washington State MESA at the UW College of Engineering, Mr. Dorsey blends nearly thirty years of progressive senior and executive leadership roles within the MESA organization with a distinct expertise in STEM education, with an emphasis on access for underrepresented students. He has dedicated his career to offering statewide and national leadership to campus-based program administrators and staff, particularly helping to “close the operational and cultural gap” between STEM related undergraduate (university and community college) and pre-college programs. Mr. Dorsey’s leadership and vision has contributed towards several of MESA’s innovations and strategic partnerships; however, his most enduring metric of success is the countless thousands of professional MESA Alumni around the country.



### **Wendy DuBow**

Dr. Wendy DuBow is a senior research scientist and the director of evaluation at NCWIT. She conducts primary research, creates practical print and multimedia resources, and evaluates the effectiveness of the various programs and materials NCWIT produces. Her areas of research include gender, diversity, and the field of computing; evaluation methodology; and the social construction of gender roles. She also is responsible for gathering and presenting the national statistics on female representation in the field of computing and serves as the external evaluator on several National Science Foundation grants.



### **Erica Flores**

Erica Flores received her BS in Electrical Engineering in June 2015 from Seattle University. While at Seattle University, Erica served as the IEEE student branch Chair, and the SWE student branch Vice President. She also served as a department tutor, and has been heavily engaged in improving the department’s student experience. Erica was one of the 40 students selected nationally to participate in the ASEE: Transforming Undergraduate Education in Engineering Phase II workshop (April 2015). Her research interests include signal and image processing and machine learning. In Spring 2013, Erica was awarded the Clare Boothe Luce Undergraduate Research scholarship for her work on snow leopard identification using digital image processing. In September 2015, Erica will begin her MS in Electrical Engineering at the University of Washington.



### **Dr. Alejandro J. Gallard**

Dr. Alejandro J. Gallard has extensive experience as a science teacher and science education researcher. He has obtained and managed large scale National Science Foundation (NSF) projects, which focus on reform in the teaching and learning of science education. Alejandro is also a participating member of the Earth Systems Science Education Alliance, which develops problem-based learning as a framework for earth systems modules that are based on real world science data. He is the past Chair of the American Education Research Association's Hispanic Research Special Interest Group. In addition, Dr. Gallard is an editorial board member of the journal Cultural Studies in Science Education and *Innovación Pedagógica*. His research interests include understanding the complexities that contribute to students' lack of success in the STEM fields. His national and international expertise encompasses three areas: socio-cultural understanding of underrepresented populations targeting Latinas and specifically the role of gender in STEM fields.



### **Stacie Gregory**

Stacie is a Postdoctoral Fellow at ASEE. Dr. Gregory earned her doctorate in Engineering Education at Utah State University. Her research interest is in developing intervention strategies to reduce the negative consequences of Stereotype Threat which may be contributing to the lack of persistence of female and under-represented minority students in engineering. She is also interested in inclusive pedagogical practices, as well as, the integration of Human-Centered Design and Service Learning opportunities to recruit and retain underrepresented students in engineering. At ASEE, she will focus on projects aimed at developing and sustaining online communities for STEM faculty in support of their teaching and research roles. She will champion online community engagement efforts to generate knowledge on community building, management and evaluation. Stacie has a BS in Physics from Spelman College and a MS in Materials Science and Engineering from Georgia Institute of Technology.



### **Charles Hickman**

Charles Hickman is Managing Director, Constituent Relations for ABET, the worldwide accrediting agency for university programs in technical fields. In his role, Hickman is responsible for managing relations with 34 member and technical societies, more than 2,000 volunteers serving in a range of ABET governing and operating positions, and with employers who represent a primary constituent of technical education at the university and collegiate level. Hickman brings varied and lengthy experience in professional education to his ABET duties. For more than 20 years he served in senior staff positions for AACSB International, the accrediting agency and service organization for university-based business schools around the world. He also served as Vice President for Academic Affairs for Quisic, a Los Angeles-based e-learning firm, as Executive Director of the Northeast Ohio Council of Higher Education, and as Director of University Programs at IEEE, the world's largest professional association dedicated to advancing technical innovation.



