Finding a Place in the Profession
Women in STEM at the National Security Agency

Incredible Sense of Pride

Glorian Rivera-Alvarez has been on an upward trajectory since college. Now, the NSA Chief of Staff gets to foster the same growth in her own engineering team.

After earning a bachelor’s degree in electrical engineering and two master’s degrees, she began her NSA career as a design engineer and moved through the ranks of several leadership positions. She now manages the staff that supports the analysts and engineers who work in the Vulnerability Solutions team.

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The leading employers listed below are SWE Heritage Club Members—ongoing advertisers in SWE Magazine as well as on swe.org and our blog All Together.

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Behind every Laboratory solution are researchers with exceptional technical abilities and imagination, developing systems from the initial concept stage, through simulation and analysis, to design and prototyping, and finally to real world demonstrations. Cross-disciplinary collaboration and the breadth of Lincoln Laboratory’s research enable continuous technical growth for its scientists—and they also inspire unparalleled creativity. In the past six years, MIT Lincoln Laboratory has been awarded 26 R&D 100 Awards that recognize the year’s 100 most significant innovations in technology.

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FEATURES

Always Connecting, Always Engineering

Introducing SWE FY18 President Jonna Gerken, the new board of directors, and the Society of Women Engineers’ theme for the year.

Women Engineering Leaders in Academe 2017

In SWE’s 16th presentation of its annual series, Elaine Scott, Ph.D., dean of the School of Science, Technology, Engineering and Math at the University of Washington Bothell, and Nada Marie Anid, Ph.D., dean of the New York Institute of Technology’s School of Engineering and Computing Sciences, discuss their roles as leaders in engineering education and offer words of advice and encouragement.

Finding a Place in the Profession

The path to a fulfilling, flourishing engineering career is sometimes altered by unexpected turns. In the midst of it all, figuring out one’s niche can be an exhilarating experience, requiring reflection on what is most important in terms of personal interests, environment, location, and many other factors. A combination of resilience, a sense of humor, and happenstance are indispensable elements for a successful career. Illustrations by Nicholas Matej

A Taste of Food Technology’s Future

With a mission to Mars looming, and a growing population on Earth, designing foods and food systems that meet safety and nutritional requirements — while offering appealing and palatable choices — is critical.

Professional Engineers: Committed to Public Health, Safety, and Welfare

Despite efforts to deregulate occupations across the spectrum, P.E. licensure remains a respected credential that ensures the highest standards of quality and competence and provides additional opportunities for engineers in all disciplines.

Special Section

The 2016–2017 Yearbook of People, Programs, and Events
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LET’S GET TO WORK.
SWE is committed to offering professional development programs that cater to the Society’s diverse membership. Presented by experts, these programs span the topics of innovation, integrating life and work, and management. Following is a sampling of webinars SWE is offering in 2017. If you miss the initial presentations, they can still be viewed under the Learning section at www.swe.org. Visit the website for more information on upcoming webinars.

MAY 4
Damaging Phrases Women Use in the Office

MAY 10
Hot Trends in Networking Know-How for 2017

MAY 16
Combating Online Abuse

JULY 20
Present with Power and Credibility

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ABOUT SWE:
The Society of Women Engineers (SWE), founded in 1950, is a not-for-profit educational and service organization. SWE is the driving force that establishes engineering as a highly desirable career aspiration for women. SWE empowers women to succeed and advance in those aspirations and be recognized for their life-changing contributions and achievements as women engineers and leaders.
At UTC, our greatest strength is the diversity of our people and their ideas. Our success as a global technology leader relies on their unique talents, perspectives and experiences.

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Shining a Hopeful Light

Given the unpredictability of life — we all know the saying about the best-laid plans not working out — how does one proceed with confidence and hope, carving out a career and life?

Are there lessons to learn from the many twists and turns, even upheaval, that can happen over the course of a career? The women interviewed for our cover feature, “Finding a Place in the Profession,” certainly think so. Willing to share their experiences, insights, and the perspectives they gained, our interviewees come from a variety of industries, personal backgrounds, and ethnicities, and are at different life stages. Still, there is one common denominator between them: a positive outcome, despite ups and downs and moments of uncertainty. Their experiences shine a hopeful light on the process of establishing oneself at the beginning of a career, or of reinventing oneself further along the way.

Taking this notion of finding a place in the profession further, the Career Pathways column, “Career Twists, Turns, and Pivots,” looks at how career decisions are often made in the wake of unexpected life events and circumstances. And in this issue’s Reinvention column, “Career Transitions — Pursuing Your Passion,” a successful woman engineer discusses the leaps she made across industries — changes she did not anticipate while working toward her engineering degree.

The underlying theme of all these articles is that the path to making a difference, to contributing meaningfully and experiencing personal fulfillment and success, frequently does not look like anything you’d expect. And that difference between expectation and reality may, at times, be all the more enriching.

This issue includes the 16th installment in our annual series on women engineering leaders in academe, featuring Elaine Scott, Ph.D., as the founding dean at the University of Washington Bothell School of Science, Technology, Engineering and Mathematics, and Nada Marie Anid, Ph.D., dean of the School of Engineering and Computing Sciences at the New York Institute of Technology. In reviewing the series over the years, it is interesting to note that a number of the women who became engineering deans had not set out to reach that position — one more example of unexpected twists and turns.

Another feature, “A Taste of Food Technology’s Future,” takes a fascinating look at the challenges involved in supplying food to astronauts in space, particularly for long-term space travel or lengthy periods on the international space station; and some of the issues involved in feeding a planet with a burgeoning population of nearly 7.5 billion. Learn about the women engineers and scientists with important roles in solving these issues.

Our final feature, “Professional Engineers: Committed to Public Health, Safety, and Welfare,” examines the current state of licensing, including legislative efforts to weaken licensing requirements. The article also takes a brief look at the history of licensing, and includes commentary from SWE pioneering members who viewed the credential as essential to professional qualifications and credibility, and a protection for the public. Companion pieces to this story include the Viewpoint, “Get Your Professional Engineer’s License — It’s What Grandma Would Want You to Do,” and Scrapbook, “When the Professional and the Political Collide.”

And our special section, the Yearbook, is a celebration of SWE’s past fiscal year, reporting on the variety of grassroots efforts from across the regions, as well as the members at large and global affiliates. Based on a collective desire to fulfill SWE’s mission, this creative and dedicated outpouring is impressive and inspiring.

Anne M. Perusek
Director of Editorial & Publications
anne.perusek@swe.org
Kudos for the Spring Issue

I have intended to send a note for some time — I have so admired all of the SWE issues, observing the many changes and congratulating you many times. And I have been enthralled, thrilled, by the Spring 2017 issue. The balance of content, variety, and cover are outstanding. The LGBTQ spread (“LGBTQ Employment Policy Caught in the Crosscurrents”) is so timely, and do we still say, “brave”? I also loved “The R Word,” the review, and the thoughtful obituaries on pioneers Mildred Dresselhaus and Pete Plunkett.

Just wanted to add my kudos to all involved in the issue.

Best regards,
B.J. Harrod
SWE Acting Executive Director, 1985-91
Affiliate member
Bethany, Oklahoma
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our perspective on leadership

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Beatrice A. Hicks Posthumously Joins National Inventors Hall of Fame

When SWE’s first president invented the gas density switch 58 years ago, she helped America take a “giant leap” toward the moon.

By Jon Reisfeld, SWE Contributor

SWE founding member and first president Beatrice A. Hicks, P.E., applied for and received just one patent during her 40-year engineering career. But that patent, No. 3,046,369, for the world’s first “device for sensing gas density,” was significant enough to earn her membership in the National Inventors Hall of Fame (NIHF) recently.

On May 4, Hicks became one of 15 inventors — 11 men and four women — officially inducted into the hall of fame during a black-tie gala at the National Building Museum in Washington, D.C. More than 400 people, including SWE outgoing President Jessica Rannow and incoming President Jonna Gerken, attended the event, which was sponsored by the NIHF and its partner, the United States Patent and Trademark Office.

The inductees were recognized as “pioneers who have significantly contributed to society through their scientific breakthroughs and patented innovations.” The range of inventions was broad, from well-known, everyday items to generally unknown, yet deeply significant items.

Hicks was honored for her invention, in 1959, of the gas density switch, a completely new type of environmental control. It was the first device of its kind that could directly — and accurately — measure the amount of gas present in a sealed container.

The gas density switch had immediate applications in all kinds of vehicles designed to operate in extreme environments, from deep-sea submarines to commercial airplanes, fighter jets, missiles, and spacecraft. The switch could detect and provide advance warning about leaks in fuel tanks, power generators, and from the sealed compartments where highly failure-prone transistor-based computers and electronics of the day were kept safe in their own protective artificial atmospheres.

The NIHF’s official write-up calls it “an innovation that made possible the development of advanced technologies of the time and [that] was a critical breakthrough [for] enabling space travel.”

Without the switch’s ability to monitor and respond to threats to onboard systems and components, the crews and mission-control teams would have been forced to fly blind, unable to prevent system failures, but merely to respond after the fact.

“Hicks’ apparatus sensed the actual amount of gas — rather than just the pressure — in the container over a range of temperatures and pressures,” the NIHF explained. “It was used in the ignition systems on the Saturn V rockets that launched the Apollo moon missions ... on Boeing 707 aircraft in antenna couplers involved in long-range communications, and for monitoring nuclear weapons in storage.”

The gas density switch was a 1-inch diameter, cylindrical device that fit in the palm of your hand. It weighed just under a pound when assembled, and it consisted of two parts. The gas density sensor came fully integrated into the switch, which served as an outer hous-

“BEATRICE HICKS … BROKE NEW GROUND IN THE FIELD OF SENSORS. HER PATENTED WORK DEMONSTRATES HER COMMITMENT TO INNOVATION, AND SHE, HERSELF, IS AN IMPRESSIVE EXAMPLE OF A FORWARD-THINKING ENGINEER AND BUSINESS LEADER.”

— Rini Paiva, vice president, selection and recognition committee, National Inventors Hall of Fame

Beatrice Hicks, first SWE president and inventor of the gas density switch.
Hicks' design has been referenced in 25 subsequent patent applications, including one approved just last year. Rini Paiva, vice president of the NIHF’s selection and recognition committee, applauded Hicks for her substantial contributions at the dawn of the Space Age. “Beatrice Hicks,” she said, “... broke new ground in the field of sensors. Her patented work demonstrates her commitment to innovation, and she, herself, is an impressive example of a forward-thinking engineer and business leader.”

**GAME CHANGER**

The invention of the gas density switch was a business game changer for Hicks, enabling her to complete her planned reinvention of Newark Controls, the heating controls manufacturing business her father had started decades earlier, into a more niche’d, and profitable, enterprise. In short order, she began transitioning the company away from manufacturing relatively low-margin, mass-market heating controls and into a far more profitable developer of its proprietary, highly customizable, quality controls for use by NASA, the U.S. military, and leading defense and aerospace contractors. Hicks had begun moving the company in this direction when she became its sole owner, and president, in 1955.

By 1963, Newark Controls’ specialty business was thriving. “There’s hardly a space shot from Cape Kennedy (Canaveral) that doesn’t carry an environmental sensor designed and made by Beatrice Hicks,” proclaimed a New York Daily News profile about Hicks and her company.

The company already had developed multiple versions of the original gas density switch, and it continued to find creative new ways to use it to solve problems for its customers. Newark Controls had developed new switch housings to further extend the product’s capabilities and even a smaller, overall version for use in ballistic missiles. Hicks was working with NASA’s Marshall Space Flight Center, in Huntsville, Alabama, to develop a standardized form of the gas density switch for use in all future space-bound instrument packages, and Hicks and her husband, Rodney D. Chipp — an engineer as well and namesake of an award SWE grants annually — had built a clean room at their company, where they assembled the switches. Each sensor contained an internal bellows that had to be preloaded with a sample of the gas to be monitored. Everything had to be carefully calibrated for accuracy.

“We control the temperature and the dust and the dirt,” Hicks told a reporter at the time. “Coats must be hung in the foyer, and we have special adhesive paper on the floor that grips any loose dust or dirt on our shoes.”

Hicks continued to run Newark Controls until shortly after her husband died in 1966. She then sold her business to environmental services company NUS and took over management of her late husband’s engineering consulting business.

**A MORE COMPLETE PICTURE**

Hicks was honored many times during her life as well as after her death in 1979. In 1952, Mademoiselle magazine named her “Woman of the Year in Business.” In 1963, SWE recognized her with the Achievement Award, its highest honor, and in 2001, Hicks was inducted into the National Women’s Hall of Fame. In 2013, the New Jersey Inventors Hall of Fame recognized her posthumously with the Advancement of Invention Award.

While these awards referenced Hicks’ achievements as an inventor and pioneer in the science of extreme environment controls, SWE FY17 President Jessica Rannow said that message may have been understated at times. She added, however, that Hicks’ induction into the National Inventors Hall of Fame clearly reinforces that connection and should enhance her legacy.

“It’s wonderful to see that 38 years after her passing, she is being recognized...directly for her technical prowess as an inventor.”

— Jessica Rannow, SWE FY2017 president

she had become a bit of an expert on how to create and maintain healthy breathing atmospheres for space crews.

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SWE Magazine Receives Publishing Accolades

Annual international competition recognizes the best corporate and nonprofit publishers, editors, writers, and designers who create print, web, electronic, and social media.

SWE Magazine was recently recognized with seven APEX Awards for publishing excellence and one Grand Award — the highest honor offered in this international competition. Now in its 29th year, the APEX competition honors outstanding work in publishing, from magazines and newsletters to annual reports, campaigns, social media, and websites.

Recognized with a Grand Award in design and illustration was Art Director JoAnn Dickey for the entire Fall 2016 issue, which debuted a magazine redesign. In addition, Dickey was honored with Awards of Excellence for the Fall 2016 cover as well as the opening spread of the cover story in that issue, "Clean Technology Makes Aviation History."

As the writer of "Clean Technology Makes Aviation History," Contributor Seabright McCabe was recognized with an Award of Excellence for green writing.

"Tissue Engineering: Merging Engineering and Medical Skills," by Charlotte Thomas, received an Award of Excellence for technical and technology writing. The article appeared in the Spring 2016 issue.

Also appearing in the Spring 2016 issue, "Why Women Leave Engineering: The SWE Gender Culture Study," by Meredith Holmes, received an Award of Excellence in writing — departments and columns, and "Women Engineers You Should Know," by Anne Perusek, earned an Award of Excellence for feature writing.

Capping the honors, SWE Magazine received its first-ever Social Media Award of Excellence. The recognition was for Best Single Blog Post, "Solar Impulse 2: A String of Pearls Against a Black Velvet Sky," by Anne Perusek. The post appeared on SWE’s All Together blog site in July 2016 to promote the upcoming feature, "Clean Technology Makes Aviation History."
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PEOPLE

From breaking the glass ceiling in industry, academia, and research to an array of accomplishments, these women are making news.

HEADING THE NSF ENGINEERING DIRECTORATE

The University of Michigan Regents publication, Michigan News, reported that the National Science Foundation (NSF) selected Dawn Tilbury, Ph.D., a University of Michigan mechanical engineering professor, to serve as head of its Directorate for Engineering. Dr. Tilbury is former associate dean for research at the University of Michigan College of Engineering.

NSF’s Directorate for Engineering is charged with supporting engineering research and education critical to the nation’s future and fostering innovations to benefit society. NSF assistant directors serve terms of up to four years. Dr. Tilbury will retain her University of Michigan appointment and intends to return to the engineering faculty when her term with NSF is completed. The Directorate for Engineering provides about 32 percent of the federal funding for fundamental research in engineering at academic institutions. It distributes some 1,600 research awards across the fields of engineering each year. Research funded by the division has enriched the understanding of natural systems, enhanced electronics, fortified the nation’s infrastructure, and introduced new possibilities of engineering to the next generation, according to NSF.

The directorate is home to many of NSF’s activities that aim to foster innovation and technology transfer. NSF’s Small Business Innovation Research program enables companies to undertake research and development with high technical risk and high commercial reward. The Innovation Corps program enables faculty and students to pursue commercialization of technologies based on previous NSF-funded research.

NAMED ASME PRESIDENT

Charla K. Wise, a senior executive in aerospace and aeronautical engineering who directed programs to develop two of the most complex aircraft in the history of the U.S. Air Force (USAF), has been named president of The American Society of Mechanical Engineers (ASME) for a one-year term that continues to July 2018. Wise becomes the 136th president of the organization and the fifth woman to serve in that post.

Wise will play a central role in growing ASME’s outreach and activities in codes and standards, industry certification,
专业发展，以及STEM教育，以及其他影响全球机械工程领域的项目。

Wise在ASME工作多年，曾担任该组织董事会成员。她被委任为成员服务的负责人，同时负责开发生物工程、清洁能
源、制造、压力技术以及机器人学等新项目。

Wise在Lockheed Martin工作过，担任过多个关键职位，包括航空技术副总裁。她还担任过Fort Worth, Texas
F-22 Raptor和F-16战斗机项目的副总经理和计划总监。

Wise还为ASME董事会、行业顾问委员会以及荣誉委员会担任过职务。她是ASME基金会董事，为该组织的项目发展提供领导
力和指导。Wise还曾荣获ASME Henry Laurence Gantt奖，以及许多其他行业奖项。

Wise是Women Engineers协会的成员，1996年获得了该协会的Upward Mobility Award（现为Suzanne Jeniches Upward Mobility Award）。她也是SAE国际、美国航空航天学会和航空工业协会的会员。

NEW DEAN AT BOISE STATE

JoAnn Slama Lighty, Ph.D., 于2017年7月17日接任博伊西州立大学工程学院院长。这
是一个全国范围的选拔结果。

Dr. Lighty在国家科学基金会（NSF）担任化学、生物工程、环境和运输系统总监
的角色。在化学过程系统、工程生物学、环境工程和运输等领域，她领导了16个
项目，其中预算为1.83亿美元。她是跨NSF倡议的关键建筑师。

Dr. Lighty从2011年开始担任Amy Moll, Ph.D.的院长职务，后者自2011年开始担任博伊
西州立大学工程学院院长。

As director of the Division of Chemical, Bioengineering, Environmental, and Transport Systems within the Directorate of Engineering at NSF, Dr. Lighty led 16 programs focusing on chemical process systems, engineering biology, environmental engineering, and transport with a budget of $183 million. She was one of the key architects of the cross-NSF initiative, professional development, and

Wise is a member of the Society of Women Engineers, and received SWE’s Upward Mobility Award (now the Suzanne Jeniches Upward Mobility Award) in 1996. She is also affiliated with SAE International, the American Institute of Aeronautics and Astronautics, and the Aerospace Industries Association.

NEW DEAN AT BOISE STATE

JoAnn Lighty, Ph.D., is the new dean of Boise State University’s College of Engineering. The appointment was effective July 17, following a national search.

Dr. Lighty has served as a division director for the National Science Foundation (NSF) since October 2013. Previously a professor of chemical engineering at The University of Utah, she has held leadership positions in research, teaching, and service. Dr. Lighty takes over leadership of Boise State’s College of Engineering from Amy Moll, Ph.D., who had served as dean since 2011.

As director of the Division of Chemical, Bioengineering, Environmental, and Transport Systems within the Directorate of Engineering at NSF, Dr. Lighty led 16 programs focusing on chemical process systems, engineering biology, environmental engineering, and transport with a budget of $183 million. She was one of the key architects of the cross-NSF initiative, professional development, and STEM education, among other programs impacting the worldwide mechanical engineering profession.

A longtime supporter of ASME and former member of its board of governors, Wise is charged with enhancing member services while overseeing the development of new programs in the areas of bioengineering, clean energy, manufacturing, pressure technology, and robotics.

Wise worked at Lockheed Martin, holding key positions, including vice president of engineering for aeronautics. She also served as vice president and program director for the development of the F-22 Raptor aircraft at Fort Worth, Texas, used by the USAF, as well as program director for the F-16.

In addition to the ASME board of governors, Wise has served the society as chair of the industry advisory board and vice chair of the committee on honors. She was a member of the board of directors of the ASME Foundation, providing leadership and guidance to the programs that support and advance the field of engineering. Wise is the recipient of the ASME Henry Laurence Gantt Medal, among several other industry awards recognizing distinguished achievement and meritorious service.

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Innovations at the Nexus of Food, Energy, and Water Systems, serving as co-lead of the program since its launch in 2015, and securing collaboration from other federal agencies.

A professor at The University of Utah for 28 years, Dr. Lighty served as chair of the department of chemical engineering, director of the Institute for Combustion and Energy Studies, and as a professor in the department of chemical engineering, among other assignments. She earned her Ph.D. in chemical engineering from the same university in 1988, and as an active researcher Dr. Lighty has been awarded more than $15 million in research funding and has more than 260 peer-reviewed publications, national report contributions and book chapters, and conference presentations.

NEW CHAIR, ENGINEERING MANAGEMENT AND SYSTEMS ENGINEERING

Suzanna Long, Ph.D., professor of engineering management and systems engineering at Missouri University of Science and Technology (Missouri S&T), was named chair of the department, effective July 1. A member of the Missouri S&T faculty since 2008, Dr. Long had served as interim chair since July 2015. Before joining the faculty, she served as director of continuing education at Pittsburg (Kansas) State University and head of the transportation-logistics area of the Plaster School of Business at Missouri Southern State University.

She is a past president of the Society for Engineering and Management Systems, a part of the Institute of Industrial and Systems Engineers. She is an American Society for Engineering Management fellow and a past board member of the organization. She was recognized as Missouri S&T’s Woman of the Year in 2016 for her efforts to improve the campus environment for women and minorities.

Dr. Long’s research interests include critical infrastructure systems; strategic management; supply chain and transportation; systems management; organizational behavior; and sociotechnical systems analysis, for which she has received national and international recognition.

LEADING AN INSTITUTE’S REVOLUTION

The National Association of Manufacturers (NAM) named Carolyn Lee executive director of the Manufacturing Institute, the industry’s premier authority for objective research, education, and workforce solutions. With modern manufacturing diversifying, transforming, and charting new frontiers, Lee will lead the institute’s own revolution: to move ahead of the times and drive the initiatives and programming to address workforce development, skills certification, and veteran training and hiring. She will focus on inspiring the next generation and all Americans, women in particular, to enter America’s manufacturing workforce.

“Over her nearly six years as senior director of tax policy at the NAM and in many other influential leadership roles in the private and nonprofit sectors and at the highest levels of government, Carolyn has built a proven track record of leading positive change, advancing key initiatives in the face of significant challenges, and bringing people together from all sides to make headway on the work that must be done for manufacturers and the people of our nation,” said NAM President and CEO Jay Timmons. “Carolyn is a respected and trusted leader of the NAM, and we look forward to seeing her take the institute to the next level.”

ADVANCING POSITIONS FOR 30 YEARS

Bonnie H. Ferri, Ph.D., was named vice provost for Graduate Education and Faculty Development at the Georgia Institute of Technology, officially assuming the role on Aug. 15.

Dr. Ferri comes to the vice provost position after nearly 30 years of advancing positions of leadership within the faculty. Prior to her appointment as vice provost, she served as associate chair in the university’s School of Electrical and Computer Engineering for 11 years in both undergraduate and graduate affairs capacities. She is also the current co-chair of the Commission on Creating the Next in Education.

“Professor Bonnie Ferri’s long history at Georgia Tech means she brings extensive experience as an administrator, leader, and researcher,” said Rafael L. Bras, Ph.D., provost and executive vice president for Academic Affairs and the K. Harrison Brown Family Chair. “She’s also proven herself as a consummate champion of excellence in teaching and educational innovation. That experience and enthusiasm will be invaluable as she assumes the role of vice provost.”

The duties of the vice provost include ensuring the quality of graduate education; working on behalf of the well-being of graduate students, postdoctoral students, and faculty; supporting faculty development and the educational enterprise; and managing the hiring, promotion, and tenure process for faculty. The vice provost also oversees the Office of Graduate Studies, the Office of Faculty Affairs, the Office of Postdoctoral Services, and the Center for Teaching and Learning.
WOMEN IN ENGINEERING ACHIEVEMENT AWARD
Janet Olson, vice president of engineering for register-transfer level synthesis research and development at Synopsys Inc., was selected as the recipient of the Marie R. Pistilli Women in Engineering Achievement Award for 2017 at the Design Automation Conference (DAC). The DAC’s executive committee presents the award annually to honor an individual who has made significant contributions to help women advance in the field of electronic design automation technology. The award is named for DAC’s former organizer, the late Marie Pistilli, who worked tirelessly to further the advancement of women in engineering.

During her 23-year tenure, Olson helped drive the evolution of one of the company’s flagship and largest products, Design Compiler®. Today, she leads a team of 70 engineers who help the world’s top integrated circuit (IC) suppliers bring their digital products to market faster.

Her work has advanced the field of logic synthesis, resulting in innovative and patented technology to resolve congestion, minimize power/timing/area, and improve routability. Most recently she led her team to develop and deliver Design Compiler Graphical and Explorer. Olson is the co-inventor of three U.S. patents and has four patents pending for the discrete Fourier transform synthesis technology and novel register transfer level techniques.

Olson received the YWCA Silicon Valley Tribute to Women Award in 2015 and the Synopsys Excellence Award in 2007.

EXCEPTIONALLY GENEROUS WITH HER TIME
Susan Stewart, Ph.D., senior research associate and associate professor of aerospace engineering at The Pennsylvania State University, was recently named the recipient of the Penn State Commission for Women 2017 Rosemary Schraer Mentoring Award. The award was created in memory of Rosemary Schraer, Ph.D., former associate provost for Penn State, and honors a current university employee, regardless of gender, who exemplifies Dr. Schraer’s giving of herself as a mentor.

Dr. Stewart’s research area is energy system design optimization as a function of component design, economics, and renewable energy resource conditions. In particular, she holds a detailed understanding of the technology, siting, and economic development issues with renewable energy.

Since joining the department of aerospace engineering, Dr. Stewart has been exceptionally generous with her time outside of the classroom in extracurricular activities related to wind energy and aerospace engineering. She is the lead strategic adviser of the Penn State Wind Energy Club, which won consecutive titles in 2014 and 2016 at the U.S. Department of Energy Collegiate Wind Competition. Under Dr. Stewart’s leadership, the club members not only learned how to build their own wind turbine, but also learned how to develop and deliver a business plan based on market research and establish a deployment strategy. The club provides outreach activities to high school students in Pennsylvania, offering an invaluable educational opportunity and leadership experience for the members, who are enrolled in various majors at the university.

As director of the Pennsylvania Wind for Schools (PA WfS) program, which supports wind energy education programs at universities, as well as at primary and secondary schools, Dr. Stewart is helping to address major challenges for the wind energy industry. The PA WfS program places significant emphasis on programming and services, including professional development workshops for middle school and high school teachers, and KidWind competitions, where Penn State students gain valuable experience in managing hands-on activities with secondary-school students.

JEFFERSON SCIENCE FELLOWSHIP
The National Academies of Sciences, Engineering, and Medicine is pleased to announce a call for applications for the 2018 Jefferson Science Fellowship program. Initiated by the Secretary of State in 2003, this fellowship engages the American academic science, technology, engineering and medical communities in the design and implementation of U.S. foreign policy and international development through on-site work at the U.S. Department of State or the U.S. Agency for International Development.

The Jefferson Science Fellowship is open to tenured, or similarly ranked, academic scientists, engineers and physicians from U.S. institutions of higher learning. Applicants must hold U.S. citizenship and will be required to obtain a security clearance. For 2018, up to five Jefferson Science Fellowships will be available at USAID. USAID works to end extreme poverty and promote resilient, democratic societies while advancing U.S. security and prosperity.

USAID benefits from the innovative ideas, energy, and state-of-the-art technical knowledge that Jefferson Science Fellows bring. By working in USAID, Jefferson Science Fellows enhance their knowledge of government and global issues and obtain valuable professional experience that enriches their careers and the organizations to which they return. They gain practical work experience in humanitarian assistance, economic, and social development, and other technical sectors; the opportunity to engage directly in solving the most challenging and critical development issues of our time; and exposure to a broad network of development institutions and actors.

The deadline for 2018-2019 program year applications/nominations is October 31, 2017. Learn more/apply at: www.nas.edu/jsf

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SWE FALL 2017 17
Bring your inquisitive "always engineering" mindset to WE17! Join us this fall in Austin, Texas and attend the world’s largest conference and career fair for women in engineering and technology. It will be an outstanding opportunity to learn, share and be inspired!

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Career Twists, Turns, and Pivots

Women’s career choices in engineering frequently reflect more than keen interest in a specific area. Unexpected life events and changing circumstances beyond one’s personal sphere can and do greatly influence career decisions. Understanding these variables may hold a key for researchers seeking to find ways to attract and retain more women in the field, as well as provide insight to women struggling to move forward.

By Sandra Guy, SWE Contributor

Some women, particularly in certain Muslim and developing countries, may feel an overarching need to pull an entire family out of near-poverty by pursuing engineering as a career, says Nehal Abu-Lail, Ph.D., an associate professor of chemical engineering and bioengineering at Washington State University.

So how can such a critical decision — some might argue a life-and-death decision — translate into attracting and retaining more women to the profession in developed countries, where women’s career choices are so much broader?

That’s what Dr. Abu-Lail and fellow researchers aim to find out.

Their study, funded by a two-year, $589,200 National Science Foundation grant, focuses on why women make up as much as 50 percent of engineers in countries such as Jordan, Malaysia, Saudi Arabia, and Tunisia. By contrast, women make up 19 percent of engineers in the United States.

THE ROLE OF SOCIOECONOMICS

If women in traditionally male-dominated cultures can overcome seemingly overwhelming challenges, why doesn’t the United States boast more diverse engineering ranks? Dr. Abu-Lail and her fellow researchers have completed focus groups with female engineering students, engineering faculty, and engineers in industry to dig deeper into the long-standing conundrum.

“The poorer the country, the more women work in engineering,” she said. “I think our study will reveal important socioeconomic factors in women’s decisions to pursue engineering, especially compared to the United States, where it’s more important to do what you like first and foremost.”

For women with the choices that democratic, industrialized countries afford, the top issues include family-friendly workplace policies, such as paid maternity leave and work-hour flexibility, Dr. Abu-Lail said.

“We have a long way to go to bridge the gap between the environment we describe to engineering students and what they experience (in the workplace in the United States),” she said.

On a personal level, Dr. Abu-Lail — one of six siblings (five women and one man), all of whom became engineers — says her parents told them they would earn prestigious degrees and be ensured excellent jobs. Her mother taught mathematics and her father taught Arabic before being promoted to head minister of a school in their native Irbid, Jordan.

“It was that kind of a driven family,” she said. “Our parents told us, ‘You really have to create a great future. That’s your only option.’”

OF CAREER CHOICES AND PIVOTS

The women who tell of their career choices and their career pivots in the feature story “Finding a Place in the Profession” in this issue say they took into consideration their personal talents and attributes, as well as their desire to hone their skills in exciting, growing, and cutting-edge fields. But they still had doubts.

This, from Cindy Zhang, a 23-year-old software engineer at Pinterest: “Everyone asks themselves whether they have the experience for the job they’re in. I’ve had the ‘impostor syndrome’ a lot, especially when I was first interning. I thought I had little knowledge about the tech industry.”

— Cindy Zhang, software engineer, Pinterest

— says her parents told them they would earn prestigious degrees and be ensured excellent jobs. Her mother taught mathematics and her father taught Arabic before being promoted to head minister of a school in their native Irbid, Jordan.

“It was that kind of a driven family,” she said. “Our parents told us, ‘You really have to create a great future. That’s your only option.’”

And that’s despite Zhang’s being admittedly “oblivious” to engineering’s being a male-dominated field while she was growing up, because she took for granted that her mother is a software engineer. Zhang eventually overcame her fears by diving into the tech industry, and the search product team she now works with at Pinterest consists of 30 percent women engineers.
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For Reates Curry, Ph.D., a member of the VIRtual Test Track EXperiment (VIRTTEX) laboratory at Ford Motor Co., home of one of the world’s most advanced driving simulators, the goal was to do something she could be excited about, that seemed to be cutting edge. But she also agreed with her husband, Alec Gallimore, Ph.D., who was then seeking tenure as a professor in aerospace engineering, and is now dean of the University of Michigan’s engineering department, that two people in the same household working toward tenure wasn’t a good idea.

Dr. Curry’s workplace is heralded for a “working together” culture that former Ford president and CEO Alan Mulally initiated to slash bureaucracy and focus on the “One Ford” strategy. Reflecting her desire to be involved in exciting and cutting-edge work, among Ford’s latest initiatives is building a fully autonomous vehicle without pedals or a steering wheel by 2021, according to a news article in the Aug. 16, 2016, edition of the publication Quartz (https://qz.com/759643/ford-self-driving-car-2012-no-steering-wheels-or-pedals-or-handover-function/). The vehicle will be aimed at ride-hailing and ride-sharing fleets, the report said.

Ford is also expanding its research and innovation center in Palo Alto, California, and is working with start-up companies using technology ranging from 3-D mapping to machine-learning software to virtual retina recognition to a remote sensing method that uses light in the form of a pulsed laser to measure ranges variable distances to the Earth. Yet, despite fascinating and challenging engineering opportunities, Dr. Curry and the other experienced engineers who shared their career pathways with SWE Magazine say at least part of their career “pivots” accommodated everyday concerns such as ensuring that both husband and wife didn’t work in the same field, and that the wife’s job changes followed the husband’s career moves.

As evidence that Dr. Curry also values family time, she left our interview to deliver 122 cupcakes to her 13-year-old son’s classmates for a theater performance of “Beauty and the Beast.” The couple also has a 17-year-old daughter.

Offering another perspective on career pivots, Catherine J. Rocky, a primary national accounts contact for Terracon Consultants’ geotechnical, environmental, materials, and facilities engineering clients, has learned to keep an open mind. Rocky points out that you never know how things will work out or whom you will continue to know professionally throughout your career. For example, crossing paths with former associates has opened doors for her. Some of the unexpected twists and turns have led to exciting opportunities Rocky might not have otherwise recognized or acted upon.

Research such as that being conducted by Dr. Abu-Lail and colleagues will shed light on the interplay between socioeconomic factors, the desire to do work one enjoys, and everyday circumstances as drivers of career choices. While those results are yet to be determined, one insight from the women interviewed here is that finding one’s place in the profession is not necessarily a straight path forward. From their perspective, the twists and turns can lead to unexpected opportunities, growth, and fulfillment.

THE POORER THE COUNTRY, THE MORE WOMEN WORK IN ENGINEERING. I THINK OUR STUDY WILL REVEAL IMPORTANT SOCIOECONOMIC FACTORS IN WOMEN’S DECISIONS TO PURSUE ENGINEERING, ESPECIALLY COMPARED TO THE UNITED STATES, WHERE IT’S MORE IMPORTANT TO DO WHAT YOU LIKE FIRST AND FOREMOST.”

– Nehal Abu-Lail, Ph.D., associate professor, chemical engineering and bioengineering, Washington State University

Positive vs. Negative Spillover Makes All the Difference

Workplace surroundings are, indeed, becoming a key factor in employee retention and productivity, studies show. For example, researchers looked at the 25-foot radius around motivated, positive-oriented workers at a large technology firm and discovered that these workers boosted their co-workers’ performances by 15 percent. That positive spillover realized an estimated $1 million in extra yearly profits, according to the research by Dylan Minor, Ph.D., an assistant professor of managerial economics and decision sciences at Northwestern University’s Kellogg School of Management in Evanston, Illinois.

On the other hand, negative spillover from so-called toxic workers proved to have twice the magnitude of impact on profits as its positive counterpart. The good news is that, though the toxic spillover happened quickly, it also disappeared after the negative-focused worker was moved to the far physical reaches of the company, the research concluded.
SWE’s new president, Jonna Gerken, proclaims that women engineers are “always engineers.” Gerken, a manufacturing engineering manager at Pratt & Whitney, an aerospace manufacturer headquartered in East Hartford, Connecticut, and a SWE member for more than 20 years, said, “That’s my main message.

“In my management job, I’m using my engineering skills, the thought processes of an engineer, making decisions, evaluating risks, and coming up with solutions just as any engineer would,” she said.

“I want to break the stereotype, especially among young women, that engineering is boring and that we wear glasses and pocket protectors, and focus on how engineering is a great job opportunity and how they help the world every day,” Gerken said.

Gerken manages a team of engineers who help identify and mitigate manufacturing risks in Pratt & Whitney’s engine programs. Her expertise is evidenced by her roles as a life member of SWE and as a senior member of the Institute of Industrial and Systems Engineers and an associate value specialist with SAVE International®, the professional society dedicated to upholding value-engineering procedures that improve products.

A native of Long Island, New York, Gerken was the only girl in her high-school drafting class, giving her the opportunity to make new friends while providing a test of her aptitude. She figured she’d become an architect — one of her uncles was one — but a summer program in architecture caused her to change her mind. A program leader recognized that Gerken was more interested in the building’s structure and its being habitable and practical.

Gerken’s first exposure to engineering won her over: While in high school, she spent a weekend at Rensselaer Polytechnic Institute (RPI) in Troy, New York, and shared a room with a woman who was majoring in engineering.

Now, Gerken talks with girls in elementary school, high school, and college, and she leads a project each year at her sons’ school for Discover E: Engineers Week. Gerken is a self-professed “hockey mom” to her sons, ages 10 and 12.

In 2016, Gerken received the Petit Family Foundation Women in Science Leadership Award from the Connecticut Science Center.

When Gerken was studying for her bachelor’s in industrial and management engineering at RPI, she quickly found the SWE section and made it her “go-to network.”

“The camaraderie, the variety of engineering majors as opposed to a single engineering group, the fun we had, really appealed to me,” she said. “We helped each other out, especially in the first two years when we were taking the same classes and tests.”

Gerken also learned that she had no desire to sit behind a computer all day, because her outgoing personality gets revved up by interacting with others. “I need others around in order to be productive, to bounce ideas off of, and focus on one project while still having lots of little things going on,” she said.

She earned an MBA in technology development through United Technologies Corp.’s Employee Scholar Program while continuing to work on the factory floor.

Gerken joined the SWE Hartford Section after she began her first job out of school at Colt’s Manufacturing Co., where she worked in a rotation program covering industrial engineering.

Introducing the FY18 board of directors and President Jonna Gerken, who encourages women engineers to own their profession, regardless of where their careers may take them.

By Sandra Guy, SWE Contributor
manufacturing, purchasing, metallurgy, and project management. She served as the section’s secretary for a number of years, later becoming the Region F membership coordinator, and credits her husband, Mike, a mechanical engineer, for supporting her career. In 2006, the Society honored Gerken as a Distinguished New Engineer.

Looking forward to her yearlong term as SWE president, Gerken emphasizes the importance of “brain power” rather than repetition in today’s fast-changing technology environment. As more predictions emerge that robots will take over many of today’s professions, Gerken has a ready answer for engineers: “Who is going to program the robots?”

She also aims to strengthen online communications among SWE members and work to continue expanding the Society internationally. “It’s about remaining flexible and welcoming the rest of the world to help improve the percentages of women in engineering,” she said.

Note: Complete bios can be found at http://societyofwomenengineers.swe.org/leadership.

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**Jonna Gerken**

**President**

**Pratt & Whitney**

**Current Role:** Manager in manufacturing engineering, Pratt & Whitney. Gerken oversees the program chief manufacturing engineers in their work to ensure all engine components meet manufacturing readiness levels appropriate to their life-cycle stage.

**Previous Roles:** Gerken has worked for Pratt & Whitney since 2000, holding numerous positions of increasing responsibility within both operations and engineering. Prior roles include: deputy engineering program manager for A320neo hot section, leading a multidisciplinary team of engineers in the design, development, and validation of module hardware; manager of the Quality, Delivery, and Cost Group in Hot Section Engineering, providing leadership and mentoring in the areas of quality improvement, process certification, cost reduction, and continuous improvement; and cost reduction manager for the Combustors, Augmentors, and Nozzles Module Center, where she oversaw the funding and execution of all activities impacting product cost for various hardware.

Prior to joining Pratt & Whitney, Gerken worked for Colt’s Manufacturing Co., where she was part of a rotation program covering industrial engineering and manufacturing, purchasing, metallurgy, and project management.

**Education & SWE:** Gerken holds a B.S. in industrial and management engineering and an MBA in technology development, both from Rensselaer Polytechnic Institute. She is a life member of SWE, a senior member of the Institute of Industrial and Systems Engineers, and an associate value specialist with SAVE International.

**Making Her Mark:** Gerken received the 2016 Petit Family Foundation Women in Science Leadership Award from the Connecticut Science Center, the 2014 STEP Award from the Manufacturing Institute, the 2011 Pratt & Whitney Diversity and Inclusion Award, the 2006 SWE Distinguished New Engineer Award, and was a 2004 New Faces of Engineering Finalist for IIE.

**Personal:** Married, with two sons. Enjoys travel and sports.

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**Penny Wirsing, F.SWE**

**President-elect**

**Torrance Refining Company LLC**

**Current Role:** Environmental manager for the Torrance Refining Company LLC in Southern California, where she manages a team of environmental engineers responsible for ensuring the refinery’s compliance with local, state, and federal regulations.

**Previous Roles:** Wirsing has had a noteworthy career in environmental regulatory compliance in the oil and gas industry, from Exxon Mobil Corporation, a major integrated oil company, to PBF Energy, a merchant refining company.

**Education & SWE:** As a single mother, Wirsing earned her B.S. in civil engineering with honors from Michigan State University, and went on to obtain her MBA from the University of Washington. An engaged member of SWE since she was a collegian at Michigan State, Wirsing became a life member in 1990. She has held numerous leadership roles at the local, region, and Society levels, leading several task forces and serving as Society treasurer and director of strategic initiatives. She was recognized for her accomplishments by SWE in 2007 when she became a SWE Fellow.

**Making Her Mark:** Wirsing serves on the board of directors for Pediatric Therapy Network, a nonprofit organization that provides services to children with special needs. She is also a member of Soroptimist International, whose mission is to improve the lives of women and girls throughout the world. In 2015, she received the Distinguished Alumni Award from Michigan State University College of Civil Engineering.