### **Diana Kardia**

I work with faculty, staff, students, and administrators on leadership and organizational change focused on promoting the health, well-being, and brilliant capacity of higher education, especially at research intensive universities. Over the past 30 years, our work has spanned a variety of diversity-focused efforts (including inclusive pedagogies, climate assessment, intergroup dialogue, and conflict resolution), broadening over time as we recognized that when leadership and educational or organizational practices go awry, those on the margins are impacted the most. Our work focuses on the intelligence and skills needed to engage diversity effectively - be it diversity in identity, opinion, experience, or role - knowing that these same mechanisms promote the cognitive complexity, empathy, and creative problem solving that underlie the mission of education: the capacity to learn, the advancement of the disciplines, and the ability to discern and address the problems of our day.



### **Russell Korte**

Russell Korte is an Associate Professor of Organizational Learning, Performance, and Change in the School of Education at Colorado State University. Dr. Korte studies the socio-cultural systems in organizations and their effects on learning and performance in school and the workplace. This work focuses on engineering students, faculty, and practicing engineers. Prior to Colorado, Korte was at the University of Illinois at Urbana-Champaign where he helped redesign the first year engineering program as a Fellow with the Illinois Foundry for Innovation in Engineering Education and was a member of the Academy for Excellence in Engineering Education—a faculty development program at the University of Illinois. Earlier, he was a research assistant for the Center for the Advancement of Engineering Education at the University of Washington. Dr. Korte received his B.S. in Education, an M.B.A. in Marketing, and a Ph.D. in Work and Human Resource Education from the University of Minnesota.



### **Barbara McAllister Whye**

Barbara McAllister Whye is the Deputy Director of the Intel Diversity in Technology Fund. In this role, Barbara leads the strategy and execution of Intel’s recently announced commitment and fund. Barbara works in collaboration with key stakeholders and respective fund decision makers to ensure that Intel has an integrated strategy that drives our funding selections and public announcements. Prior to transitioning to catalytic philanthropic roles inside of Intel, she spent 15 years in key leadership and project engineering roles responsible for acquiring and starting up new facilities for Intel Corporation worldwide. Barbara has a BS degree in Electrical Engineering, an MBA and currently pursuing a PhD in Human and Social Dimensions of Science and Technology at Arizona State University.



### **Sylvia McMullen**

Sylvia McMullen brings more than 30 years of educational leadership, business development, project management and educational research to her role as President for the Brazos County campuses of Blinn College. Her expertise in data management and education reform has been used with more than 500 schools districts. She was project director for the Nevada Race to the Top and served as a senior consultant to Dell Services on education data management in the development of integrated data warehouses in the Pk-20 environment. McMullen has led education and workforce policy at the state and national level in her role at the Greater Houston Partnership. She has served on numerous state organizations, including the Texas Business Education Coalition, and the Closing the Gap Initiative with the Texas Higher Education Coordinating Board. McMullen has a Master of Educational Administration from Texas A&M University and a Doctorate of Jurisprudence from the University of Houston.



### **Lorelle Meadows**

Dr. Lorelle Meadows received her Ph.D. in Oceanic Science from the University of Michigan, College of Engineering in 2002. Her primary areas of research include the application of high-frequency radar to the determination of air-sea parameters in the near-shore zone as well as natural and anthropogenic influences on near-shore processes and productivity. In 2009, Dr. Meadows joined the University of Michigan, College of Engineering as Assistant Dean of Academic Programs. Her primary responsibility in this role was the design, implementation and assessment of the first year program, as well as targeted curriculum development projects in areas such as ethics and sustainability. She recently shifted her research to engineering education, with specific emphasis on the influence of gender stereotypes in undergraduate student teams. In 2014, she joined Michigan Technological University as the first dean of the new Pavlis Honors College, an innovative college boldly redefining the concept of honors.