**Personal:** Wirsing lives in Redondo Beach, California, with her husband, Rick, and both are active members of the American Homebrewers Association.
ALEXIS MCKITTRICK, PH.D. | Secretary | IDA Science and Technology Policy Institute

Current Role: Research staff member for the IDA Science and Technology Policy Institute (STPI) in Washington, D.C., conducting research and analysis supporting a variety of tasks for the White House Office of Science and Technology Policy and various federal agencies.

Previous Roles: Prior to joining STPI, Dr. McKittrick worked for the U.S. Environmental Protection Agency’s Climate Change Division, where she focused on greenhouse gas analysis and policy for the oil and gas, chemicals, and semiconductor sectors. She also gained early-career experience working for Praxair Inc., as both an R&D technical lead and an R&D program development manager covering industrial sectors that included oil refining, chemicals, and steel manufacturing.

Education & SWE: Ph.D. in chemical engineering from the Georgia Institute of Technology and a bachelor’s degree in chemical engineering from the University of Maryland, Baltimore County, where she was a Meyerhoff Scholar. A SWE member since 2001, Dr. McKittrick has held a number of leadership roles within the Society. She has been chair of both the strategic planning committee and the government relations and public policy committee and is a past governor of the Mid-Atlantic region.

Making Her Mark: Dr. McKittrick’s environmental and energy expertise includes experience in corporate R&D, technical analysis, policy analysis, and government regulations.

Personal: Lives in the suburbs of Washington, D.C., with her husband and two daughters. Outside of her work with SWE and STPI, Dr. McKittrick enjoys being a Girl Scout troop leader.

HEATHER DOTY | Treasurer | Ball Aerospace

Current Role: Recently named the engineering integration manager for Ball Aerospace in Boulder, Colorado, she supports strategic initiatives and coordination across the engineering organization. Doty also serves on the leadership team for the Women’s Ball Resource Group.

Previous Roles: Doty spent more than 15 years as a structural engineer with Ball, performing structural analysis and supporting environmental testing for a variety of space hardware, from focal planes and telescope optics to instrument benches and spacecraft buses for weather, defense, and science satellites.

Education & SWE: Doty is a senior life member of SWE. Since joining as a university student, she has held a number of leadership positions, including director of regions.

Making Her Mark: She was recognized by SWE as Outstanding SWE Counselor in 2008 and as a Distinguished New Engineer in 2007.

Personal: A Colorado native with a thirst for knowledge, Doty holds four degrees from the University of Colorado Boulder: an MBA, B.S., and M.S. in civil engineering, and a B.A. in music. She enjoys playing flute, Zimbabwean-style marimba, and singing with other musicians in the Boulder area.

RACHEL MORFORD | Director of Advocacy | The Aerospace Corporation

Current Role: Senior project engineer at The Aerospace Corporation in El Segundo, California, where she provides technical leadership to the management and development of international partnerships for U.S. military satellite communications systems.

Previous Roles: Morford has served on the Excellence in Diversity Award selection committee at Aerospace, been a member of the companywide diversity action committee, and led the Aerospace women's committee.

Education & SWE: B.S. and M.S. degrees in electrical engineering from the University of Southern California. She also holds a certificate in technical management from UCLA. She has held several leadership roles in SWE since joining the organization in 2004, including president of the Los Angeles Section, region governor and lieutenant governor, chair of the collegiate leadership coaching committee, a member of the now-sunset collegiate interest committee, and, most recently, deputy director of regions.

Making Her Mark: In 2013, Morford received the New Faces in Engineering Award from the Society of Women Engineers, and in 2015 was named a SWE Distinguished New Engineer. She is a frequent speaker on technical and leadership topics and has served as a mentor for several university students.

Personal: Morford enjoys outreach opportunities to encourage students to pursue careers in math, science, engineering, and technology. She also enjoys running, travel, and refinishing furniture.
### DAYNA JOHNSON, P.E.  
**Director of Achievement**  
**GE Energy Connections**

**Current Role:** Participant in the Accelerated Leadership Program at GE Energy Connections.

**Previous Roles:** Johnson joined GE in 2012 as a commercial manager, leading large teams through the bidding process to develop proposals for high-voltage electrical substations. Prior to joining GE, she worked as a civil engineer, designing water and wastewater projects for rapidly growing communities in the Chicago suburbs.

**Education & SWE:** Johnson holds a B.S. in civil engineering and a Master of Engineering Management from Valparaiso University, and she is a licensed professional engineer and LEED accredited professional. Johnson has been an active member of SWE since joining as a collegiate member in 2000. She has served as Chicago regional section president and section representative and as Region H lieutenant governor and treasurer. She was previously the awards and recognition committee chair and WE11 local host committee co-chair. Most recently, she has been engaged as a governance task force member and senator.

**Making Her Mark:** Johnson received the SWE Distinguished New Engineer Award in 2011. Outside of SWE, she is involved in her church and Toastmasters.

**Personal:** She resides in the Chicagoland area with her husband, their two young sons, and their dog. Johnson enjoys traveling to warm locations with beaches far from Chicago, hiking, and home improvement projects.

### MICHELE O’SHAUGHNESSY  
**Director of Membership Initiatives**  
**U.S. Department of Energy**

**Current Role:** Project manager for the Department of Energy (DOE) at the Savannah River Site. She supports multi-appropriation programs, projects, and activities, as well as the effective integration of site planning and budget development.

**Previous Roles:** Employed by the federal government at various agencies and locations for more than 22 years.

**Education & SWE:** O’Shaughnessy holds a B.S. in civil engineering and a Master of Engineering Management from Clemson University. She is a senior life member of SWE, O’Shaughnessy has been actively involved in the Society since joining as a collegian in 1993. As a collegian, she served as the WPI treasurer. As a professional member, her experience includes Society bylaws chair, government representative on the conference advisory board; Region D governor, lieutenant governor, and secretary; and co-chair of the Outstanding Collegiate Section Award. She has served as Central Savannah River Area Section president and as vice president, secretary, and section representative for the CSRA and Baltimore-Washington sections.

**Making Her Mark:** An active member of the Aiken, South Carolina, community, O’Shaughnessy serves on the board of directors for Leadership Aiken County (LAC) and as the 2016-2017 LAC class coordinator. She was the 2013 DOE loaned professional and supported the United Way and CSRA combined federal campaigns and is a member and past president of the Springstone HOA board. She is a member of Women in Nuclear, the Project Management Institute, and Federally Employed Women.

**Personal:** A member of the Carolinas Nature Photographers Association, O’Shaughnessy enjoys photography, traveling, and attending NASCAR races.

### KAREN ROTH  
**Director of Professional Excellence**  
**Booz Allen Hamilton**

**Current Role:** Lead associate and cybersecurity expert with Booz Allen Hamilton in Rome, New York.

**Previous Roles:** Roth recently transitioned from Sikorsky Aircraft, where she was the system security lead for the new Air Force Combat Rescue Helicopter. Her responsibilities included execution of cybersecurity requirements and program protection elements.

**Education & SWE:** Roth holds degrees from the Rochester Institute of Technology and Cornell University in software and systems engineering, and is pursuing an MBA from Indiana University. She joined SWE in 2001 as a collegiate member and has been an active leader ever since. She has served as a collegiate and professional leadership coach, members-at-large president, lieutenant governor, Society audit chair, senator, a member of the strategic planning committee, and, most recently, as deputy speaker of the senate.

**Making Her Mark:** Roth’s passion is coaching and creating networks within the Society. Additionally, she is a regional Young Technologist of the Year, a USAF Civilian Achievement Medal recipient, and was recognized as a SWE Distinguished New Engineer in 2013.

**Personal:** Outside of SWE, Roth actively participates in her local community on the regional engineering council board and her local Rotary board. Through these organizations she has advocated for STEM activities via MATHCOUNTS, Project SITES, and the Books for the World program.
LISA RIMPF  Director of Regions  The Babcock & Wilcox Co.

Current Role: Rimpf works in business process improvement at Babcock & Wilcox in Barberton, Ohio, a global leader in energy and environmental technologies and services for the power and industrial markets.

Previous Roles: She was a research engineer for 10 years and team leader, responsible for evaluating processes for scrubbing exhaust gases from electric utility and industrial point sources to ensure clean air and water discharges.

Education & SWE: Rimpf earned both a Bachelor of Science and a Master of Science in chemical engineering from The University of Toledo. Introduced to the Society of Women Engineers as an undergraduate student, she has been passionate about the mission of SWE ever since and became a life member in 2006. She most recently served as the FY16 deputy director of regions, after leading Region G as governor during FY14/FY15. Rimpf has been continuously active with the Northeast Ohio Section in various leadership roles, and served as The University of Akron Collegiate Section counselor for nearly a decade.

Making Her Mark: Recognized in 2014 as a SWE Distinguished New Engineer, Rimpf enjoys outreach and mentoring activities to pay it forward to the next generation of STEM enthusiasts.

Personal: A first-generation American and the daughter of immigrants who now call Northeast Ohio home, Rimpf enjoys German folk dancing and perpetuating the customs and traditions of her ancestors. She serves on the board of trustees for the Donauschwaben’s German-American Cultural Center in Cleveland.

KATE HULL  Speaker of the Senate  Spire Consulting Group

Current Role: Managing consultant for Spire Consulting Group, where she assists owners, contractors, and law firms throughout the full life cycle of a project, from project planning and management to dispute resolution.

Previous Roles: Hull has worked on more than 50 projects globally, ranging in value from $1 million to $1.2 billion.

Education & SWE: She began her journey with the Society in 2004 while earning a bachelor’s degree in architectural engineering and a master’s in civil engineering from The University of Texas at Austin. She has held multiple leadership positions, from section representative and professional senator to her current position as speaker of the senate.

Making Her Mark: Hull has been named a Top 20 Under 40 professional by Engineering News-Record, nominated as a Profile in Power by the Austin Business Journal, and awarded a fellowship by the State Bar of Texas. In addition, she was recently honored as a Gulf Coast Region Emerging Leader.

Personal: A first-generation American and the daughter of immigrants who now call Northeast Ohio home, Rimpf enjoys German folk dancing and perpetuating the customs and traditions of her ancestors. She serves on the board of trustees for the Donauschwaben’s German-American Cultural Center in Cleveland.

INGRID ARAMBULA  Collegiate Director  Texas Tech University

Current Role: Arambula recently joined Schlumberger as a field engineer.

Education & SWE: Graduated from Texas Tech University in May with a bachelor’s degree in chemical engineering. A passionate SWE member, Arambula has served in several leadership positions since 2012. At Texas Tech, she held the role of region collegiate representative (RCR) for Region C for two years. Prior to that, she served as section president at the University of Houston (UH) in 2013 and as outreach chair in 2012.

Making Her Mark: She launched the SWE graduate community at UH in 2013, organized the section’s annual “Launch into Engineering” outreach event, and participated in the first edition of “One Day in Engineering,” UH’s first international outreach event in Brazil. She also organized Texas Tech’s two international outreach events in 2016 and 2017, which took place in Costa Rica and Chile, respectively. Also at Texas Tech, Arambula started the Outstanding Member Spotlight, which recognizes outstanding members on the region level as RCRs.
### RAINIA L. WASHINGTON  
**Current Role:** Vice president, global diversity and inclusion for Lockheed Martin Corporation, responsible for developing and executing global strategies that cultivate and maintain a culture of inclusion for the 97,000 employees worldwide. She is responsible for diversity outreach efforts that support the development of diverse talent pipelines, employee engagement and retention, and promoting inclusive leadership behaviors. She leads the company’s Executive Inclusion Council in partnership with the CEO and senior executive leadership.  
**Previous Roles:** Washington held a number of human-resources-related positions within Lockheed Martin during her 22-year career with the company, including corporate director, performance management, and director and human resources site lead for the Lockheed Martin Aeronautics Marietta facility in Marietta, Georgia.  
**Personal:** B.S. in systems engineering from the University of Pennsylvania and an MBA in organizational development from The Pennsylvania State University. Married to Sammie Jr., and they have two children, a daughter and a son.

### CHERI CHAPPELLE  
**Current Role:** Retired as the first director of diversity and inclusion for Illinois Tool Works (ITW), one of the world’s leading diversified manufacturers. Having enjoyed an extensive career in manufacturing operations and human resources, now devotes her time pursuing her passion for wellness and currently serves as a wellness coach on a limited, part-time basis.  
**Previous Roles:** Led strategy creation and implementation for ITW, globally, emphasizing inclusive leadership, recruiting, and retention of talent. Provided leadership for the corporation’s employee resource groups and was a member of the Diversity and Inclusion Leadership Council and the Women’s Leadership Development Council.  
**SWE & Education:** The desire to recruit the next generation of innovative technical talent led Chappelle to the Society of Women Engineers in 2008. She served as a member of the Corporate Partnership Council from 2010 to 2013 and represented SWE on the Four Winds exploration committee.  
**Making Her Mark:** Chappelle volunteers with her church and the Chicago Sinfonietta, a professional orchestra dedicated to modeling and promoting diversity and inclusion, where she has served on the board of directors, is former board chair, and currently chairs one of the auxiliaries. Other civic work includes more than 20 years of volunteerism with Junior Achievement of Chicago, where she is a former Central Division board chair.  
**Personal:** Chappelle and her husband, Norman, live in Chicago. They have three children and enjoy spending time with their grandchildren, traveling, and serving the community through their church.

### KAREN HORTING, CAE  
**Current Role:** Executive director and CEO for the Society of Women Engineers since Dec. 31, 2013.  
**Previous Roles:** With more than 20 years of experience in sales, marketing, and fund development, Horting was most recently the SWE deputy executive director, responsible for all fund-development activities, including corporate membership and SWE’s Corporate Partnership Council, as well as more traditional philanthropy. She also oversaw a number of SWE’s programs and services, including professional development, K-12 outreach, the annual conference, and SWE’s international expansion.  
**SWE & Education:** Horting holds a B.S. in biology from Northern Illinois University and an MBA from Johns Hopkins University. She joined SWE in March 2004 after working for the New York Academy of Sciences, where she served as director of strategic planning, managing the academy’s development activities and long-range organizational planning. Prior to NYAS, Horting worked for the American Association for the Advancement of Science, managing both marketing and fund development on a global level for Science’s Next Wave, a groundbreaking career-development website for graduate students and postdocs in science, math, and technology.  
**Making Her Mark:** In 2008, Horting earned her certified association executive credential from the CAE Commission of the American Society of Association Executives. Less than 5 percent of all association professionals have achieved this mark of excellence.  
**Personal:** Horting returned to her hometown of Chicago when she joined SWE.
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Women Engineering Leaders in Academe 2017

From drastically different institutions on opposite sides of the continent, these women engineering deans are at the helm, sharing perspectives, insight, and advice.

By Peggy Layne, P.E., F.SWE

According to the American Society for Engineering Education (ASEE), in 2015 women accounted for 21 percent of engineering undergraduates and earned 20 percent of bachelor’s degrees, 25 percent of master’s degrees, and 23 percent of doctoral degrees at the 368 U.S. and nine Canadian engineering colleges tracked by the organization. The number of engineering students, both male and female, has been increasing since 2005, but the proportion of women has remained fairly constant during that time. On the faculty side, women currently make up slightly less than 16 percent of engineering professors, an increase of more than 4 percent since 2006. Of those engineering programs tracked by ASEE, 59 are led by women deans, interim deans, or directors as of early 2017, and more than half of those leaders have been named in the past four years.

While most undergraduate engineering degrees in the U.S. are awarded by large, research-intensive, public, often land grant universities with dedicated colleges of engineering, one of the interesting aspects of engineering education is the variety of programs and institutions where it is offered. Students can earn engineering degrees at large or small institutions, public or private, and choose among schools that offer graduate degrees or those that serve primarily undergraduate students. The two institutions represented in this profile reflect this diversity. One school is a relatively young branch campus of a public research university, while the other is a private research university founded more than 100 years ago as a technical school.

DRIVING CHANGE

Established as a branch campus of the University of Washington in 1990, UW Bothell is the fastest-growing four-year public university in Washington with more than 5,000 students and 45 degree programs. More than half the students are the first in their families to attend college, and nearly 46 percent are students of color. The School of Science, Technology, Engineering and Mathematics was approved in 2013 with Elaine Scott, Ph.D., as the founding dean, and offers degrees in biology; chemistry; physics; mathematics; computer science; and computer, electrical, and mechanical engineering, with programs in climate science, cybersecurity, and media design.

The New York Institute of Technology was founded in 1910 as the New York Technical Institute, with a mission to provide career-oriented professional education to all qualified students. The school took its current name in 1955 and began offering four-year degrees in 1960. With close to 10,000 students and main campuses in New York City and Long Island, NYIT also has programs in China, the United Arab Emirates, and Canada. The School of Engineering and Computing Sciences is one of seven colleges and schools offering close to 100 degree programs in 50 fields of study. The school’s 3,500 undergraduate and graduate students pursue B.S. and M.S. degrees in mechanical and electrical engineering and computer science. Nada Marie Anid, Ph.D., has been dean of the school since 2009 — the first woman to serve in the role.

Dr. Scott is currently one of the longest-serving women in a dean’s or director’s role for an engineering program in the United States. Prior to her current position at UW Bothell, she served as director of engineering programs at Seattle Pacific University from 2006 to 2012. With degrees in agricultural and mechanical engineering, Dr. Scott served on the faculty at Michigan State, Virginia Tech, and The University of Utah before moving to Seattle. Her commitment to interdisciplinary and collaborative research has produced scholarly publications ranging from applications of heat transfer in food processing, polymer production, power electronics, and tumor detection to factors that influence student success.

Dr. Anid came to NYIT from Manhattan College, where she served on the faculty and as chair of the chemical engineering department after earning degrees in chemical and environmental engineering from the Royal Institute of Technology in Sweden and the University of Michigan. Her research focuses on water quality, sustainability, and engineering education, and she recently co-edited The Internet of Women: Accelerating Culture Change (River Publishers, 2016), a collection of profiles of women scientists and engineers around the world.

Until the formation of the School of Science, Technology, Engineering and
Mathematics, UW Bothell was primarily a liberal arts campus. With Dr. Scott’s leadership, STEM now has a much greater presence on the campus: “Since I started in autumn 2012, our school was officially formed; we established our school’s vision, mission, and core values of collaboration, opportunity, rigor, and engagement; and we began a period of rapid growth,” said Dr. Scott. “Since that time, we increased our student FTE [full-time equivalent] from 600 to over 1,400; hired over 50 new faculty; moved into a new building; increased research productivity; and started 11 new degree programs and four new minors. We hope to secure funding for an additional STEM building in the near future to provide further growth. STEM is now a mainstay — not an outlier,” she said.

Dr. Anid is leading change in her school as well, establishing an Entrepreneurship and Technology Innovation Center and working toward a Ph.D. program. “I created an Entrepreneurship and Technology Innovation Center because I felt that it would complement what students do in the classroom, equipping them with business skills, and teaching them to pitch their ideas and how to fund and manage a start-up. This was a particularly important project to instill risk-taking and the acceptance of failure in female students.” Other changes include tripling the number of female faculty members, increasing the research portfolio of the faculty, and working with industry to engage students in more research and design projects.

FACILITATORS OF SUCCESS

Dr. Scott describes her role as a facilitator of success as well as administrator of operations: “As a dean, I work with faculty, staff, and students to establish our vision, mission, and core values, and provide a strategic pathway to reach them. The dean oversees the overall operations (personnel, fiscal, facilities, etc.) of the school, including developing the faculty — recruitment, hiring, professional development, research, and promotion and tenure; developing the curriculum — new degree programs, new courses, assessment, accreditation, and continual improvement; developing the staff — recruitment, professional development, organizational structure; developing the infrastructure — equipment, teaching and research laboratories, buildings; developing our community partners — advisory boards, industry partners, external funding; and anything else that affects the school. Most of all, I am a facilitator for our faculty, staff, and students to succeed.”

Dr. Anid also sees the dean’s role as focusing on mission, vision, and relationships: “Academic deans are leaders who inspire and set a vision that grows and advances their unit. Deans set goals and priorities for their schools ... and run their schools with an entrepreneurial spirit, always anticipating new trends and pushing research and innovation. They are responsible for all the students, faculty, staff, and academic programs and majors in their school. Aside from academics, deans manage their school’s budgets and finances, as well as renovations and expansions. They also cultivate relationships and forge partnerships that benefit their school and secure external resources to support various initiatives through fundraising and grants.”

Like many engineers, Dr. Scott ended up in engineering because she was good at math and science in high school. Her willingness to try new things opened doors to leadership roles, and her professional society experience helped to develop those skills. As she describes it: “I always loved math and science. In high school, I didn’t know much about engineering other than it required math and science. That sounded good to me, and I tried it — and I liked it! To be honest, it was not a very well
thought out decision, but it worked. … Overall, a willingness to try things outside my comfort zone [led to leadership roles]. I was not on a path for an administrative position, but I took advantage of an opportunity, and then realized that I did enjoy the work. … I was provided an opportunity to be director of a center shortly after I was promoted to full professor at Virginia Tech. That exposed me to more leadership opportunities throughout the university, and provided me with a focus on leadership opportunities when I left VT for family reasons. … Participation in professional societies has been a very important part of my career, especially early on. I was very active in ASME, and that helped form a network of colleagues as well as develop leadership skills through participation in various activities within the organization.”

Dr. Anid, on the other hand, did not originally set out to become an engineer: “As a teenager I wanted to be a writer and I was fascinated by psychology, cognition, and the chemistry of thought. But my family owns a paint manufacturing plant, so I grew up hearing the names of complex chemicals in a business environment. This is mainly why I started my undergraduate studies as a chemistry major and ended up earning a chemical engineering degree.”

Once Dr. Anid became a faculty member, her dean recognized her leadership potential, and professional societies helped her develop those skills. “I was vocal, volunteered on committees, and I was organized, so I was offered the position of department chair. I excelled in that position for eight years and felt that I was ready to accomplish more and make a bigger impact at a higher level. … I owe three professional organizations the skills I have today: AIChE, ASEE, and WELI [Women in Engineering Leadership Institute].”

**LEADERSHIP STYLE AND INFLUENCES**

Dr. Anid’s family has always had a big influence on her life. “The people who have influenced me the most are my parents and, later in life, my children: always striving to put their best effort in what they do. What I have accomplished thus far would not have been possible without the support of my husband: always there for me as a true companion and champion.” She believes that as a woman, her leadership style is more collaborative, but not necessarily emotional: “Being a woman is the one reason why my leadership style is collaborative and why I am firm but at the same time gentle and caring. Contrary to typical stereotypes, I don’t show emotions and am calm in crisis situations.”

Dr. Scott’s role as a leader in engineering education has led to an interest in broadening participation in engineering careers and getting more students on the path to studying science and engineering. She notes, “It has made me think about our K-12 education system and how we prepare students to pursue degrees in STEM. In particular, I’m interested in how we can diversify the students who seek STEM degrees.” Asked how being a woman has influenced her leadership style, Dr. Scott replied, “That is difficult to answer, because I only can answer from being a woman. I like to think of myself as being collaborative and open, and willing to listen. I’m not sure how different I would be if I were a man.”

Dr. Scott enjoys seeing her students and faculty succeed. Asked to describe the best and worst aspects of her job, she replied: “The best things about this job are providing access to excellence in education in the STEM fields for our student body, which has a high percentage of first-generation students, and seeing our faculty and staff advance toward their professional goals. The worst thing is not having much control over limiting factors such as space and budget.”

Dr. Anid also values the ability to have a positive impact as a dean: “The best thing about being a dean is the ability to make a difference, the ability to turn ideas into reality, and produce palpable results that affect people directly — students, faculty, alumni, employers, and the wider community. The worst thing about being a dean is the workload, which can become unmanageable while a new dean is assembling her/his team.”

**WORDS OF ENCOURAGEMENT**

Dr. Scott’s final words for SWE readers: “Don’t be afraid to pursue a leadership role. It can be extremely rewarding!” Dr. Anid advises, “Never give up. Believe in yourselves and always tell yourselves you can do it! You’re going to go through bad days; always find your inner strength, pick yourself up, and keep walking.”

Peggy Layne, P.E., F.SWE, joined Virginia Tech in 2003 as director of the ADVANCEVT program and is currently assistant provost for faculty development in the office of the executive vice president and provost. A former chair of the SWE Magazine editorial board, Layne also is a past president of the Society and was named a SWE Fellow in 2001.
Recommended Reading and Viewing

Two books Dr. Scott has found helpful are *Presumed Incompetent: The Intersections of Race and Class for Women in Academia* (Gutiérrez y Muhs, Ph.D., et al., eds., Utah State University Press, 2012) and *Whistling Vivaldi: How Stereotypes Affect Us and What We Can Do* (Claude Steele, Ph.D., W.W. Norton & Co., 2011). While these books are not about leadership per se, they address issues of difference. “We used both books for schoolwide faculty book readings and workshops. *Presumed Incompetent* looks at the issues women of color face as faculty in academia — the faculty made changes in how they do things as a result of reading this. *Whistling Vivaldi* looks at how stereotypes affect us. We looked at how they affect how we teach and what to do about it. Both books generated very interesting discussions.”

Dr. Anid recommends a pair of TEDx talks by Pope Francis (“Why the Only Future Worth Building Includes Everyone”) and Sheryl Sandberg (“Why We Have Too Few Women Leaders”). “Pope Francis because he says, ‘Tenderness is not weakness; it is fortitude. It is the path of humility; the more powerful you are, the more your actions have an impact on people, the more responsible you are to act humbly.’ Sheryl Sandberg because she encourages women to ‘sit at the table,’ persist, and rely on their partner.” Dr. Anid also recommends her own book *The Internet of Women* and an NYIT TEDx talk on the power of persistence and community.
For 23-year-old Cindy Zhang, the certainty that she would follow in her mother’s footsteps as a software engineer didn’t initially play out as she had expected. Her father is a data scientist. “College didn’t entirely prepare me for the tech industry,” she said. “There was so much about the tech industry that they didn’t teach you in school.”

Zhang, who came with her parents to the United States at age 7, knew no English and found herself in a rural town with no diversity when she first arrived. She attended eight elementary schools as her parents moved for their careers. “I constantly felt I was the new kid at school,” she said. “But it helped me learn to adapt quickly.”

By age 10, Zhang found herself at ease playing computer games, especially using HTML and cascading style sheets (CSS) to build web pages for her virtual pets on NeoPets, a website where children create and take care of their pets online. “I had the ability to change a web page’s appearance by writing a few lines of code,” she said. Zhang’s interest turned to mobile-app building when she entered the University of Southern California, San Diego. “I built a mobile app in a class in about 10 weeks, mainly working on the front end. I designed it using wire-framing tools,” she said. “It was really exciting to see the app come alive and use an app you built yourself.”

Yet Zhang said she honed in on working at Pinterest as she neared graduation because she had used the website so often to decide what to wear and how to do her makeup and create her dorm room. After acing an internship at Pinterest, Zhang is now a software engineer with the company, helping 175 million active monthly users operate “Lens,” the site’s camera search tool.

On Pinterest, people discover ideas they want to use in their real lives and save them to boards. Lens is a new feature that lets users take a photo of an object so Pinterest can return ideas for it. The photo doesn’t actually post anywhere. If a user takes a photo of an avocado, for example, she could get a list of helpful items such as avocado recipes.

Zhang’s advice: Ask yourself whether you enjoy working with the people around you and in a particular environment. She said she had to admit to herself that she was always going to confront challenging situations in new and uncomfortable environments — and that everyone else does, too. Zhang
allows herself to relax by pursuing another interest — music. She’s a singer in and songwriter for her band, Mino, specializing in jazz-inspired pop and contemporary R&B.

PURPOSE AND FULFILLMENT

For Reates Curry, Ph.D., a lifelong interest in electronics prompted her to obtain her bachelor’s and master’s degrees in electrical engineering. “I grew up as a tomboy, and my brother and I would install things, like ceiling fans,” she said. “We’d read the fan’s instructions, turn off the fuse in the utility box, and install whatever needed to be wired up. Then we’d flip the (light) switch to delight in our new installation.”

Dr. Curry attended the University of Missouri–Columbia for her undergraduate work, partly so she could run on the women’s track team and major in electrical engineering. Her interests remained with robotics and robotics control when she earned her master’s degree from Purdue University. Yet she started to realize she was growing more interested in learning how humans interacted with technology than about robotic controls. After researching her options, Curry found her answer in bioengineering.

She earned her Ph.D. in biomedical engineering (her specialty is human-machine/computer interaction) from Rutgers University in New Brunswick, New Jersey. She found her path by undertaking two pursuits: She started using eye-tracking technology to understand how people scan and inspect things, and she started training for marathons (she’s run five, including two New York City marathons) by running at least three days a week with four biomedical engineering classmates, including a long weekend run.

She has used that expertise at Ford’s Research and Innovation Center to build safer cars for nearly 22 years. Dr. Curry is a member of the VIRtual Test Track Experiment (VIRTTEX) laboratory, home of one of the world’s most advanced driving simulators. The lab features a 24-foot-diameter dome that encases an entire vehicle to give researchers the sense that they’re driving a real car.

The driver can virtually drive through a “world” projected around the dome’s interior wall. The dome can move about 11 feet back to front, 11 feet side to side, 6 feet up and down, and features “yawing” (think of shaking your head “no”), pitching (shaking your head “yes”), and rolling (touching your ears to one or the other
shoulder). All this motion gives drivers a realistic sensation of braking, accelerating, and changing lanes.

Dr. Curry said she ultimately found a career that encompassed a combination of all of her interests. She advises up-and-coming engineers to take an aptitude test, ask questions, and research the latest and most technologically pertinent careers, such as autonomous technology and the internet of things.

"Initially, I didn’t know what an engineer was," she said. "But I knew I liked to problem solve. I needed to feel that I was going to do something I could be excited about, that seemed to be cutting edge, and that made people’s lives better."

**MAKING A COURSE CORRECTION**

Catherine J. Rocky credits a friend with encouraging her to make a key pivot in college that put her on a track to success. Currently a primary national accounts contact at employee-owned Terracon Consultants Inc., specializing in geotechnical, environmental, materials, and facilities engineering services clients, Rocky was a rising senior, majoring in earth science at the University of South Dakota, when her friend offered to drive her to any university within a five-state area to pursue a more “substantial” degree.

So Rocky attended a scheduled field camp in geology at the South Dakota School of Mines and Technology and realized her future was in geological engineering. She transferred 99 of 100 credits — everything but a gym class — yet she still had to take first-year engineering classes as a senior and start over on her grade point average. It took an additional semester and an extra year for her to earn her bachelor’s degree.

Rocky has never looked back. “Once I received my degree, I never gave a second thought about not using it and leaving engineering and science,” she said. “It opened many doors and opportunities, with not a single experience wasted.”

Indeed, a combination of resilience, a sense of humor, and happenstance are the ingredients for a successful career. “I’ve been a ‘spouse-in-tow’ for many years, but I always found opportunities,” Rocky said. On the other hand, being in the right place at the right time created a surprising opening. Rocky’s first job as a dam inspector for the South Dakota Department of Natural Resources (now the South Dakota Department of Environment and Natural Resources) began shortly after the Teton Dam north of Rexburg, Idaho, collapsed on June 5, 1976, virtually wiping out the small cities of Teton, Newdale, and Sugar City, Idaho.

As a result of this unforeseen circumstance, Rocky found herself working on a first-ever national effort to determine the hazards of any dam failure — an order from then-President Jimmy Carter.

Rocky recommends pursuing your interests with no agenda, because you never know how things will work out or whom you will continue to know professionally throughout your career. She recalls taking a graduate class in remote sensing aerial photography because she found it interesting, and it proved a perfect setup for some of her later work.

**THE RIGHT ENVIRONMENT**

Nehal Abu-Lail, Ph.D., an associate professor of chemical engineering and bioengineering at Washington State University, says she quickly realized in her first job that she didn’t want to spend her life working as a chemical engineer at a refinery because it was so repetitive and male dominated.
“I didn’t like repeating the same thing over and over,” said Dr. Abu-Lail, who spent a three-month internship working at the refinery in her native country of Jordan. She also quickly realized that she wanted a more innovative, cutting-edge workplace.

Dr. Abu-Lail, the eldest of six siblings — five daughters and one son — all of whom became engineers, continued to search for her place in the work world. She earned her master’s degree in chemical engineering from the Jordan University of Science and Technology, where she had obtained her undergraduate degree, and earned her doctorate from Worcester Polytechnic Institute in Worcester, Massachusetts.

Along the way, Dr. Abu-Lail realized that her most exciting moments stemmed from a multidisciplined approach: teaching, research, and service. She says she enjoys staying on the cutting edge by measuring and quantifying cells’ responses to stressors, such as a toxin or high temperature, to reach goals such as finding a way to produce energy or to clean the environment.

Dr. Abu-Lail writes proposals to obtain funding for the research, which gives graduate and doctoral students the opportunity to apply research to real-world solutions. She also has worked to improve her teaching, which encompasses electives and core classes, ranging from 30 to 100 students each.

“I really love to teach,” she said. “I love the interactions with the students.” She appreciates the direct and immediate gratification she experiences when a student “gets it,” as opposed to the painstaking and often long-term work involved in research. “It’s a reward I don’t want to give up,” she said of nudging students toward enlightening moments.

Dr. Abu-Lail said she twice won entry to the National Effective Teaching Institute, where she learned how to design an exam, engage her students, and use experiential learning methods, and attended American Society for Engineering Education sessions. The efforts paid off: In 2013, she received teaching awards from Washington State University’s bioengineering program as well as from the school’s Voiland College of Engineering and Architecture. She received another teaching award in 2016 in chemical engineering.

Dr. Abu-Lail draws upon her own experience when she tells her students to think carefully about what fuels their interests when they choose careers — and that they may have a time in their lives when they want to try something different. “It’s never too late to explore something new,” she said.

“I initially didn’t know what an engineer was, but I knew I liked to problem solve. I needed to feel that I was going to do something I could be excited about, that seemed to be cutting edge, and that made people’s lives better.”

– Reates Curry, Ph.D., technical expert, research and innovation, Ford Motor Co.
A Taste of Food Technology’s Future

Whether here on Earth or exploring outer space, everyone needs safe, plentiful, nutritious food to survive. Food technology plays a crucial role as we prepare for a world of 9 billion people — and plan a mission to Mars.

By Seabright McCabe, SWE Contributor

“Think about the polar exploration missions of 100 years ago,” Grace Douglas, Ph.D., advanced food technology lead scientist at NASA Johnson Space Center in Houston, said. “They definitely had cold storage, and some level of resupply from their environment, which included hunting animals for meat. A lot of those early expeditions were not successful, due to malnutrition or not carrying enough food due to poor planning. All of these things are really important in a hostile environment.”

No environment is more hostile to humans than deep space, and NASA is ramping up to the challenge. “My job is to determine how we get to a food system that can take us to Mars,” Dr. Douglas said. “Right now, we’re looking at four crew on a 2.5-year mission by the middle of 2030, but that number is not set in stone.”

Dr. Douglas is leading NASA’s effort to develop safe, nutritious, and palatable foods to sustain astronauts in long-duration spaceflight. Her work includes investigations into novel processing, packaging, storage, probiotics, and functional foods.

“What we’re trying to do here is unprecedented,” she said. “We have huge mass and volume limitations on a spaceship. No one’s ever had to have a five-year shelf life with no resupply if something goes wrong. There’s no cooking in microgravity; everything is either heated or rehydrated because the environment is completely enclosed. Meals are in single portions because you can’t wash dishes. Vitamin supplements and nutrients degrade, and we have no option for fresh foods.”

Currently, astronauts on the International Space Station (ISS) have limited fresh-food choices for a short time when cargo vehicles arrive. The rest of the time, they choose from a variety of 200 foods and beverages. Thermostabilized (canned) foods are dependable, and so are the freeze-dried and irradiated foods that fill out their diets.
Dependency isn’t always palatable, though. One of the main complications of food for the Mars mission is maintaining quality. “Even freeze-dried foods lose quality over time because the packaging is not a complete moisture or oxygen barrier,” Dr. Douglas said. “That’s pretty much true of every food that’s stored for long periods, and our challenge is five years.”

Early on in the space program, NASA noticed that ISS crew members were losing weight, in part because they weren’t getting foods they craved. “We don’t have any choice except to offer a variety of prepackaged meals,” Dr. Douglas said. “If your food isn’t appetizing, you don’t stop eating altogether — you just don’t eat enough to maintain top performance and cognition. So we have to make sure the food’s acceptable, that they have the variety they want with the nutrition they need.”

Vickie Kloeris, manager of flight food systems, has worked in food technology at Johnson Space Center since 1985 and is responsible for the operation and continuing development of ISS food systems. “There’s a few concerns we have about nutrition and long-duration space flight,” Kloeris said. “First, losing weight in space equates to losing bone and muscle mass. There’s a constant turnover of bone in the human body, and bone loss increases as we age,” she said. “High-salt, prepackaged foods exacerbate that, especially in space. In microgravity, we’ve learned the body needs less iron because it’s not turning over red blood cells as fast as on Earth. Meals-ready-to-eat (MREs) are too high in salt for crew members who are in space for a long period of time.”

Nutrients also degrade over time, another challenge for the five-year plan. “Even though we control moisture and eliminate bacteria, the texture, flavor, and nutritional content of the food degrades,” Kloeris added. “In some products you get changes in color, breakdown of flavor components — the chemical structure changes.”

Satisfying, appealing food is important

“Acceptability” is vital to keeping astronauts healthy on a long mission. That rules out “meals in a pill.” Because there’s no option for exposure to sunlight, astronauts receive Vitamin D supplements only (however, they may take supplements at their discretion and that of the flight doctor if they wish). “If you correct for the fact that nutrition does degrade in shelf-stable food systems, “Crews come back and say food is more psychologically important in spaceflight than they ever thought it would be.”

– Grace Douglas, Ph.D., advanced food technology lead scientist, NASA Johnson Space Center
systems by using supplements, you’re leaving out the fact that you’re losing acceptability anyway,” Dr. Douglas said. “If you have a food system that’s stabilized, you should be stabilizing your nutrition and your quality as well.”

The battle to maintain nutrients and palatability would be much easier if there were refrigeration in space — but that’s not currently possible. “Refrigeration uses too many of a spaceship’s limited resources — power, mass, and volume — so NASA hasn’t had a food freezer on a mission since Skylab,” Kloeris said.

Yet another challenge of growing living things in space is the potential for contamination, and researchers will have to develop processes to prevent foodborne illness. Still, on the other side of these steep challenges lies a big human benefit. “Crews come back and say food is more psychologically important in spaceflight than they ever thought it would be,” Dr. Douglas said. “And also, having the ability to celebrate in a common area — there has to be space for the entire crew to eat together.”

“If the human race wants to be Earth-independent, we need to be able to grow crops on spaceships and on other planets,” she concluded. “We need to mature that technology, and the only way to do that is to keep testing and building the system.”

EXPLORING A POST-ANIMAL BIOECONOMY ON EARTH

In 2017, Earth’s population will likely reach 7.6 billion and, by 2050, more than 9 billion. Currently, one-third of all grain on Earth is devoted to raising livestock. The industry consumes 8 percent of the global water supply and produces 18 percent of all greenhouse gases. Livestock consume 79 percent of all antibiotics produced in the United States alone, and the global demand for meat is projected to grow by 10 percent to 100 pounds per person per year by 2030.

For meat lovers, a potential solution may be on the horizon: cellular agriculture. Isha Datar, executive director of New Harvest, a 501(c)(3) devoted to promoting, funding, and kick-starting cultured food research, has a B.S. in cellular biology from the University of Alberta and an M.S. in biotechnology from the University of Toronto. She and New Harvest are working toward producing animal products without animals, with a focus on cultured meat,
regarding it as “no longer a science problem, but an engineering problem.”

Datar makes a compelling case. “When there’s no ‘animal,’ there’s no manure, no overcrowding that leads to suffering and diseased animals, no factory farming, fewer risks of viruses like avian or swine flu jumping to humans,” she said. “Instead of raising a whole animal to be slaughtered and processed with many parts discarded, you only grow the parts you eat. If cultured meat was subsidized like livestock farming is, and if a large food producer adopted cellular agriculture into their production methods, it would be affordable.”

New Harvest supports cellular research for agriculture. “We’re dealing with knowledge and expertise that comes from the medical research world, but applying it to food science, a crossover that doesn’t often happen,” Datar said. New Harvest is finding opportunities at agricultural state universities where meat science is already being studied — funding a project in a poultry science lab at North Carolina State University and a bioreactor design at Kent State University, among others.

As with anything unprecedented, the basic elements for performing the research aren’t all there yet. “For example, it’s very easy to find human cells, canine kidney cells, bovine ovary cells, all these common research cell lines,” Datar explained. “It’s less common to find cell cultures from agricultural animals.

We’re trying to identify those cell lines and make them publicly acceptable and easy for researchers to get. When they have access to these materials, they can do the research properly.”

Many of the research materials available are not necessarily food grade or scalable. “They might be appropriate for a medical treatment that costs tens of thousands of dollars but may not translate well into an affordable food application. So we’re finding a lot of opportunities for funding research materials and cellular materials.”

Datar believes the next 10 years will bring the research much closer to producing cultured meat with sustainable materials. “Right now, tissue culture is routinely done with fetal bovine serum — a byproduct of the livestock industry that’s very unsustainable. We need to re-engineer that, using plant sources to make cultured meat a reality. There’s no reason why that can’t be done — there’s just a lot of work to do.

“We’re a bit like the early stages of pharmaceutical research — research that asks questions but doesn’t have market value yet. We want to make sure ‘toolkits’ of cell lines and media for the research are available. We’ve done a lot of the background work already, setting the stage for experiments to advance the field.”

“EVEN THOUGH WE CONTROL MOISTURE AND ELIMINATE BACTERIA, THE TEXTURE, FLAVOR, AND NUTRITIONAL CONTENT OF THE FOOD DEGRADES. IN SOME PRODUCTS, YOU GET CHANGES IN COLOR, BREAKDOWN OF FLAVOR COMPONENTS — THE CHEMICAL STRUCTURE CHANGES.”