### **H. Keith Moo-Young**

Dr. H. Keith Moo-Young became chancellor of Washington State University Tri-Cities in June 2013. Chancellor Moo-Young previously served as Dean of the College of Engineering, Computer Science, and Technology at California State University, Los Angeles. Before that, he was at Villanova University in Pennsylvania as the Associate Dean of Research and Graduate Studies. He earned his Ph.D. and his master's degree in Civil and Environmental Engineering from Rensselaer Polytechnic Institute, a leading technological university in New York state. He also holds an executive master's in technology management from the University of Pennsylvania. Chancellor Moo-Young started his career in higher education at Morgan State University in Baltimore, where he earned a bachelor's degree in civil engineering. As a licensed Professional Engineer, he has conducted research in solid and hazardous waste management, environmental containment, and remediation technologies. He is known for his innovative ideas, his energy, and his focus on student success.



### **Veronica L. Nelson**

Veronica Nelson earned her BS in Mechanical Engineering from Fairleigh Dickinson University and her MS in Mechanical Engineering-Robotics from Howard University. She was the first female to obtain her MS in Mechanical Engineering. She received the National GEM Fellowship and spent her summers during graduate study working for RCA David Sarnoff Research Center. Veronica has held a variety of manufacturing and process engineering positions of increasing responsibility including the development of the first Automated Surface Mount Assembly Line in Northrop Grumman's (NG) Electronic Systems sector. She is currently the University Relationship Manager responsible for developing and implementing strategies to maximize relationships with Northrop Grumman's University partners. She received the 2007 Women of Color Technology Award for Educational Leadership – Corporate Promotion of Education and the 2009 Black Engineer of the Year Award for Educational Leadership – Promotion of Higher Education for her dedication to increasing the STEM Pipeline.



### **Thommi Odom**

Thommi Odom, LAPC, NCC, PMP, PHR relates to the unique challenges professionals face daily. After all, she spent 20 years of her life on the organizational chart in several areas: Accounting (B.S. in Accounting, Mercer University), Information Services (M.B.A., Kennesaw State), Human Resources (M.S. in Professional Counseling, Mercer). Thommi is a certified Psychotherapist and Career Coach who helps individuals fall in love with Mondays again. As a counselor, Thommi specialize in helping adults and couples with: Depression, anxiety, relationship challenges, stress, life transitions such as loss/grief, divorce, job loss, etc. As a Professional Development Coach, Thommi specialize in helping professionals with: identifying and developing a career path, personal branding, creating a job search strategy. Now a doctoral candidate at Mercer, Thommi is in private practice in Savannah, GA and is an adjunct professor at Georgia Perimeter College.



### **Rebecca Primeau**

Rebecca Primeau is the Associate Director of Recruitment & Student Engagement in the College of Engineering at the University of Arizona. In this role she is responsible for developing and coordinating undergraduate recruitment and retention programs, with a specific focus on women and other minority student populations. Her work on diversity and first-year retention extends to several programs, including the Women in Engineering Programming Board, the Society of Women Engineers, the Engineering Leadership Living-Learning Community, and the Engineering Ambassadors. The College of Engineering expects to welcome a freshman class that is 31% female, with a first year retention rate of 91% (AY 2013-14). Rebecca received an M.S. degree in Higher Education Administration from the University of Michigan in 2009. She is currently pursuing a Ph.D. in Higher Education at the University of Arizona.