– Vickie Kloeris, manager of flight food systems, NASA Johnson Space Center

Ph.D. candidate and SWE member Natalie Rubio studies a culture of turkey muscle cells at the David Kaplan Lab, Tufts University.
Once certain leaps are made in research, companies follow with investment. “I think 10 years from now we’ll have a plant-based serum that will work with animal cells,” Datar said. “By then, we will have produced cultured meat prototypes that are sustainable and meaningful for science. Something truly novel.”

EDIBLE SCAFFOLDING FOR CULTURED CELLS

One of the projects New Harvest is funding is at Tufts University’s David Kaplan Lab, where Ph.D. candidate Natalie Rubio is researching ways to grow cultured meat. “I was at Colorado University at Boulder, earning my chemical and biological engineering degree,” she said. “I was passionate about becoming a fertility doctor, but we were using transgenic mice as an animal model and I had an intense gut reaction to that.”

Rubio’s concern for animal welfare and an interest in tissue engineering led her to cultured meat. “It was such a brilliant idea that I couldn’t believe more people weren’t pursuing it,” she said.

Joining New Harvest as a volunteer in 2014, Rubio gained invaluable experience doing everything from social media, fundraising campaigns, and interviewing researchers, to building presentations and attending conferences. “Ultimately, I got a chance to apply for New Harvest’s fellowship. It was the perfect timing for me to go where I could work on the exact research I wanted to do.

“Right now, I’m looking at scaffolding materials for cultured meat. We need an edible material that has an appealing texture,” Rubio continued. “It’s important to consider future marketing, and it has to be something people will want to eat.”

One potential scaffolding biomaterial is chitosan, a polysaccharide derived from the shells of crustaceans, which is not animal-free but can also be extracted from mushrooms, other types of fungi, and algae. “Assuming that both types have the same properties, I’m using the less-expensive, crustacean-based chitosan to build different scaffolds and see how muscle cells work on them,” Rubio said.

Her biggest research challenge is the media for feeding cultured cells. “We use fetal bovine serum and it’s derived from factory farming — so we need to develop a media for feeding cells that’s animal-free.”

Rubio joined SWE as an undergrad at the University of Colorado Boulder, and is active as a grad student in SWE’s growing section at Tufts. She’s also finding many other students who are excited and interested in her research. “My first semester I was working with six undergrads, helping them design their own independent research projects, growing different cell lines that might be relevant to cultured meat,” she said.

For her Ph.D. work, Rubio has an ambitious goal. “I’d love to develop a reliable scaffold material that is cheap and accessible enough to be used in the industry,” she said. “That would be huge. Long term, I definitely see myself doing this for as long as it takes to get this to being a product.”

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Statistics from: Food and Agriculture Organization of the United Nations (FAO) and The Economist

Your Kitchen Owes a Debt to the First Lady of Engineering

Industrial engineer, inventor, and industrial psychologist Lillian Moller Gilbreth, Ph.D. (1878-1972), together with her husband, Frank, invented motion study, breaking industrial tasks down into components that can be analyzed and made more efficient. Her passionate belief that industrial management as a science should consider the perspectives and job satisfaction of workers spurred stellar achievement on a number of fronts.

An early proponent of ergonomics, Dr. Gilbreth went so far as to interview 4,000 women to determine the proper heights for stoves, counters, and sinks, not to mention a labor- and step-saving kitchen design that is still a big influence today. She invented the foot-pedal trash can, and designed the now-universal refrigerator butter tray and egg keeper.

The Gilbreths had 12 children, and when Frank died in 1924, 11 of them were under the age of 20. Two of the children grew up to write the bestselling Cheaper By the Dozen and Belles on Their Toes, about their early lives, both of which were made into popular films, starring Myrna Loy as Lillian Gilbreth.

Frequently referred to as “the First Lady of Engineering,” her long list of firsts includes the first woman elected to the National Academy of Engineering, the first female professor of engineering at Purdue University, and the first woman to receive the Hoover Medal (awarded by five engineering societies). In 1950, Dr. Gilbreth became the first honorary member of SWE.

Since 1958, SWE has awarded its Lillian Moller Gilbreth Memorial Scholarship to exceptional undergraduate women engineering students to celebrate Dr. Gilbreth’s life and to provide a springboard for the next “genius in the art of living.”
SWE’s International Champions are organizations that actively create, nurture and sustain global opportunities for women engineers and technologists. Thank you for advancing our mission.

Interested in joining our growing International Champions program? Visit internationalchamp.swe.org for details.
Professional Engineers: Committed to Public Health, Safety, and Welfare

Professional engineering licensure was introduced in 1907 to establish an informed and rational procedure for making decisions about water rights. Despite some recent legislative attempts to weaken and even eliminate licensure, ensuring the competence and integrity of the engineers who touch almost every aspect of our lives is just as critical now as it was more than a century ago.

By Meredith Holmes, SWE Contributor

In the early 1900s distribution of water rights in Wyoming had become chaotic, and state engineer Clarence Johnston realized he had to take action. As noted on the National Society of Professional Engineers’ (NSPE) website, Johnston wrote a bill requiring engineers and surveyors to be licensed. The bill, which also provided for creation of a state board of examiners for engineering and surveying, met with some resistance, but passed the Wyoming State Legislature in 1907. A few years later, Johnston observed, “A most astonishing change took place within months in the character of maps and plans filed with the applications for permits.”

NSPE, the organization that promotes engineering licensure, was formed in 1934. One of NSPE’s early goals was to establish licensing laws in every state. Passage of state laws that created licensing boards was fairly rapid. These laws are based on the 10th Amendment of the U.S. Constitution, which grants to the states all powers not delegated to the federal government. By 1947, there were state licensing boards in all 48 states (Alaska and Hawaii were still territories then). Although the particulars vary from state to state, to earn a P.E. an engineer must receive a four-year engineering degree from an accredited program; pass the fundamentals of engineering (F.E.) exam; work for four years under the supervision of an engineer with a P.E. license; and pass the principles and practices of engineering exam.

INSIDE THE EXAM PROCESS

Licensing authority and responsibility for the P.E. exam lies with the state licensing boards, which are represented by a national nonprofit, the National Council of Examiners for Engineering and Surveying® (NCEES). NCEES develops, scores, and administers the examinations for engineering and surveying licensure in all 50 U.S. states, the District of Columbia, Guam, the Northern Mariana Islands, Puerto Rico, and the U.S. Virgin Islands. NCEES also evaluates education credentials for engineers educated outside the United States.

The P.E. exams are developed by licensed engineers who volunteer their time to write and evaluate exam questions. In 2015, a total of 772 volunteers attended 51 meetings to ensure that exams were fair, technically current, and reflected the various conditions and safety concerns of the NCEES regions.

Different education and work requirements can be an obstacle to licensed engineers who want to work in more than one state. The NCEES Records Program expedites the process of applying for a comity license by storing all licensure credentials in one place and enabling applicants to access them electronically. Multistate licensure applications are on the rise, increasing from 4,049 in 2010-2011 to 5,775 in 2013-2014.

A RESPECTED CREDENTIAL

Tim Miller, P.E., is director of exam services for NCEES. He has worked for the organization since 2005 and manages the development, editing and formatting, printing, security, and scoring of the exams. Miller earned his B.S. in civil engineering from Virginia Tech. He is convinced that P.E. licensure is important to engineers in all disciplines. Many federal and state agencies and city and local governments require a P.E. for engineering positions. Some states require that engineering instructors be licensed, and only a licensed engineer may prepare, sign and seal, and submit engineering drawings to a public authority or seal engineering work for public and private clients.

Miller said, “It is still an advantage for all engineers to be licensed. Licensure sets them apart from their co-workers. It is, for the most part, a respected credential, and gives instant credibility, and by allowing you to offer your services to the public, gives you additional opportunities.”

He added, “We have not seen a
test takers in EAC/ABET engineering programs passed the exam.

The F.E. is now administered year-round at 310 test centers, and most universities encourage engineering students to take it. Jim Thompson, Ph.D., P.E., assistant teaching professor in the civil and environmental engineering department at Carnegie Mellon University, advises students to take the F.E. and later, the P.E. “I do as an individual and as an instructor, and the department encourages it as a whole,” he said. “We believe taking the F.E. now is a good idea, since our graduates don’t know what their career path will be, and this prepares them to go toward professional licensure if they want.” He added, “The number of our students taking the F.E. exam is increasing, partly because we encourage it and support it. The department supports taking the F.E. exam by reimbursing the students for the cost. In our senior capstone design class, we encourage it by awarding students a small amount of credit for doing so.”

THE PROBLEM WITH THE RECENT CHALLENGES TO PROFESSIONAL LICENSURE IS THAT THEY PAINT ALL THE PROFESSIONS WITH THE SAME BRUSH. INTERNAL OVERSIGHT MIGHT BE ADEQUATE FOR FLORISTS, BUT THE MOST STRINGENT LEVEL OF REGULATION — LICENSURE — SHOULD BE RESERVED FOR PROFESSIONS THAT MOST AFFECT PUBLIC SAFETY, AND ENGINEERING IS ONE OF THOSE.”

— B. David Cox, executive director, Kentucky State Board of Licensure for Professional Engineers and Land Surveyors

fell off for about a year-and-a-half but has returned to pre-2014 levels.

P.E. LICENSURE RECONSIDERED

Professional licensure — in all occupations — is at the intersection of two opposing forces. On one hand, the number of regulated occupations is increasing. The percentage of the workforce that requires a license to practice has grown from about 5 percent in the 1950s to about 29 percent currently. The increase includes jobs that have been around for a while — private investigators, cosmetologists, and funeral directors — and newer ones, such as music therapists, natural hairstylists, and elevator maintenance workers. Advocates of minimal government interference in business are pushing back, contending that licensing is a drag on the economy, creates barriers to employment, and drives up costs. In July 2015, after examining the difficulties
state legislatures. One of its model bills, “The Occupational Licensing Relief and Job Creation Act,” has been introduced in several states, including Arkansas, Iowa, and Minnesota. This bill does not single out P.E. licensure, but could result in weakening or even eliminating it. NSPE has vigorously opposed ALEC’s proposed legislation and has so far defeated all direct attempts at abolishing P.E. licensure. In January 2017, NSPE released a position statement on professional practice that read, “Licensure of professional engineers is critical to protecting the health, safety, and welfare of the public. The practice of engineering is not a right, but a privilege granted only to those who hold the proper qualifications. Licensing boards and governing jurisdictions are necessary to regulate the profession.”

B. David Cox, executive director of the Kentucky State Board of Licensure for Professional Engineers and Land Surveyors, has seen demands for both less and more regulation come and go. “Movement toward regulation is often triggered by a catastrophe that involves loss of human life — like the 2010 Deepwater Horizon explosion in the Gulf of Mexico or the 2007 collapse of the I-35 bridge in Minneapolis,” he said. “But I think now the pendulum may be swinging too far in the other direction — against regulation. We want to be somewhere in the middle — where public safety is the number one concern, and people can still make a living.”

Pointing out that it never hurts to analyze regulations to make sure they are efficient and effective, Cox said, “The problem with the recent challenges to professional licensure is that they paint all the professions with the same brush. Internal oversight might be adequate for florists, but the most stringent level of regulation — licensure — should be reserved for professions that most affect public safety. Engineering is one of those.”

A LEARNED PROFESSION

Kodi Verhalen, P.E., is the 2016-17 president of NSPE. She is the youngest P.E. to serve as president since NSPE’s founding in 1934 and only the third woman. She no longer practices engineering, but works closely with many licensed professional engineers as an attorney in the Minneapolis office of Briggs and Morgan, P.A. Her practice is focused primarily in environmental and energy law.

Observing that ALEC has chosen an “unfortunate” approach to revoking professional licensure by going after the learned professions — medicine, law, and engineering — along with dog grooming and hair braiding, Verhalen pointed out that the most serious and direct threat to P.E. licensure so far came from an advisory group called the Indiana Jobs Creation Commission (JCC). “In Indiana in 2015, a formal recommendation was made to then-Governor Mike Pence to eliminate engineering licensure altogether from the state’s laws,” she said. The JCC evaluated 10 other professions at the same time. The committee of six men rated each on a scale of one to five, with one being the least deserving of licensure, and five, the most deserving. Engineering was rated 2.75, behind accounting and private investigating.

“As a result of advocacy efforts by NSPE and partners to inform legislative leadership in Indiana of the importance

### Number of P.E. Exams Taken for the First Time

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Source: NCEES statistical annual reports, Squared.

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of professional engineering licensure in protecting the public health, safety, and welfare, that recommendation was killed,” said Verhalen. She added, “A professional engineering license is more than just a license and a set of technical qualifications. It’s a commitment to hold the health, safety, and welfare of the public paramount.”

Editor’s note: See the Viewpoint column, “Get Your Professional Engineer’s License — It’s What Grandma Would Want You to Do,” and the Scrapbook, “When the Professional and the Political Collide,” in this issue of SWE Magazine. Both articles provide a look into members’ views regarding the importance of professional licensing as well as early members’ perspectives on the perceived need to refrain from political discussions.

SWE Pioneers on P.E. Licensure

For many of the SWE pioneers — the founders of SWE and the women who cleared significant hurdles to practice engineering in the 1950s and 1960s — adding P.E. to their names was a source of pride. In a 1986 SWE Newsletter editorial, SWE National President Ada Pressman advised young women to earn their P.E. licenses so they could advance in their careers. “To be a professional,” Pressman wrote, “one must have learned the area of expertise. It cannot be inherited, bought, found, or stolen. In certain areas of employment, registration by a state agency is the one and only recognition for professional advancement.”

Margaret H. Kipilo graduated from Penn State University with a B.S. in electrical engineering during the WWII era and worked for Westinghouse Electric Corp. and the Pennsylvania Electric Company. In an April 11, 2003, interview conducted by Lauren Kata for the Profiles of SWE Pioneers Oral History Project, she explains why she was determined to earn her P.E. license: “Because I was a woman. I felt I needed it more than a man. I felt having a P.E. on your name would help you get a job more than anything. ... When I first started to work for Penelec ... somewhere in the 1950s, they just started P.E. in Pennsylvania. And I wasn’t old enough to get in on the grandfather clause. If you had enough years in, you could get your license without taking a test or anything. ... And they sent me notice that the test was going to be given. I had less than a week’s notice. ... I didn’t pass it the first time. They didn’t have these refresher courses which they do now. But I did pass it, and I am a professional engineer. And for a while, I was the only woman in Pennsylvania who was. ... But that was just for a short time, because other women engineers did take the P.E. and pass.”

Josephine Webb graduated with a degree in electrical engineering from Purdue University in 1940. She was a Buhl Research Fellow at the Carnegie Institute of Technology and worked at Westinghouse Electric Corp. In 1946, she became director of development at the Alden Products Co., where she designed a newspaper-size fax machine. In the early 1950s, Webb co-founded Webb Consulting Co., an industrial electronics firm, with her husband. In her Profiles of SWE Pioneers Oral History Project interview, conducted by Lauren Kata on March 2, 2002, Webb talks about how having her P.E. enabled her and her husband to run a business and manage their work and family lives in a way that suited them: “We set up our consulting business, called Webb Engineering, and we both got our PEs. ... I think it was in the ’50s. Because we wanted to do consulting business and be independent of working for industry. We had worked at Westinghouse for a large company, then we worked in Cambridge, Massachusetts, for smaller companies at that time. And we decided it was time to try it on our own. ... [We had] one daughter in ’48 and another daughter in ’52. And so I was able to be home. We had our laboratory, which was also set up as a measurements laboratory, as an addition to our home. ... The trick was to close the door and not do any home stuff when (laughs) we should be upstairs working in the lab. ... that kind of discipline you learn as you go along. We were there when the kids came home from school.”

Yvonne Clark was the first woman at Howard University to complete her B.S.E.M., graduating in 1951. She became a licensed professional engineer and was the first woman to receive a master’s degree in engineering management from Vanderbilt University. Clark worked at Frankford Arsenal-Gage Laboratories and at RCA. She was the first female faculty member in the College of Engineering and Technology at Tennessee State University and taught there for more than 50 years, serving twice as department chair. Clark joined SWE in 1952 and received its Distinguished Engineering Educator Award in 1998. In an interview conducted by Lauren Kata, Anne Perusek, Isabelle French, and Dianne DelTurris for the Society of Women Engineers, June 29, 2001, she talked about her long career and the rewards of encouraging young engineers: “A lot of times the students will call me and say, ‘Mrs. Clark?’ I say, ‘Okay, what’s the problem?’ ‘I don’t have a problem.’ ‘Oh, you called me to tell me some good news. What’s the good news?’ ‘I got my P.E.’ I mean, both of us, there’s electricity on the wire, because the kid has gotten his professional license. And he knew I would understand that, where his mom and dad wouldn’t.”
Congratulations and thank you to all of our Society of Women Engineers members and supporters for another fantastic year! “Life’s Variable: SWE’s Your Constant” was the theme for FY17. Although this theme is quite personal to me, it has resonated with members everywhere. It has been inspirational to hear the stories from so many members on how SWE has been a constant to them as they go through their schooling and lives. This past year, SWE continued to expand its reach and programming as the world’s largest advocate and catalyst for change for women in engineering and technology.

WE16, our annual Society conference, took place last October in Philadelphia — “the City of Firsts.” The conference lived up to the city’s nickname. We held our first “State of Women in Engineering” at WE16 to educate members, supporters, and the media on statistics and research surrounding women in engineering. We presented new awards for both professional members and SWENexters. And, most exciting, WE16 set a record, with nearly 12,000 attendees — including more than 1,000 participants in our signature outreach event, “Invent It. Build It.” All precollege attendees received an exciting gift this year — a print version of SWE’s first comic book, Constance and Nano: Engineering Adventure #1.

Continuing the theme of firsts, following WE16 the Society launched the SWE research website to host statistics on women in engineering. Our climate control study published on the site revealed interesting results on the unconscious bias women experience in the workforce. SWE Magazine’s annual literature review inspired a new publication based on the research SWE and others have conducted on women in engineering.

SWE’s STEM Re-Entry Task Force completed its first year in 2016. This cohort of seven SWE Corporate Partnership Council member companies created individually unique internship programs for women who have been out of the workforce for more than two years to return to work. All seven companies renewed for 2017, and seven additional joined for 2017. This program has truly shown how SWE can support our members throughout their career lifetimes and be their constant.

We hosted our first WE Local conferences this year, in Pittsburgh and San Jose, along with two international events, in India and the Netherlands. As we move into FY18, there will be five WE Local events in the United States as well as additional international events to allow members to “Meet Locally. Learn Socially.” The keynote speakers at this year’s conferences were top-notch, and it was great to experience some local flair at the Friday night networking events! To further SWE’s mission and make an impact on each conference city, Design Lab — a new outreach for middle-school girls and their parents and educators — was held on Saturday during the two U.S. WE Local events. The lab drew rave reviews from the attendees.

SWE’s social media reach has continued to grow, and we marked a milestone of 50,000 Facebook followers this year. All Together — the Society’s blog — was recognized with a Golden Trumpet Award from the Publicity Club of Chicago. Did you get to use some of the new SWE-specific filters on Snapchat at WE16 or WE Local — a first for us? We launched a highly rated SWE podcast series this year covering a variety of topics, available on iTunes®. I have enjoyed interacting with members around the globe through our new SWE President Facebook page.

It has been an amazing year in SWE, an organization with so many dedicated members and supporters. As we move into the new SWE fiscal year, we’ll continue to have more firsts and expand our programming to be “Always Connecting. Always Engineering.”


Jessica Rannow
SWE FY17 President
As director of regions, I congratulate and acknowledge the regions, members at large, sections, and affiliates on the growth and many accomplishments that have taken place over this year. It is the efforts and contributions of many individuals, working together, that have brought the Society to a new and exciting point in its history.

Thanks to every member — whether you took on leadership responsibility, supported events behind the scenes, attended WEi6, viewed our webinars, kept up with SWE through the magazine and *All Together*, or engaged in our social media, to name a few of the ways to be part of SWE. Each action contributes to our effectiveness and overall impact.

And whether you express your passion for engineering through outreach activities, professional development, advocacy, networking, or by keeping current with dues and viewing our communications, every expression of commitment is important. Each contributes to success and engagement on one’s own terms.

This has been an exciting year as we took new steps to grow and change, developing the SWE of the future. We held the inaugural WE Local events in Pittsburgh and San Jose, and in FY18 will fully launch this new model.

One of the ways to celebrate the successes of FY17 is by looking forward, envisioning an even brighter future for the Society, as FY18 will be a significant year of transition.

Once again, thank you for your dedication and contributions.

*Lisa Rimpf*

Lisa Rimpf
Director of Regions
Fostering discussions and gathering feedback from members was a primary goal of the Region A leadership team. As the fiscal year progressed, the region governance task force held periodic updates while region leadership passed along information and collected comments from sections. In addition, section reports and discussions with the leadership coaching committee successfully tracked each section’s progress throughout the year. Such information made it possible to collaborate more effectively regarding how to best help individual sections, determining the resources needed, and selecting the best mentor for each. Region A leadership also found Facebook an efficient way to disseminate information across the region. Members are encouraged to use the social media platform to promote events, find speakers, and recruit volunteers for events.

A FIRST WE LOCAL
Region A’s first WE Local was a clear success, alongside the added plus that SWE headquarters was involved in the planning process. This was greatly appreciated as headquarters took care of the logistical work — such as booking a location and negotiating contracts — a key ingredient of the WE Local events. Region members could then focus on choosing workshops and choosing keynote speakers. Many members at this first WE Local said they particularly enjoyed the sense of closeness among attendees.

GREAT LEADERSHIP TRAINING
The ABJ leadership meeting continues to provide excellent leadership training that brings together members from regions A, B, and J. This year, the event was hosted by the Sierra Nevada Section. Members discussed strategic issues at the Society level that are having an impact on the regions, as well as best practices and new SWE programs relevant to sections. The meeting allowed sections to network and learn how other sections are holding events or solving problems that arise.

WOW! COLLABORATION REALLY WORKS
Though the Santa Clara Valley Section has held many successful “Wow! That’s Engineering!” outreach events, members continually find ways to fine-tune the process. This year they partnered with the San Jose State University Collegiate Section with the aim of building knowledge and experience so that the collegians could host a future event on...
their own, freeing the professional section to partner with other collegiate sections and further everyone’s capabilities. These collaborations hold many advantages. While professionals contribute information and resources from their employers, collegians are closer in age to the high school girl attendees, who can more easily identify with collegians. The professional section also found that postings on Facebook and in the section’s newsletter brought volunteers with a variety of backgrounds and skills, so event activities were based on the volunteers’ disciplines and employers. This collaboration also extends to lab tours and presentations about jobs in various engineering disciplines.

BIG SIBLINGS – LITTLE SIBLINGS
Last year Stanford University’s Collegiate Section began a SWE Siblings mentorship program as a more personal way to welcome first-year female engineering students, who enter the university with a lot of questions. This year’s program was even more successful than the previous year’s, as the new students were matched with Big Sibling collegiate members who understand what it’s like to be a first-time university student. Experienced SWE members welcome new students and introduce them to the Society. Before the fall quarter, experienced collegians apply to become mentors. Matching is based on both academic specialties and personal factors. Big Siblings send a welcome packet with relevant advice such as packing for college, studying, managing time, and living in Stanford. Big and Little Siblings gather at casual events such as picnics and professional development talks. An interview-prep session was a popular addition this year. With more pairs of Siblings than last year, the program is indeed a success.

Let’s Watch a Movie!
At the beginning of each academic quarter, the Santa Clara University Collegiate Section holds an enjoyable activity such as painting pottery or rock climbing. This January, section members decided to watch the movie “Hidden Figures,” which they determined a must for women engineers and scientists as it features three African-American female pioneers who calculated the equations that propelled Neil Armstrong, Alan Shepard, and John Glenn safely into space.

Understanding the scope of the movie, the section invited other groups on campus, such as Women in STEM and Women in Physics, to join them in viewing this inspiring film. The section found that reaching out to other groups produces a higher turnout and allows them to meet new friends. Since then, it has become a trend for most of their events.

IN THE FILM “HIDDEN FIGURES,” NASA HEAD ENGINEER PAUL STAFFORD DENIES A REQUEST FROM KATHERINE JOHNSON (PLAYED BY TARAJI P. HENSON) TO ATTEND AN EDITORIAL MEETING CONCERNING JOHN GLENN’S IMMINENT MISSION TO BECOME THE FIRST AMERICAN TO ORBIT THE EARTH. STAFFORD ABRUPTLY DISMISSES THE REQUEST, REPLYING, “THERE’S NO PROTOCOL FOR WOMEN ATTENDING.” JOHNSON REPLIES, “THERE’S NO PROTOCOL FOR A MAN CIRCLING EARTH EITHER, SIR.”
This fiscal year Region B fulfilled two main goals: continuing an emphasis on outreach at region and section levels and helping sections connect with one another. Over the years, Region B sections have learned much about holding outreaches and thus have lots of advice to share. For instance, one key point is to not only emphasize what the children learn but also to demonstrate to teachers, parents, and guidance counselors the advantages of engineering careers. Toward this end, a dual track for parents and girls was offered at the Girl Scout outreach at Region B’s conference.

The region’s second goal focused on encouraging sections to work with one another. The region publishes a scorecard where sections earn points for sharing the practices they have found most valuable. The scorecard lists what each section is doing so that best practices are promoted, comments are posted on a blog, and sections are invited to come together to vote on an issue. In addition, incoming professional section officers are asked to visit collegiate sections to offer resources and advice.

FROM 1991 TO 2017

On Sept. 13, 1991, the Los Angeles Section held a corporate-sponsored banquet and scholarship awards recognition with Section President Sharon Cascadden serving as host. By 2017, the event had transformed into a professional development conference focused on working professionals. Attendance is not limited to women engineers but encourages all professional women and men. One constant of the event has been a focus on collegiate scholarships, including the Sharon Cascadden Memorial Scholarship, given to an individual who, like Cascadden, has returned to school as a re-entry student to pursue an engineering degree. While keeping some traditions from the past that reflect its rich history, the section continually strives to improve this event through post-event surveys, which generate suggestions such as increasing time for networking and providing methods and techniques for enhancing career growth.

LIVING THE LIFE OF AN ENGINEERING STUDENT

For many years, members of the California Polytechnic State University, San Luis Obispo Collegiate Section have invited high school students to SWE Welcome, a two-day shadowing event held in the fall and spring. To either spark or fuel an interest in an engineering career, participants attend classes and live the life of engineering students for a day. To
publicize the event, collegians host a SWE phone-a-thon for members to invite female engineering students to participate in SWE Welcome. In preparation for the event, the section holds a certified TechBridge outreach committee training at the beginning of each school year to teach volunteers about various topics, including how to address common misconceptions about engineering. When the students arrive, they attend an Engineering Like a Girl presentation and participate in various icebreaker activities such as a photo scavenger hunt, along with a tour of the campus and classroom visits. They are paired with a night host who houses each student in her residence hall. In the morning, they attend a student and industry panel hosted by the university’s Women’s Engineering Program. This year, SWE Welcome reported a record-breaking 132 participants and many enthusiastic post-event responses.

**HERE’S WHAT KEEPS THIS SUCCESSFUL OUTREACH GOING**

When Girl Scouts approached the San Diego County Section in 2001 about partnering to incorporate engineering badges into the curriculum, little did they know that by 2009 this would become the section’s SWEET (Society of Women Engineers Exploring Technology) outreach. After several changes, this successful event now partners with collegians from three area universities who hold the outreach on their campuses. They have learned that basing the number of participants on the number of volunteers needed ensures quality interaction with the girls; however, there is no limit on the number of parents who sign up. Connections with nearby collegiate sections also contribute to the number of volunteers, plus the section receives funding from local corporations. Volunteers are not limited to SWE members but also include area women engineers who recognize the need to encourage girls to consider engineering. This year’s theme was Dare to Be a Force of Nature, and the event was held, appropriately, on Earth Day. It featured responsible ways in which engineers respect the earth. The goal was to show attendees that engineering isn’t just working alone in a lab but holds opportunities for those interested in everything from environmental to social issues. Parents learned about gender bias and how to use community resources to encourage their daughters and were provided a list of local STEM resources. This year, girls and parents also received information about continuing with SWE through SWENext.

**LEFT:** Make Waves was Region B’s conference theme, and attendees enjoyed scores of activities, including a raffle to win a behind-the-scenes Disney-land tour. Conference workshops offered three tracks: technical, work/life, and leadership, with topics as varied as dealing with leadership burnout and being a mom in the corporate world. Speakers connected with the audience through stories on topics that held personal relevance for them, for instance, helping others to rise to greatness. Corporate sponsorship helped tremendously with events and many of the giveaway items.

**ABOVE:** Though the Orange County Section normally hosts a biannual fall and spring outreach for Girl Scouts to earn an engineering badge, this year the Girl Scouts Make Waves event took place at Region B’s conference. Activities were based on “STEMsational Me!” — the new badge for the Girl Scouts of Orange County. Girl Scouts from councils in the Los Angeles and Orange County areas were invited. Attendance exploded thanks to each section’s advertising the outreach on its Facebook page. A second outreach session was held for troops of Girl Scouts from high-risk communities who couldn’t attend the conference event because of a full capacity. The section partnered with iD Tech Camps, a conference sponsor. To earn the badge, the girls completed five activities centered around science and technology in their daily lives in Southern California. Parents listened to a panel of active and retired engineers offering advice to encourage their daughters to pursue engineering and science.

**Being a SWE Mom**

Since becoming a mom, Susie Kirkland, a member of the SWE leadership coaching committee, has provided support to other moms whenever she can. One such instance was at Region B’s conference where she talked about Creative Problem Solving. “Wearing” her 2-month-old infant, she set an example about normalizing motherhood in the SWE community and how to integrate motherhood and engineering careers. Speaking from her own experience, Kirkland knows that women engineers work in male-dominated industries. Additionally, taking care of an infant can be stressful and isolating, so a support network is imperative. She suggests that SWE moms find a mentor at their workplace or SWE section and join the Engineering Working Moms Facebook group, which was created by a SWE Phoenix member to share resources and offer support and advice.
A productive leadership summit and an ongoing collaboration between sections and MAL are two highlights of Region C’s accomplishments this year. The region also increased SWENext participants by 50 percent over final FY16 registrations and saw a 10 percent increase over FY16 submittals in the number of events reported by the outreach metric tool.

Collaboration among sections, MALs, and other organizations is an ongoing goal for Region C. Region leaders encourage networking, outreach, and community service as ways to make these connections happen and to achieve a stronger impact. Collaboration advances SWE’s mission by demonstrating that the engineering profession is a positive force to improve the quality of life. Looking ahead, Region C leaders prepared a financial plan for dissolution of region funds once the Society governance changes are approved and go into effect. Governance updates are discussed during region meetings and members are encouraged to follow updates on the governance website. In addition, members are asked to offer their input about the proposed changes.

A SUCCESSFUL SUMMIT IN SEVERAL WAYS

Approximately 80 leaders from Region C’s collegiate and professional sections and MALs gathered for the FY17 leadership summit. The day began with a presentation by an executive coach who talked about the region’s successes and the importance of networking with a purpose. Attendees also made 10-year vision boards as an exercise to visualize their futures and learn more about one another. A speaker and summit sponsor from the U.S. Air Force outreach and recruiting office gave a presentation on programs the Air Force is implementing to recruit and retain women engineers. In the afternoon sessions, attendees discussed SWE business and learned more from leadership coaching committee presentations.

A PARTNERSHIP THAT REALLY WORKS

In 2013, the Fort Worth Section approached Girls Inc. to partner with them for an Introduce a Girl to Engineering event. The partnership was so successful that it not only continues but has expanded. The daylong outreach now takes place annually during the summer. To provide support for this collaborative effort, The University of Texas at Arlington Collegiate Section was invited to serve as host on its campus. The goal of this group effort was to give fourth-grade girls a taste of engineering through hands-on activities and by hearing successful women engineers talk about their careers. The sections found that introducing girls to engineering at this age effectively captures their attention before facing the potential distractions of middle- and high-school pressures. Holding the outreach on a university campus helps the girls understand more explicitly what engineering is about by touring campus
ABOVE: Members from the SWE Dallas Section and the Dallas–Fort Worth chapters of the National Society of Black Engineers and the Society of Hispanic Professional Engineers came together three times this year for events that offered networking opportunities, career development panel talks, and community service. Plans are underway to continue these successful collaborations.

BELOW: In addition to attending presentations on envisioning career success and networking with purpose, the 80 attendees at Region C’s leadership summit made 10-year vision boards, which are collages made of images that represent their goals and dreams. In the process, the participants also learned more about themselves and one another.

How to Have Color-filled Conversations

If collegians want to meet professional SWE members, what better way to do so than while painting together? Four years ago, the Austin Section reached this conclusion. Hosting this annual event in collaboration with The University of Texas Collegiate Section, they have seen it grow and achieve its purpose of encouraging conversations to flow naturally between the two groups. The collegians ask professionals questions about engineering jobs or about deciding whether they should change majors. They enjoy hearing the professionals talk about their careers and experiences they had in university. The location for this event is an art studio, providing the members a casual environment in which to talk and work together. Little or no artistic talent is required, just the desire to get to know one another and eat pizza. As a bonus, the participants get to keep their artistic creations!

FUN AND CASUAL GATHERINGS TO TALK ABOUT ENGINEERING CAREERS

To encourage and educate women in various stages of STEM careers, the Baylor University Collegiate Section provides a way to discuss the experiences they have gained in the classroom and workplace. Once a month for the past three years, women who are studying engineering, women engineers employed in local companies, and faculty and staff gather in fun and casual settings. While enjoying activities ranging from laser etching to T-shirt printing, they engage in insightful and interesting conversations that support collaboration, creativity, and personal development. Most of these gatherings take place at the Baylor University campus in the computer science building; a recent “field trip,” however, took them to Maker’s Edge, a local lab for “do-it-yourselfers” to use a variety of fabrication equipment. To support these activities that encourage diversity and inclusivity in the STEM fields, the section receives funding from local companies and the university.

THE UNIQUE FLAVORS OF A TEAM EFFORT

SWE, the National Society of Black Engineers (NSBE), and the Society of Hispanic Professional Engineers (SHPE) share similar missions and goals. To further promote collaboration, create partnerships, and build upon the success of Diversity and Excellence Nights at the University of North Texas, the Dallas Section joined with the Dallas-Fort Worth chapters of NSBE and SHPE. Leaders from each organization agreed upon the general focus for the events and decided to have one career-enhancement event, one community service event, and one social-networking event. Each organization used its strengths and contacts to contribute their unique flavors to each team effort. In the Dallas-Fort Worth area, for example, NSBE has a long-term relationship with a nonprofit conference center, SHPE has strong links to community college engineering students, and SWE has solid conference-planning experience. SWE led the first event, a transition from college to career workshop. NSBE held a community service event at two Habitat for Humanity ReStores. SHPE planned a social get-together to celebrate the successes of these partnerships. Leaders of the three organizations agree that these connections are building lasting relationships, opening up new professional network connections between collegians and professionals, and generating opportunities for future collaborations.

SPECIAL SECTION | 2017 YEARBOOK
In May 2015, 16 women engineers met to assess whether there were enough women to form a section and take leadership roles. By March 2016, the petition to charter was filed, and in February 2017, they held Celebrate SWE Memphis to create awareness that Memphis had a new professional section. The event was also a celebration to generate support from executive leaders in local engineering organizations. The charter event was a sold-out, resounding success with seven corporate sponsors representing large engineering employers in the area. As of the beginning of June, the Memphis Section had grown its membership by 50 percent.

Enabling sections to better serve their members is an ongoing focus for Region D. As the region is geographically large, physically attending meetings can be difficult. To increase participation, last year the region initiated virtual meetings, and the results have been favorable. The most successful tool to draw more participants is Freeconferencecall.com, as more than 35 members can virtually discuss issues “face-to-face” and view slides and videos. In addition to connecting sections virtually, region leaders encouraged section leaders to find out what their members want and have asked that each section submit reports on a regular basis. Region D learned of another way to handle section concerns from its neighbor, Region C. Members are asked to write their concerns and needs on an index card and give it to region leaders — a simple but effective method to address issues that members raise. Other ways to tap the sections’ concerns have included surveys and providing a region discussion board.

FOR THESE SECTIONS MENTORING IS A PRIORITY

Mentoring new university students is a focus of the Atlanta Section and for SWE members who are also involved with The University of Alabama advisory board. As these professionals engage with the next generation of women engineers, they are paying forward the support they received from SWE during their collegiate careers. Thus, for more than a decade, the Atlanta Section has maintained strong ties with the Georgia Tech Collegiate Section as mentors. Last August, the section established connections with the University of Georgia, Kennesaw State University, and Spelman College, which is in the process of chartering a section. The collegiate sections appreciate the interaction and advice they receive from the mentors and update them on the results.

Collegiate sections are also invited regularly to participate in the Atlanta Section’s outreach, professional development, and networking events such as volunteering at the section’s “Wow! That’s Engineering!®” outreach. These partnerships foster engagement with members who may otherwise not be active because of the section’s wide geographic area. Appointing collegiate liaisons for each collegiate section promotes increased interaction and guidance. The liaisons ask what the collegians need the most and have found their requests include professional development, resume reviews, and mock interviews.

AN ADVISORY BOARD AND BIG SISTER/LITTLE SISTER GROUPS HELP COLLEGIANS

Since its beginning 20 years ago, The University of Alabama (UA) Collegiate Section has grown tremendously. In 2012, the UA advisory board was founded, and its members, who are former SWE collegiate leaders who understand the needs of collegians, serve as mentors to current collegiate leaders. Six board members serve a three-year term. Meeting once in the fall semester and again in the spring semester, the board pro-
An annual Tea with the Dean is at the heart of the Georgia Tech Collegiate Section’s year. Because the tea takes place at the start of the semester, members hit the ground running with plans to welcome new students and gain new SWE members. Experience has shown that the section must get on the engineering dean’s schedule early, and they must spend the summer planning logistics from food to speakers and attendee gifts. All the planning and experience has paid off, with a 10 percent increase in attendees each year. Starting in July, the first invitations are emailed to incoming women engineering students with an online RSVP. At this dress-up occasion, the tea offers speakers such as the dean, the director of the Women in Engineering program, and a welcome from the section president.

For the fifth consecutive year, The University of Alabama at Birmingham Collegiate Section has held a Kids in Engineering Day. Hosting attendees from the entire state, the section has a wealth of great ideas for outreach events. For example, the section creates binders containing information about each outreach they hold, so that the following year every officer will know what works and what doesn’t. To further outreach support and implementation, the section created three committees: The materials committee designs and prints T-shirts and bags and orders materials for all of the activities; the sponsorship committee drafts, edits, and sends sponsorship letters to local engineering companies and hosts at least one fundraising event on campus; and the social committee spreads the word about the outreach with fliers, posting countdowns on Facebook, and asking the on-campus news organization to cover the event. To increase participation next year, a 3-D printer will be offered as a prize to the teacher with the most students in attendance. Volunteers earn SWE membership points that will accumulate toward eligibility for partial or full sponsorship at region and annual conferences.

How to Encourage a Potential SWE Section

Meeting with a member of the Women in STEM at Florida Polytechnic University, a University of South Florida collegian discussed how her section organizes fundraisers, gains potential sponsors, and finds outreach and volunteer opportunities. She also stressed the encouragement that SWE offers new sections, such as how to find sponsors and academic advisors, hold webinars and activities, or help grow membership. The SWE collegiate member plans to stay in touch to help establish this new section. Her advice about assisting potential SWE sections is to meet with women interested in SWE to share knowledge as well as offer documents, contacts, experiences, and opportunities to collaborate.

Mice to Muscadine Grapevines — Beautyberry Bushes to Lion Bugs

On a beautiful hike through The Enchanted Forest, members of the Space Coast Section, as well as nonmembers and families, learned from two volunteer guides about the vegetation and wildlife in this 472-acre sanctuary in Brevard County, Florida. From Spanish moss to gopher tortoise burrows, animal tracks, and the Florida scrub jay, participants not only enjoyed the views but also learned interesting facts such as this forest was originally a beach. Plans are to visit another wildlife area along the county coastline.
From a successful region conference to expanding leadership summits and monthly council meetings, Region E members had many ways to share ideas and connect with one another. For example, the region’s monthly council provided professional members the opportunity to share best practices in 10-minute segments. Instead of reinventing an event or outreach they had only heard about, members could ask questions at council meetings and receive help with specific issues. Likewise, Region E’s conference reported record attendance and was highly successful thanks to a strong planning committee made up of local members and those who had planned previous region conferences. Attendees enjoyed a packed schedule that included an interactive networking reception, informative workshops, motivating keynote speakers, and a fair for those currently working or in graduate school. The executive leadership summit was also well attended, as this year’s attendees valued the opportunity to deal with region finances, become aligned with what’s going on in SWE, and keep abreast of what’s happening outside their sections.

HOW TO INSPIRE A SUMMIT

Region E’s SWEet collegiate leadership summits are attracting more participants due to the simple process region leaders developed to ensure sections aren’t intimidated by planning events and meetings. Using a booklet developed from the know-how of those who have planned previous summits, inexperienced collegians can tweak the contents to fit their own needs and ideas. Another key to success is mentoring sections through the planning process with suggestions about logistics, such as submitting a professional development grant to fund the summit. Feedback indicates that after collegians attend this summit, they are inspired to host one themselves.

TED TALKS TO FIRST-YEAR STUDENTS

Looking for a way to engage incoming first-year engineering majors, the University of Delaware Collegiate Section found that TED Talks are the key to creating an inclusive environment. For example, in Inspiring the Next Generation of Female Engineers, Debbie Sterling, the founder and CEO of GoldieBlox, describes how as a young girl she wanted to be an engineer but felt she didn’t fit. Following the video, participants asked questions and discussed topics such as whether any of them had similar experiences. The goal of this TED Talk was to show members how to encourage the younger generation to enter engineering. It also was a way to ask new members what they hoped SWE could provide for them and how the section could meet their needs. The section created a new “SWEets” tradition by handing a piece of candy to those who shared something worth celebrating that had happened to them that week.