### **Karl Reid**

Karl Reid is the Executive Director of the National Society of Black Engineers (NSBE), a 31,000 plus student-governed association in Alexandria, Virginia whose mission is to increase the number of culturally responsible black engineers who excel academically, succeed professionally and positively impact the community. Dr. Reid came to NSBE from the United Negro College Fund where he served as Senior Vice President of Research, Innovation and Member College Engagement. Before joining UNCF, he was Associate Dean of Undergraduate Education and Director of the Office of Minority Education at the Massachusetts Institute of Technology (MIT). Dr. Reid earned both his Bachelors and Masters of Science degrees in Materials Science and Engineering from MIT, and his Doctorate of Education from the Harvard Graduate School of Education. His research interests include exploring the relationships between racial identity and self-efficacy, and their influence on the academic achievement of African American males.



### **Rachelle Reisberg**

Rachelle Reisberg is Assistant Dean for Engineering Enrollment and Retention as well as Director of Women in Engineering at Northeastern University. She was the Principal Investigator on the Pathways research grant titled “Self-Efficacy and Retention of Women in Undergraduate Engineering” funded by NSF’s Gender in Science and Engineering program. Rachelle earned her Bachelor’s and Master’s degrees in Electrical Engineering at Rice University. After graduating, she joined IBM in Austin, Texas where she worked in thin film head manufacturing, strategic planning, and marketing support. After IBM, she spent several years at Hanover Insurance in Worcester, MA. She was promoted to Vice President, Information/Systems after the company merged with Allmerica Financial. After doing strategic planning for Allmerica Financial, Rachelle began a high tech start-up company specializing in speech recognition software and training. She was President of this company for five years prior to joining Northeastern University.



### **Donna Riley**

Donna Riley is Program Director for Engineering Education in the Engineering Directorate of the National Science Foundation. She is on detail from Virginia Tech where she is Professor of Engineering Education. Her research interests include engineering and social justice; engineering ethics; social inequality in engineering education; the liberal education of engineers; and engineering studies. Riley joined Virginia Tech from Smith College, where she spent thirteen years as a founding faculty member of the first engineering program at a U.S. woman’s college, and one of very few engineering programs in a liberal arts college context. Riley is the author of two books, *Engineering and Social Justice* and *Engineering Thermodynamics and 21<sup>st</sup> Century Energy Problems*, both published by Morgan and Claypool. She holds a B.S.E. in Chemical Engineering from Princeton University and a Ph.D. in Engineering and Public Policy from Carnegie Mellon University.



### **Thea Sahr**

Thea Sahr is Director of Programs at DiscoverE where she oversees eight international engineering outreach initiatives (such as Engineers Week, Introduce a Girl to Engineering Day, the Future City Competition, and Global Day of the Engineer). Thea also works with DiscoverE’s coalition of 100+ partners to develop customizable resources volunteers and educators can use to celebrate engineering and engage students in engineering exploration. Prior to DiscoverE, Thea worked at WGBH on engineering and science programs such as Design Squad, ZOOM, NOVA, and Engineer Your Life. A particular focus of her work is dispelling stereotypes about engineering and encouraging girls and minorities to pursue STEM education and careers. Thea received her M.Ed. from Boston University and her B.A. from Clark University. She is the recipient of a Peabody Award for Design Squad; the Lawrence W. Prakken Professional Cooperation Award from ITEEA; and the WEPAN Educator Award for Engineer Your Life.



### **Rovani Sigamoney**

Rovani Sigamoney is a chemical/environmental engineer from South Africa who started in the platinum refinery/mining sector and then moved on to researching bioenergy systems and biofuels for Africa. She joined the United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2007 and later ran the Chemistry program and International Year of Chemistry 2011 and thereafter the Engineering program. The Engineering Program is working with countries, international partners and program experts to strengthen engineering education through curricula development, hands-on training and capacity building. In line with UNESCO's global priorities on Africa and Gender Equality, it focuses on women and Africa. Rovani is passionate about women in engineering and encouraging more youth to pursue careers in engineering. She previously worked at UNEP, Paris on a biofuels strategy and also at the Wuppertal Institute of Climate Change in Germany on a policy document for the European Parliament on the security of energy supply.

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### **Jacquelyn Sullivan**

Jacquelyn Sullivan is founding co-director of the General Engineering Plus degree program in the University of Colorado Boulder's College of Engineering and Applied Science. As recent Associate Dean for Inclusive Excellence, she spearheaded design and launch of many initiatives focused on broadening participation—resulting in dramatic and lasting results. Sullivan established the Engineering GoldShirt Program to provide a unique access pathway to engineering for high potential, next tier students not admitted through the standard admissions process; significant challenges in calculus readiness were revealed and overcome. Sullivan was conferred as an ASEE Fellow in 2011 and was awarded NAE's 2008 Gordon Prize for Innovation in Engineering and Technology Education. She is currently launching CU Teach Engineering, a unique initiative to produce secondary science or math teachers through a new design-based engineering degree, with the ultimate goal of broadening participation among who comes to engineering colleges.

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### **Yvette Pearson Weatherton**

Dr. Yvette Pearson Weatherton has 20 years of experience in engineering education. After serving as a faculty member at Southern University for 12 years, she joined the faculty of The University of Texas at Arlington in September 2007, where she is Associate Chair of the Department of Civil Engineering. Dr. Pearson Weatherton holds a B.S. in Civil Engineering and an M.S. in Environmental Chemistry from Southern University, a Ph.D. in Engineering and Applied Sciences from The University of New Orleans, and is a registered Professional Engineer in the State of Louisiana. Currently an Intergovernmental Personnel Act (IPA) appointee, Dr. Pearson Weatherton is a Program Director in the Division of Undergraduate Education at the National Science Foundation where she manages a large and diverse portfolio of awards geared toward STEM education and workforce development. One of her key focus areas is broadening the participation of students from underrepresented groups – minorities, females and persons with disabilities – in STEM education and careers.

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### **Bruce Wellman**

Bruce is the department chairperson of the Aerospace & Engineering (A&E) Department at Olathe Northwest High School in Olathe (Kansas). This unique engineering program is embedded within a traditional public high school and is a four-year integrated sequence of engineering design courses and science classes that seeks to build students' skills in engineering design, CAD, technology tools for collaboration, teamwork, project management, scientific reasoning, and human centered design. Bruce currently teaches the Engineering Chemistry class in the program. He is a National Board Certified Teacher (Chemistry), a 2009 recipient of Presidential Award for Excellence in Science Teaching, and a 2011-12 Teaching Ambassador Fellow for the US Department of Education. Bruce received his B.S. Degree in General Science from Penn State University and his M.S. Degree in Education (Joint Education Specialist, Hearing and Deaf Education) from the University of Rochester (New York).

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### **Rochelle Williams**

Dr. Rochelle Williams is the Director, Programs and Events at ABET (formerly, Accreditation Board for Engineers and Technology) Headquarters. In this role, Dr. Williams directs ABET's global educational offerings and leads technical education research projects. Prior to joining ABET, Dr. Williams held two positions at Baton Rouge Community College: Science Laboratory Manager and Adjunct Faculty in the Mathematics Department. In addition, Dr. Williams has worked closely with the National Science Foundation's Next Generation Composites Crest Center at Southern University. In this role she supported the center's mission to increase the awareness of engineering education to underrepresented minority groups on both the secondary and post-secondary levels. Dr. Williams holds a Ph.D. in Science and Mathematics Education and a Master of Engineering in Mechanical Engineering from Southern University and A&M College in Baton Rouge, LA, and a Bachelor of Science in Physics from Spelman College in Atlanta, Ga.



### **Ece Yaprak**

Dr. Ece Yaprak is a Professor of Engineering Technology in the College of Engineering at Wayne State University. She received her PhD in computer engineering from Wayne State University in 1989. She has held eight research fellowships at NASA research centers (John Glenn Laboratory at Case Western, Jet Propulsion Laboratory at Cal Tech, Ames Research Center at Stanford, and the Johnson Space Center at Texas A&M Universities) and the U.S. Navy (at its SPAWAR Research Center in San Diego). She has also served as a Fulbright scholar at the Nokia Wireless Communications Research Center at the University of Oulu in Finland in 2009. She is a senior member of the IEEE. Dr. Yaprak serves as an ABET IEEE/ETAC Commissioner since 2012. Currently, she serves as Program Director of Division of Undergraduate Education (DUE) at the National Science Foundation (NSF).