BUTTERING A BAGEL TO LEARN HOW TO CODE

Looking to offer outreach topics not typically taught, the Philadelphia Section found that girls generally don’t learn about coding and computer science. So, joining with The Coding Space, they offered an outreach for fifth- to eighth-grade
A Deliciously Chocolate Event

Having a chocolate shop in town inspired the Richmond Section to attend a class the owner titled “The Sweet Science of Chocolate.” Members decided this would be a tasty event, so they invited the Hampton Roads Section and other women engineers in the area to join them. Naturally, there was a strong turnout to hear about the science of chocolate and chocolate making. After lunch, the group learned that three elements go into tempering chocolate: time, temperature, and agitation to form crystals. The group witnessed what makes dark chocolate shiny and hard enough to snap and had hands-on experience stirring chocolate to temper it. After that experiment, the group learned that mixing chocolate with coconut oil produces an eutectic mixture, which is a mixture of substances in fixed proportions that melt and solidify at a single temperature lower than the melting points of the separate constituents or of any other mixture. In addition to tasting chocolate and learning its chemical processes, the attendees remarked that this was a delicious way to meet people.

Girl Scouts and another to high school girls. Both groups had a hands-on coding workshop that generated many thank you notes from participants. Parents indicated that their daughters returned with increased confidence to design and develop projects and to brainstorm solutions to problems. To gain an understanding of coding, the girls wrote instructions about how to butter a bagel with a single command. This activity taught them that the most successful commands are quite simple, with no possibility of misinterpretation. They then coded their own computer games using Scratch, a free programming language.

FRANK TALK ABOUT WORKPLACE INEQUALITY

When Rutgers University Collegiate Section members began considering what events to hold, the idea of discussing gender inequalities in the workplace and how to overcome them arose. Because the collegians had held previous events with the New Jersey Section, the idea evolved into “Girl Talk,” an event that gathered 40 collegiate and 10 professional women. The professional members introduced themselves, discussed their experiences, and led five individual groups based on their backgrounds. In some of the groups, Rutgers University alumnae talked about balancing work, travel, and children. Others discussed what it was like to be in entry-level positions with less than five years of experience, while women with more than 25 years of work history shared aspects of their careers. The event was successful as collegians gained insights about the workplace from a diverse group of engineers. Professionals spoke frankly as individuals, rather than as company representatives. Both sections anticipate holding more events to further develop collegiate and professional connections.

ABOVE: Believing it would be a great fit for both organizations, Lean In Circles contacted the Howard University Collegiate Section with the idea of partnering to offer a program to help SWE members and other female engineering and STEM students form strong bonds. Lean In Circles and SWE have similar aims — to empower and uplift women with the support and inspiration they need to achieve their goals by exchanging ideas, networking, and hosting events. At every Circle, attendees discuss a different topic — how to stick to personal goals, for example — making each meeting unique. Since the fall of 2015, Lean In Circles are held twice a month. Initially only women attended, but a few men have begun to participate as well.

ABOVE RIGHT: What should women engineers wear to a business career event? The State University of New York at Binghamton Collegiate Section wanted to show incoming first-year students and new members the appropriate clothes to wear when attending various career events. Rather than just showing photos of the clothing, however, collegiate “models” walked down the runway onto the stage while an energetic emcee engaged the audience with advice. After the models made their presentations, the audience had the opportunity to ask questions.

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Leadership coaching, outreach, and networking were major goals for Region F this fiscal year. Achieving these targets began with the region's leadership coach participating in three region council meetings and informing every section that leadership coaching was available. The number of sections that asked for coaching and their responses on the post-session feedback forms indicated that the region's leadership coaching initiative is working. This effort will continue as the executive board team seeks to make coaching for sections an ongoing project.

Region leaders are seeing positive outcomes from the goal of increased networking. One such instance was a region meeting at WE16 for collegiate and professional section leaders who met in small groups to share best practices with one another. This was successful in other ways, too, as section leaders connected with other leaders in their geographic areas that resulted in some joint events. To further encourage networking, the region is planning to offer more opportunities for members to meet, such as at the leadership summit and WE17 meetings.

Since June 2016, involving parents in outreach has been another region goal and one that also has succeeded. SWE’s Parent/Educator Program (PEP) is now a consistent part of the region's STEM events. Because many parents and teachers aren’t engineers or particularly interested in or knowledgeable about STEM, the challenge was to provide them tools and resources to encourage the careers their children could pursue should they show an interest in STEM. The challenge was to provide them with the information that would allow them to help their children pursue STEM. As a result of the help the LCC offers sections, Region F has exceeded its goals to increase interaction between collegians and professionals. Encouraging participants at presentations and meetings to compare notes with one another to see what each has learned.
How about making snowflakes to celebrate winter or getting together to play Jeopardy? Does a campus scavenger hunt to acquaint new students to campus resources or a Getting to Know You Bingo game sound like fun? Events such as these are part of a new member program that the University of Connecticut Collegiate Section offers incoming collegians, providing the opportunity to get to know one another and members who have been in the section awhile. The section’s goal with these interesting events is to connect new members with current members as they discover commonalities. The section also facilitates a mentor/mentee program that pairs newer members with upper-class women who have the same major to help them decide which classes and professors best fit their interests.

**ADDITIONS TO A GIRL SCOUT BADGE DAY**

For a number of years, the University of Rhode Island Collegiate Section has held a Badge Day outreach for Girl Scouts from all over Rhode Island. This year they added the benefits of involving parents in PEP. The section partnered with the New England Shoreline Section for assistance with the PEP and discovered the advantages of having experienced professional team members share their resources, volunteers, and knowledge. The section saw the importance of teaching parents how to encourage and support their daughters to pursue engineering. While their parents listened to several speakers, the girls, ages 9-10, worked on an Engineering Your Tomorrow badge that involved activities focused on electrical, mechanical, materials, and civil engineering. They made electrical circuits, assembled a rolling toy to learn about energy, and designed a bungee jump for an egg to prevent it from hitting the floor. An added activity was a scavenger hunt with questions to ask SWE volunteers such as why they chose engineering, what kind of engineers they had wanted to be, and what classes they liked.

Building the tallest freestanding spaghetti tower, racing a balloon–powered rocket car, or making Alka-Seltzer®-powered lava lamps were just some of the fun activities at the New York State Capital District Section’s Science Day. The students also listened to chemical, electrical, bridge, aviation, and nuclear engineers share interesting details about their fields. From its initial conception to a successful completion, this was the section’s first Science Day outreach. It partnered with the Duanesburg YMCA for a location and the Schoharie Mohawk Initiative for Science and Technology. Funding was obtained with a SWE professional development grant. The section was pleased to discover that applying for the grant was a simple, online process.

**Gingerbread Conversations**

Yale University’s Collegiate Section found that one of its strengths lies in the many opportunities it offers for informal mentoring between graduate and undergraduate students. For example, talking while piling frosting and candies on a gingerbread house gives members a comfortable and yummy way to get to know one another. By co-hosting its annual Gingerbread Decorating event with the Yale Center for Engineering Innovation and Design, the section not only reached a larger population but also increased SWE’s visibility on campus. Although the event was held just before finals, turnout was strong as attendees took a break from studying to build their own gingerbread houses and, of course, to “taste test” the candy they piled on the roofs.
In addition to ongoing goals such as member engagement and outreach, Region G sought to increase its membership and to interest more young girls in engineering. Using SWE resources, plus flyers, website postings, and social media, sections promoted outreach and increased the number of region SWENexters by 25 percent and the number of outreach events by 20 percent. Adding SWE’s parent/educator program to region events showed adults ways to encourage girls to learn more about engineering as a career.

Many section representatives and collegians participated in the leadership summit, which had a strong mix of new and returning officers. Setting goals was the main topic of the meeting. Sections were asked to hold a new event annually, either within their sections or by partnering with other engineering organizations. With a number of employee resource groups and relationships with like-minded professional societies already established across the region, this is an attainable goal.

Encouraging professionals and collegians who are in proximity to meet and get to know one another is beneficial in many ways. Region leaders aim to ensure that members understand that they are not just collegians or professionals but are members of the larger SWE organization, which offers them many benefits. To encourage collegians to transition to professional membership, the region keeps them engaged with events such as a senior send-off dinner.

BALANCING FINANCES, STRATEGIC NETWORKING, AND YOGA

The Kentuckiana Section’s annual Enriching Your Engineered Life event offered a fresh agenda with a speaker who focused on professional development and a wellness session showing participants how to balance their minds and bodies. The goal was to help participants be more effective at work and in their everyday lives. Section members and nearby collegiate sections were invited, as were colleagues and professional acquaintances. SWE President Jessica Rannow led a session on strategic networking, and a licensed professional engineer covered financial topics ranging from checking and savings accounts to insurance. The event ended with a yoga session for attendees to unwind and relax. Funded by a SWE professional development grant, the event was held at the Kentucky Science Center, providing attendees an opportunity to tour the facility.

SHADOWING LEADERS TO LEARN

Members of The Ohio State University Collegiate Section realized that first-year collegians elected to demanding leadership roles are often overwhelmed with the responsibilities and don’t have enough information to guide them. An officer shadow program set up by the outgoing section president in August 2016 was the solution. Though all collegians are welcome, the emphasis is on helping inexperienced members gain insights about leadership positions. The program also...
To plan and host the first SWENext DesignLab at the WE Local Pittsburgh conference, Region G’s WE Local host and outreach committees received help from the Pittsburgh Section, the University of Pittsburgh and Carnegie Mellon University collegiate sections, and a MAL. Sixty-four volunteers came from 10 universities and two professional sections in the region. Seventeen ninth- to 12th-grade SWENexter girls volunteered as engineer assistants. The middle-school girls took part in two hands-on activities. The first involved creating a structure using coffee stirrers and modeling clay that was tested on a “shaker table” the girls built with cardboard, tennis balls, and rubber bands. For the second activity, the girls made a device from wooden rulers and duct tape that could reach out 4 feet to grip a bag or ball. Parents enjoyed a presentation, a panel discussion, and their own hands-on activity creating a landing module for two marshmallow astronauts that had to remain in their paper cup spacecraft. At a debriefing session, parents and girls demonstrated to one another what they had done.

GOOD ADVICE ABOUT SUCCESSFUL CONFERENCES

After hosting their third annual Women in STEM conference, members of the University of Pittsburgh Collegiate Section shared some valuable advice about what makes a successful event. One tip is to enlist a faculty advisor to help recruit keynote and session speakers. Each year, the section receives positive comments from attendees about the value of the conference for professional and leadership development. This year, undergraduate and graduate students from the University of Pittsburgh, members from neighboring universities, and professional women engineers attended breakout sessions with topics such as mentoring, salary negotiation, and public speaking. One of the keynote speakers talked about recognizing and coping with gender bias in the workplace. Attendees indicated their appreciation for how the speakers focused on ways to tackle and remedy these issues.

Meet Locally, Learn Socially, and Have a Lot of Fun

This year, Region G hosted the first-ever WE Local conference. Unlike previous region conferences, it was held at a hotel, which made the event more accessible and welcoming. With much help from SWE headquarters for logistics, contracts, and finances, assistance from local sponsors, and involvement from the Carnegie Mellon University and University of Pittsburgh collegiate sections, the two-day event was a success. The program featured four keynote speakers, including Elayne Arrington, Ph.D., the first African-American female engineering graduate from the University of Pittsburgh. She is presently senior lecturer in the department of mathematics and statistics at the University of Pittsburgh. Dr. Arrington spoke about her experience as an engineering student and how the field has changed during her career. In addition, carnival games and a photo booth encouraged attendees to mingle.
Members of the Dubuque Area Section, their families, and new interns gathered to socialize at a local park for pizza and to make and eat ice cream. Experimenting with liquid nitrogen to make the ice cream added to the fun. With the proper supervision, people took turns stirring the mixture, and as the section’s treasurer had access to liquid nitrogen from her work, there was an ample supply. The gathering was a hit for the 30-plus attendees, 10 of whom were children.

During FY17, Region H focused on growing the strengths of its sections and continuing momentum from the previous year. Over monthly calls, region leaders asked section presidents and members about a best practice to share with others or updates on section accomplishments. Sections are also asked to ascertain their individual strengths and needs so that region leaders can help them with any questions they might have. The region has a strong economic base, so its leaders have been seeking feedback from members regarding disbursement of funds. The Region H dissolution task force is seeking members with fiduciary experience, such as section treasurers, for their views.

With the transition to WE Local underway, region leaders are looking at the experience gained from past region conferences to determine best practices. Committees are considering issues such as funding for WE Locals and awards as well as conference planning and judging small posters. A major revamp of Region H’s awards that began at the FY16 region conference has grown in just one year. Region H’s awards chair, for instance, did an excellent job of acknowledging members.

THE IMPACT OF ONE WOMAN ENGINEER
A Northeast Indiana Section member and other engineers working at local engineering and robotics companies were invited to tell their stories at a Women in Engineering conference, where 100 eighth-grade female students from two middle schools had expressed interest in robotics and engineering. After a breakfast session with the students, the SWE member shared her personal story as a biomedical engineer and her work in an orthopedic device company, while showing some of the implants and instruments the company had developed. She also talked about her involvement with SWE and handed out SWENex flyers. The students asked questions such as, “What do you do each day?” and “What is your favorite part of engineering?” Following the talk, the students rotated to hands-on activities in different classrooms. Using a plastic foam cup, string, paper clips, and Popsicle® sticks, the SWE member led a hands-on activity to create a robotic arm that could pick up a water bottle and answered additional questions. One of her favorite questions was, “Do a lot of guys go into engineering?” She answered, “Yes,” and then...
The Central Indiana Section and IEEE hosted an Engineer’s Day at The Children’s Museum of Indianapolis. The section has been a proud partner for this event for the past few years. The event is open to children of all ages and their families. This year, the section led a Helping Hands activity that challenged the children to create a device that allowed them to pick up assorted objects. They were told to use their imaginations when thinking about what they could design and build for someone who couldn’t use their hands and were reminded that this activity was indicative of a real-world challenge that engineers work on every day. Other partner organizations for the event included the Indiana chapter of the Society of Hispanic Professional Engineers (SHPE-Indiana) and Purdue University, who led their own activities. After participants completed the various activities, they received stickers to complete a “circuit” on their event programs and earn a prize.

talked about how she had been the only female on a baseball team so she was used to being the “only” or one of a few in the minority. Many teachers thanked her and also asked their own questions. This experience made her realize the impact she could make as an individual.

CELEBRATING SWE AND GAINING NEW MEMBERS

To showcase past and upcoming events, network with like-minded people, and gain new members — especially those who have recently moved to the Twin Cities area — the Minnesota Section holds an annual open house. While the section partners with a local company to provide a keynote speaker, the event is mainly a celebration of SWE. Although this is a somewhat formal networking event, the section creates fun themes such as past female inventors or STEM toys. The venue also is a draw, as the section moves the location to various museums in the area. From the keynote speaker to booths highlighting what the section has done, to the fun of a photo stand and door prizes, this year’s turnout was 120 people.

The Central Indiana Section and IEEE hosted an Engineer’s Day at The Children’s Museum of Indianapolis. The section has been a proud partner for this event for the past few years. The event is open to children of all ages and their families. This year, the section led a Helping Hands activity that challenged the children to create a device that allowed them to pick up assorted objects. They were told to use their imaginations when thinking about what they could design and build for someone who couldn’t use their hands and were reminded that this activity was indicative of a real-world challenge that engineers work on every day. Other partner organizations for the event included the Indiana chapter of the Society of Hispanic Professional Engineers (SHPE-Indiana) and Purdue University, who led their own activities. After participants completed the various activities, they received stickers to complete a “circuit” on their event programs and earn a prize.

Although the Southwest Central Indiana Section is relatively small, its annual Recognition Dinner is a big celebration to acknowledge and reflect upon what the section has accomplished as a whole, what individual members have achieved, and what SWE is doing in the community. The section holds different types of casual end-of-year events in various locations. This year it was held at Function Brewing, a brewery started by two Purdue University engineers. The space features scientific motifs on the walls and chemical formulas on wine bottles. In addition to good food and stimulating conversations, the program includes a year-end recap by the section president and recognition of members with SWEet rewards and others who have received region awards. Though the section funds this event, corporate sponsors are invited to the dinner to thank them for their help and encouragement.

Good Food, Stimulating Conversations, and Recognizing Accomplishments
Because Region i has strong programs and many sections support outreach, to maintain and sustain were its top two objectives this fiscal year. Major accomplishments were ICONi7, the annual leadership summit, and awarding $100 mini-grant stipends for professional or collegiate events. Region scholarships also continue to be a big success with three awarded this year. The region awards program is viewed as a pipeline for nominating Society awards. The region performs its own fundraising with company sponsorships and the sale of Region i apparel at conferences. Now in its third year, the region’s mentoring program has 32 pairs consisting of collegiate pairs, professional pairs, and collegiate and professional pairs. As a result, members have a better understanding of SWE in general and the process of nominating and electing leaders. Many mentors nominate mentees for awards and encourage them to submit nominations for section programs.

Recognizing individual members, such as volunteers who put in countless hours, is important to the region. Members are acknowledged for their efforts at monthly region meetings where leaders have the opportunity to share successful best practices, which inspires others to also implement that best practice. Personal accomplishments are recognized, such as a member’s job promotion or having a child.

THE BENEFIT OF FIVE YEARS
Region i spans seven states, making it difficult for some to attend the region’s leadership summit. The solution was to move the summit to different locations in the region. Thanks to this change five years ago, region leaders have seen many improvements — for example, fewer questions about basic SWE topics, general reports, or financial issues. The purpose of the leadership summit is to train new leaders; by changing locations, however, it now offers another way to connect members. The region leadership provides what the sections need at the beginning of each fiscal year and communicates with monthly calls to section representatives, region committee chairs, and the executive council. Results have been seen in best-practice sharing, finding volunteers and sponsors for outreach programs, and professional development.

During the day-and-a-half leadership summit meeting, topics such as addressing a section’s particular needs, or outreach opportunities to the leadership pipeline are discussed. There are also sessions specifically for collegians and professionals and breakout times to introduce collegians to the representatives and professionals plus the opportunity to catch up with friends. Summit planners have found that polling leaders about the best date and location and announcing the date of the summit early helps increase attendance. One of the best practices has been peer-to-peer sharing about subjects such as recruiting volunteers or connecting with resources. Summit planners also poll sections with a questionnaire to ascertain their specific needs or struggles in addition to reviewing section reports for other information that could help them.

OH, YOU LIKE BIOLOGY? HOW ABOUT A DEGREE IN MARINE ENGINEERING!
For four years the Oklahoma City Section has held a reception for girls at a FIRST® Robotics Competition to inspire them to explore engineering as a college major and a career. Many
ABOVE: More than 60 participants attended the one-day professional development conference co-hosted by the Rocky Mountain Section and the University of Colorado Boulder Collegiate Section. Held on Earth Day with the theme “Be the Difference,” the conference featured a full schedule of seminars ranging from networking, interview strategies, sustainability, and professional development. The day culminated with the presentation of the Rocky Mountain Section’s awards and scholarships, totaling $10,500, to local high school and university students. The two sections continue to build their relationship through collaboration on outreach and other events.

ABOVE RIGHT: Building a structure capable of holding 36 sandbags weighing approximately 18 pounds was one of many activities high school girls took part in while attending the Kansas City Section’s seventh annual Introduce a Girl to Engineering Day. The students also spent time with a woman engineer from the local area to learn about engineering and visited an engineering discipline and industry fair. Afterward, they used their ingenuity and teamwork skills to build various structures and heard from Tara Ruttley, Ph.D., who works for NASA and shared some fascinating stories about her experience as a rocket scientist.

A Stress-free Event About Being Stress Free

Considering all they have to do in their school/work/home/SWE/personal lives, most SWE members are busy people. Members of the Tulsa North–Eastern Oklahoma Section joined with others seeking to learn how to deal with all the “I need to do” things in a Stress Free Productivity Workshop. The speaker engaged them with exercises, discussions, questions, and knowledge sharing. Tips to be stress free included:

• Have a system (digital, paper, or a combination of both) to capture the constant stream of to-dos running through your head.

Your brain should not be used to remember and store tasks, but instead for critical thinking, creativity, and focus.

• Focus your energies on critical and important tasks first.

• Review your system on a weekly basis so your brain can trust that your tasks are safely in your system.

And a Tip to Relieve the Stress of Getting People to Come to an Event

For several months prior to the event, the Tulsa North–Eastern Oklahoma Section advertised its Stress Free Productivity Workshop in its monthly newsletter through MailChimp, a marketing automation platform. The event was created using Eventbrite, and the section sent out a direct invitation through MailChimp one month before the event and again one week before the event. They created a Facebook event, linked it to Eventbrite for tickets, and spent $20 for advertising using Facebook promotion that received 560 views.
At the WE Local conference in San Jose, California, a Region J member told the governor that she enjoyed meeting people from different areas of the region because she realized she could find specific support from other sections. To the governor, this summed up the region leadership’s goal: to make members comfortable with upcoming changes and to ensure that they had productive discussions to help them. Region leaders have used monthly calls to prepare sections for their future responsibilities. Generating a support network at the beginning of the fiscal year helped everyone know what other sections are experiencing.