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## **ASEE Staff**

### **Ashok Agrawal**

Managing Director, Professional Services

### **Amlan Banerjee**

Sr. Research Associate

### **Rocio Chavela**

Director, Education and Career Development

### **Ray Phillips**

Program Assistant

### **Tengiz Sydykov**

Assistant Program Manager, Education and Career Development

### **Brian Yoder**

Director of Assessment, Evaluation, and Institutional Research

## Pre-Workshop Survey Report

In preparation for the workshop, all attendees were asked to complete an online registration survey that provided the opportunity to offer open-ended feedback about (1) what they perceive as primary barriers to women's participation in engineering; (2) what they have done (or can do) to address and overcome such barriers; (3) what type of institutions are best equipped to address these barriers; and (4) personal experiences of gender-related challenges in engineering. The report presents a summary of the 38 responses that were submitted: [http://docs.asee.org/public/TUEE/PhaseIII/Pre-workshop\\_Survey\\_Results.pdf](http://docs.asee.org/public/TUEE/PhaseIII/Pre-workshop_Survey_Results.pdf)

## Discussion Starters

Four "Discussion Starter" papers (~10-12 pages) were commissioned to guide conversations on Day 1. Workshop attendees are encouraged to rank the following four areas by level of interest: State of Affairs, Perceptions of Engineering, Engineering Experience, and Promising Practices. Based on the ranking, attendees are encouraged read in detail at least one (ideally two or more!) Discussion Starter.

### Empirical Description of the State of Affairs

*Clemencia Cosentino*, Senior Researcher and STEM Area Leader, Mathematica Policy Research  
*Amlan Banerjee*, Senior Research Associate, American Society for Engineering Education  
[http://docs.asee.org/public/TUEE/PhaseIII/DiscussionStarters/State\\_of\\_Affairs.pdf](http://docs.asee.org/public/TUEE/PhaseIII/DiscussionStarters/State_of_Affairs.pdf)

### Perception of Engineering

*Lecia Barker*, Associate Professor, University of Texas at Austin  
[http://docs.asee.org/public/TUEE/PhaseIII/DiscussionStarters/Perception\\_of\\_Engineering.pdf](http://docs.asee.org/public/TUEE/PhaseIII/DiscussionStarters/Perception_of_Engineering.pdf)

### The Undergraduate Experience

*Rachelle Reisberg*, Assistant Dean for Engineering Enrollment and Retention & Director of Women in Engineering, Northeastern University  
[http://docs.asee.org/public/TUEE/PhaseIII/DiscussionStarters/Undergraduate\\_Experience.pdf](http://docs.asee.org/public/TUEE/PhaseIII/DiscussionStarters/Undergraduate_Experience.pdf)

### Promising Practices

*Daryl Chubin*, Independent Consultant  
[http://docs.asee.org/public/TUEE/PhaseIII/DiscussionStarters/Promising\\_Practices.pdf](http://docs.asee.org/public/TUEE/PhaseIII/DiscussionStarters/Promising_Practices.pdf)

## Four Frames for Creating Gender Inclusive Organizations

# Four Frames for Creating Gender Inclusive Organizations

Frame  
**4**

### Re-Vision Engineering Culture

Focuses on underlying systemic factors that lead to inequity.

Organizations are inherently gendered and gender is a social construct.

Interventions change the culture by addressing underlying assumptions, norms, and practices.

Frame  
**3**

### Value Difference

Focuses on valuing difference rather than eliminating difference.

Places gender equity within a broader diversity perspective. Gender seen as an important contributor to innovation and business performance.

Frame  
**2**

### Create Equal Opportunity

Focuses on eliminating structural and procedural barriers that are biased against women and impede advancement.

Interventions tend to be legalistic and policy-based.

Frame  
**1**

### Equip the Women

Minimize differences in experience between women and men so that women can compete as equals.

Focus is on the individual.

**Source:**

CGO Insights, Briefing Note No. 1,  
Simmons Graduate School of Management,  
[http://www.simmons.edu/som/docs/Insights\\_01.pdf](http://www.simmons.edu/som/docs/Insights_01.pdf)

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## The Four Frames in Brief: Changing Organizational Culture A Distillation of Kolb et al. (1998)

### **A. Equip the Women/Prepare Women for Success**

The most traditional and popular approach to achieving gender equity is equipping participants with the resources to compete as equals. In practice, this means remediating women through training programs and skills development. It recognizes that organizations are flawed, but offers opportunities for individual women to acquire the skills to compete without changing the policies and structures in place.

### **B. Heed Policy and Law**

The second frame focuses on structural barriers, with the “deficiencies” of individual women no longer viewed as the source of the problem. Rather, structures of opportunity create an uneven playing field, with interventions introduced from outside the institution that are both legalistic and policy-based. Implementation of organizational accommodations reduce structural disadvantages to promote recruitment, retention, and graduation of women. But such actions are directed to the formal organization, not the informal rules and practices that govern behavior. Therefore, they are insufficient for achieving lasting gains because they do not change campus culture.

### **C. Value Differences**

The third frame places gender equity within the context of broader diversity. It is thus more systemic about valuing differences of all kinds and focuses on practices anchored in evaluation criteria. But it fails to break down gender stereotypes and challenge the hierarchical valuing of what is “masculine”—assertiveness, decisiveness, competitive—over what is “feminine”—people skills—in producing desired organizational results. In short, valuing differences, even celebrating them, does not penetrate the culture or change the behavior of those who dominate it.

### **D. Re-envision Work Culture**

The fourth frame integrates the first three frames and sees the organization as inherently gendered. In other words, the organization is unconsciously biased by privileging traits socially and culturally ascribed to men while devaluing or ignoring those ascribed to women. This frame is difficult for many to acknowledge because what has always appeared neutral and inconsequential is now re-conceived as an unearned advantage that differentially impacts men and women inhabiting the organization. To operate on the organization at its most fundamental level of practices requires an ongoing and iterative process of examining, experimenting, and learning. This takes time, demands commitment, and may sacrifice short-time organizational strife for enduring gender equity. It ties policies to their use in practice, entertains alternative strategies for success, and lays bare conceptions of ideal workers, exemplary managers, and strong leaders. Most organizations are not ready for such a cultural transformation, but the fourth frame imagines the possibilities that will benefit women, men, and the organization as a whole.

Source: Kolb, D., Fletcher, J., Meyerson, D., Merrill-Sands, D., and Ely, R. 1998. “Making Change: A Framework for Promoting Gender Equity in Organizations.” *CGO Insights*, Simmons Graduate School of Management, October.

# Notes

**Notes**

## Notes



The **American Society for Engineering Education** is a global society of individual, institutional, and corporate members founded in 1893. We are committed to furthering education in engineering and engineering technology by promoting excellence in instruction, research, public service, professional practice, and societal awareness.

ASEE seeks to more fully engage with high school students, parents, teachers, engineering faculty and business leaders to enhance the engineering workforce of the nation.

ASEE is the only professional society addressing opportunities and challenges spanning all engineering disciplines, working across the breath of academic education, research, and public service.

- We support engineering education at the institutional level by linking engineering faculty and staff to their peers in other disciplines to create enhanced student learning and discovery.
- We support engineering education across institutions, by identifying opportunities to share proven and promising practices.
- We support engineering education locally, regionally, and nationally, by forging and reinforcing connection between academic engineering and business, industry, and government.

[www.asee.org](http://www.asee.org)



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