For example, the Greatland Section, based in Anchorage, worked on improving its monthly meetings, and the payoff included increased attendance and interest in leadership positions. The Pacific Northwest Section learned how to motivate its more than 700 members by changing the locations and types of events they hold and by reaching out to members where they are and in ways that encouraged interaction. A partnership between the Columbia River Section and the Portland State University Collegiate Section has successfully linked professionals and collegians. To sum up FY17, Region J sections have grown stronger and are prepared for the future.

HOLDING A SUCCESSFUL OUTREACH FOR 15 YEARS
Since 2002, a goal of the Greatland Section has been to generate interest and awareness in engineering, especially for girls, by hosting an Engineers Week (DiscoverE) Student Competition for K-12 students. Its most important objective is showing students they can be engineers regardless of gender. The section has learned that the best time to share engineering is with middle-school students when they begin to ask, “What do I want to do with my life?” To help them answer that question, the section offers an engaging activity to introduce different aspects of engineering such as theory, design, construction, and implementation. For example, children learn about finding innovative solutions to problems such as dropping an uncracked egg from a designated height onto a target without breaking the egg.

Generating volunteers for SWE’s part of the outreach is easy, as it’s considered one of the year’s most enjoyable events. The section sends out requests for volunteers and advertises it in its monthly newsletter. The University of Alaska College of Engineering is the main organizer of all the activities and receives support from professional organizations and larger engineering firms and employers in the community.

CREATING A “MAKER” CULTURE OF OUTREACH
To communicate the “maker” hands-on workshop vision to young girls, the Columbia River Section employed the maker movement by including innovative design and building processes. With the goal of using the maker culture of outreach in six events — held between Aug. 16, 2016, and January 2017 — the section offered hands-on workshops for children and parents, such as Coding with Arduino 101, and Grove kits to...
Whitney Hale, right, a member of the Portland State University Collegiate Section, poses with closing keynote speaker and Olympic gold medalist Maya DiRado during a WE Local San Jose "Power Pose" photo shoot. DiRado spoke about her own experience not only as a competitive swimmer winning a 200-meter backstroke event by one-hundredth of a second, but also her perseverance to graduate from Stanford University with a degree in management science and engineering. She is now a business analyst in a management consulting firm.

I’ve Been Meaning to Read That Book!

When a SWE member joined the Pacific Northwest Section, she brought with her the idea for a book club. Having seen its value as a recruiting and networking tool, she helped the section form the Pacific Northwest Book Club, now in its second year.

In addition to discovering interesting books, another goal of the club is for participants to get to know one another by sharing their personal reactions to the book they have just read. Because the club members come from varied backgrounds, their perspectives lead to interesting conversations. And if the conversation slows down, there are plenty of get-to-know-you networking questions on hand.

Initially, the club met from January to June, and resumed in November, but because of its popularity, it now meets year round. Once a month, the club members gather in a pub for two to three hours. Books are chosen from a list of topics such as leadership, professional development, science and technology, biography, and fiction. There is a strong emphasis on choosing current books to generate a buzz or add to the meaning of a special month or occasion, such as Black History Month or Earth Day.

PREPARING FOR JOBS AND INTERNSHIPS

Resume Night for the Seattle University Collegiate Section began when all the engineering clubs on campus decided to take turns hosting an event during each day of DiscoverE: Engineers Week, with the purpose of preparing all interested university students for internships and jobs. Resume Night is followed by an IEEE mock interview session. Some 40 students attended Resume Night to have their resumes reviewed by SWE professional members. The collegiate section reached out to alumnae and other professional women who have volunteered previously. Because this event has been held for a number of years, the section knows how to ensure enough professionals are available to review each resume. The volunteers know what is expected of them and how to help the students. Attracting new members is another benefit of Resume Night.
Two goals of the MAL leadership this fiscal year were to increase the number of MALs involved in outreach and to expand training on managing issues in members’ professional lives. The MALs also focused on outreach, including spreading awareness of program development grants (PDGs) among the MALs and encouraging them to hold outreach events themselves or in conjunction with professional sections.

At this year’s MAL summit, held annually at the Society conference, training focused on leadership burnout. MAL leaders were educated on the signs of leadership burnout and were given strategies for managing and avoiding burnout. Readership of the MAL newsletter is rising as readers discover what MALs are accomplishing and other relevant topics such as working from home. The newsletter has been issued four times annually for the past four years. Many of the articles are written by MALs who know what MALs want to read.

MALs Engage in Outreach

The Kettering University Collegiate Section again hosted a SWE Expo, a long-running outreach event for high school girls interested in STEM. The expo is managed by the collegians with support from their faculty advisor and counselor, both of whom are MALS. The goal is to inform the participants regarding STEM subjects and nurture their interest in STEM before they choose their future universities and majors. The event consists of a speaker panel on careers in STEM. Because the expo is held at the university, participants are exposed directly to STEM research by touring research labs. While finding nearby outreach events can be a challenge for MALs, there may be opportunities to contribute to outreach events organized by local universities or to serve on a career panel at the university.

Parent/Educator Programs (PEPS) Hosted by MALs

While engineers can serve as mentors for children who are interested in engineering, an excellent source of inspiration can be their parents, even if they are not themselves engineers. During a Girl Scout Day at West Virginia University, an undergraduate student noticed how many parents simply observed their daughters working on activities instead of
This year marked the eighth year of the Redding MALs’ “Wow! That’s Engineering!®” program. The program has been running so long that many previous attendees have returned as volunteers to support the event. This year’s Wow! was a collaboration with Girls Inc. With a grant from Google’s Made with Code program, the group was able to create a coding chapter in one of the local high schools. In the past, a core group of MALs organized and implemented the event, but this year Girls Inc. helped with planning and logistics as well as funding. Four Girls Inc. board members also volunteered to work the event. Activities are changed from year to year so it remains exciting for returning girls. This year, in addition to coding, the girls used sand and gravel samples to design a basic water filtration system and also designed and constructed a Mars rover from cardboard, with rubber bands for power. Because the event has taken place over a number of years, the organizers have generated a list of best practices, such as scheduling at least an hour for each workshop and keeping rotations small with 25–30 girls. To determine what has worked well, the girls fill out a survey following the event. In addition, developing good relationships with the parents keeps them not only returning but also volunteering to support the effort.

MALs can become involved in outreach in many ways, such as organizing a Parent/Educator Program (PEP). One MAL did just that at a Girl Scout Day at West Virginia University. Totally involved in the planning, she helped select speakers and panelists and prepared hands-on activities for the parents. The event was quite successful as parents indicated they thoroughly enjoyed the program. MALs can share their experience as engineers with parents in PEPs while providing another avenue for exposure to engineering as a career option.

At SWE’s annual conference, attendees can connect with colleagues and friends in a number of ways. How about working out? At WE16, several MALs attended the Nike+ Training Club workout that took place during the conference. The event was open to all who preregistered. The instructors were enthusiastic, energetic, and supportive and catered to the various fitness levels in the room. The workout was an opportunity for MALs and SWE friends old and new to sweat together prior to an engaging day of personal and professional development and provided an invigorating start to the day.
Although the SWE International initiative has been renamed SWE Global, its vision hasn’t changed. With an expanding presence in Asia and successful conferences in India and Europe, SWE Global is growing as more students and professionals join the Society. Corporate support is a big factor in India’s growth, as positive projections of the country’s gross domestic product (GDP) generate an increased focus on recruitment and gender diversity in engineering. Recent roundtable events in Malaysia and the Czech Republic are also a testament to the steady growth of SWE Global. With greater numbers of roundtables, workshops, and corporate partners, SWE Global is planning more expansion as the demand for women with engineering skills grows. SWE Global’s online training, resources, and offline events engage more members as do the programs that SWE hosts for collegians. Within Asia, the possibility for a future partnership also motivated a visit by SWE to the Chinese Academy of Engineering in Beijing. SWE endeavors to host a symposium in FY18 in collaboration with Chinese engineering organizations.

While roundtable events have increased in Europe, SWE hosted its first roundtable in Shanghai, which attracted 50 people. Typically, these roundtable events are a mix of engineers, human resources staff, and executives who engage in dialogues about diversity and inclusion as well as corresponding research and best practices. These roundtables are an important step in sharing the value of SWE. Thus far, the evaluations for these roundtable events have been very positive and support the need for more of them.

NUMEROUS WAYS TO KNOW ABOUT SWE

SWE’s ambassador program, in tandem with SWE affiliates and the FRIEND of SWE program, is designed to let people outside the United States learn about SWE. These programs, in addition to the All Together blog, SWE Magazine, SWE learning tools, and networking opportunities, promote the Society’s mission, vision, and services on a global scale.

GROWTH OF AFFILIATES

Launched two years ago, SWE international affiliates are attracting more members, helped by the fact that overall awareness of SWE has grown through WE Local conferences and roundtable events. SWE is expanding its outreach groups...
in the international affiliates system so those outside the United States can learn about the opportunities and resources SWE offers women engineers. Through SWE’s international champion program, more corporations are sponsoring SWE events and getting involved in the affiliates program.

A look at the international affiliates' growth and some of their events indicates the action and enthusiasm happening around the globe:

- As the first international SWE affiliate, Koç University in Istanbul has been active for more than eight years. In May, it held a daylong outreach for 110 SWENexters ages 15 to 16, approximately 70 percent of whom were girls. Hands-on experiments, lab sessions, and presentations focused on a specific engineering or science field. The participants learned how to work in teams, address engineering issues, and become familiar with engineering concepts. They also heard professors discuss their decision-making process.

- After the SWE affiliate in Chennai, India, was formed in August 2016, it collaborated with Dow Chemical International Pvt. Ltd. to host a SWE corporate roundtable discussion and several other events.

- The newest SWE affiliate in India is the Bangalore affiliate. Initiated by General Motors Technical Centre, Bangalore, in May, it hosted its first meeting in June.

- SWE affiliate Jakarta, Indonesia, was accredited on Jan. 4. Its members attended a #GirlsinTech event to celebrate International Women’s Day with one of its members participating as a facilitator at a seminar for women titled “Resonation.” More than 1,000 women attended to learn how to face fears and excuses that keep them from achieving their dreams.

- In March, the Universidad Latinoamericana de Ciencia y Tecnología in San José, Costa Rica, became a SWE international affiliate with students from several engineering disciplines and the support and active participation of the female dean of engineering and female directors of the schools of Occupational Health and Environment, Informatics, and Industrial Engineering.

- SWE Pune affiliate members provide immense support to university students via mentoring. A core member of the affiliate and an international ambassador from India in 2017 both mentored and helped initiate two more university affiliates in Pune: the M.E. Society’s Nowrosjee Wadia College and Pune Vidyarthi Griha’s College of Engineering and Technology. Pune now has four university affiliates in India.

A SECOND WE LOCAL IN PUNE, INDIA

Like other WE Local events, the theme for WE Local in Pune, India, was “Meet Locally. Learn Socially.” The conference brought in nearly 700 participants, a significant increase over 350 the previous year. Many corporate partners and SWE international champions sponsored WE Local Pune while also sending their top managers and leaders to participate in plenary sessions. The SWE Pune affiliate set up a booth to create awareness about SWE in India and affiliate activities. Not only were the affiliate’s FY17 goals displayed, but attendees also learned about a mentor program for university students and recruited professional attendees to sign up as mentees.
As it prepares for a significant governance restructure, the Society of Women Engineers experienced another robust and productive year. Membership soared to more than 40,000, while the annual conference drew a record attendance of nearly 12,000, surpassing the 2015 event by 2,500.

Among the myriad highlights of FY17, SWE debuted its WE Local conferences, designed to offer many of the same components of the annual conference but in more intimate settings. The inaugural events took place in Pittsburgh, and San Jose, California. For the second year, SWE hosted a WE Local conference in Pune, India, and, for the first time, in Amsterdam.

SWE relocated its headquarters in November 2016. Between the growth the Society has undergone in recent years and the expiration of the former space’s lease, the time was right for the move to the SWE-branded, modern facility in downtown Chicago.

In October 2016, the Society launched the SWE Magazine mobile app, offering a convenient way for members to access the magazine.

Following is just a sampling of other noteworthy highlights and accomplishments of the SWE year.

ARCHIVES
Troy Eller English fielded numerous reference requests in FY17, providing research support for, among many other projects, the induction of Beatrice Hicks, P.E., SWE’s first president, into the National Inventors Hall of Fame.

Eller English also offered consultations with SWE sections concerning their paper and digital records.

Among other FY17 highlights:
• Eller English discovered a birth announcement for actor, comedian, and musician Jack Black in a 1969 SWE Los Angeles Section newsletter. Black’s mother, Judith Love Cohen Siegel Black Katz, was president of SWE-LA in 1964 and 1965, and in her honor, Black and his brother Neil Siegel, professor at the University of Southern California Viterbi School of Engineering, made a generous donation to SWE, including more than $70,000 that Black won on the celebrity edition of The Price Is Right in February.
• A story about the American Society of Women Engineers and Architects Records, originally published on SWE’s All Together blog (http://alltogether.swe.org/2017/05/swe-founders-day-letters-past/) was picked up in a number of national online publications, including the Huffington Post, The Atlantic, and Glamour.

MAGAZINE RECOGNIZED WITH APEX AND FOLIO AWARDS
SWE Magazine earned seven APEX Awards for publication excellence and one Grand Award for work produced in FY17. The Grand Award went to Art Director JoAnn Dickey in design and illustration for the entire Fall 2016 issue, which debuted a magazine redesign.

In addition, SWE Magazine earned its first-ever Social Media Award of Excellence, for Best Single Blog Post, “Solar Impulse 2: A String of Pearls Against a Black Velvet Sky.” Written by Anne Perusek, the post appeared on SWE’s All Together blog in July 2016.

For details on the other APEX Awards SWE Magazine received, please see the News & Advocacy section of this issue.

In the FOLIO: Eddie and Ozzie Awards competition, SWE Magazine took home top honors in the use of illustration for the opening spread of “Cyberbullying: Resistance Is Not Futile,” appearing in the Fall 2015 issue. The magazine also earned honorable mentions for the Fall 2015 cover and in feature design for “The Music of Engineering,” from the Conference 2015 issue. Honorable mentions in writing were awarded for “Women Engineers You Should Know” and “Tissue Engineering: Merging Engineering and Medical Skills,” both appearing in the Spring 2016 issue.

GOLDEN TRUMPET AWARD
SWE’s All Together blog was also honored this year, earning a Golden Trumpet Award from the Publicity Club of Chicago.

OUTREACH
“Invent It. Build It.” continued its successful run at SWE’s annual conference. The Society’s signature outreach now includes an awards component and recognized more than 40 high school girls as part of three separate awards programs.

In other highlights:
• The SWENext DesignLab debuted at WE Local Pittsburgh in February and was also featured at WE Local San Jose.
• Middle-school SWENexters were invited to participate in a challenge to construct a paper airplane that can carry cargo (coins) and travel more than 10 feet. The challenge winner will be a featured character in the second edition of the Constance and Nano Engineering Adventure comic book.
• SWE continues to participate in FIRST® robotics programs and competitions, sponsoring 20 teams that made a commitment to gender equity. SWE Executive Director and CEO Karen Horting, CAE, was invited to serve on the
FIRST™ advisory board.
• SWE partnered with iDTech Camps to provide a matching grant for 10 needs-based scholarships for SWENexters to attend their camp. iDTech also provided 25 scholarships for SWENexters to attend its spring break camp.

PROFESSIONAL DEVELOPMENT
Now in its fourth year, the Academic Leadership for Women in Engineering (ALWE) Program took place Oct. 28–29, 2016, at WE16 in Philadelphia. The program drew 48 faculty women, most of whom were funded with travel grants through a generous four-year award from the National Science Foundation (NSF). Attendees represented a diverse group of backgrounds and 35 institutions.

Since 2012, SWE has hosted the Collegiate Leadership Institute (CLI) at its annual conference. At WE16 in Philadelphia, 120 students, comprising SWE Future Leaders, region collegiate leaders, and applicants to the program (more than 175 collegians applied to attend), were in attendance. During the three-day program, participants attended six sessions covering an array of topics closely aligned with SWE’s leadership competency model.

PUBLIC POLICY
Throughout the year, the Society of Women Engineers utilized relationships with allies, on both sides of the aisle on Capitol Hill and in the advocacy community, to advance public policy priorities that support women and girls in STEM in the K-12, higher education, research, and career spaces. As always, these efforts are ongoing, and the following are just a few of the highlights of SWE’s public policy work in FY17:
• SWE members advocated to members of Congress to ensure cuts to critical science agencies were minimal in the FY17 and FY18 budgets.
• Working with the STEM Education Coalition, SWE wrote to and received feedback from the U.S. Department of Education that the department would continue to support science as an “other academic indicator” for states under the Every Student Succeeds Act.
• SWE supported the Harry W. Colmery Veterans Educational Assistance Act of 2017.
• The Society supported the Patsy T. Mink Gender Equity in Education Act, which seeks to provide more resources for educational institutions to implement Title IX.
• SWE co-signed a letter from The Leadership Conference on Civil and Human Rights to the Department of Education to support equal protection for student assault victims under Title IX.
• As a member of the National Coalition for Women and Girls in Education (NCWGE), SWE participated in NCWGE’s congressional briefing highlighting the ongoing importance of Title IX on the law’s 45th anniversary.
• SWE continued to work with the Title IV, Part A Coalition, which has successfully advocated for $400 and $500 million for well-rounded K-12 education funding in FY17 and FY18, respectively.

• SWE organized its annual “Diversity and Inclusion Fuels Innovation in Science, Technology, Engineering, and Mathematics (STEM)” Capitol Hill Day in March. The event drew more than 130 participants despite a serious snowstorm.

RESEARCH
Continuing to shape its role as the primary resource for information and trends on women in STEM, this year SWE launched research.swe.org, a centralized data source for those seeking information about women in engineering and STEM.

Other happenings in SWE’s research arena in FY17 include:
• The “State of Women in Engineering,” the first-ever event of its kind for SWE, was introduced at WE16, featuring the authors of the annual literature review and research partners who discussed current research trends surrounding data on women in engineering.
• Collaborating with the Center for WorkLife Law, SWE released a new study in FY17 and is commencing work on several more under the direction of Roberta Rincon, Ph.D., manager of research. “Climate Control: Gender and Racial Bias in Engineering” uncovered specific gender and racial biases in the engineering profession.
• In March, the Society unveiled a special issue of SWE Magazine devoted to research. SWE’s latest annual literature review serves as the centerpiece of the publication, which also presents details on the Society’s own recent research.

SOCIAL MEDIA
FY17 propelled SWE’s social media presence into an expansive era. Highlights of SWE’s social media efforts in FY17 include:
• With more than 1,000 followers on Snapchat, SWE doubled its audience from last year. Instagram boasts more than 4,000 followers.
• The Society’s Facebook page reached more than 50,000 “likes,” and SWE celebrated with a specially curated “Thank You” video that made more than 3,000 digital impressions. The Society also participated in the newest content curating Facebook trend: going LIVE. Our first LIVE video featured FY17 President Jessica Rannow.
• Twitter boasts some 22,000 followers, and SWE achieved national trend status with its collaborative #GrowMakers Tweetchat during Makers Week in June 2016.
• SWE’s LinkedIn page has nearly 10,000 followers, and SWE’s private LinkedIn Group has more than 30,000 members. Collectively, SWE speaks to an audience of more than 100,000 each day.
• SWE expanded its social media presence in other countries this year, matching its growing presence in Europe and India with respective Facebook and Twitter pages.

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In the Midst of Life’s Variables, SWE’s a Constant

When the calendar changed over to July 2016 and my term as SWE president began, I knew a big year was ahead of me. I had no idea, however, just how many airports and flights, hotel rooms, events with chicken dinners, and emails awaited me. After 29 trips for conferences and events; 1,550 SWE President Facebook followers; more than 120 nights spent in hotels; and countless email, conference call, and meeting hours later, I’ve had an amazing experience interacting with SWE members from around the globe.

The theme of my year was “Life’s Variable: SWE’s Your Constant.” From my first meeting at the University of Wisconsin–Madison in 1995, where I set the goal to be section president and met my upper-class mentors, SWE has been there for me. Through SWE, I found roommates in college and, later on, made my first friends in Columbus, Ohio. It’s where I gained the skills to be an engineering manager. It’s where I made the friends who celebrated my recent milestone birthday with me. It’s why I joined Facebook and Twitter.

After working for nine companies, SWE continues to be my home. My term as SWE president is just one year in the Society’s 67-year history, but I believe we have made many impacts to keep SWE relevant and progressive in my four years on the board of directors.

My year included more events than I ever imagined, beginning with The United State of Women Summit in Washington, D.C., where I saw President Obama speak and Oprah interview first lady Michelle Obama, along with many others. I lived out my “Top Gun” dream and participated in the U.S. Navy Embark Program to the USS Carl Vinson, including a catapult launch in a C-2 Greyhound off the aircraft carrier.

Moving into the SWE year, the board of directors installation was held in August at the beautiful Ohio Statehouse. It was amazing to see nearly 12,000 attendees at the WE16 conference in Philadelphia in October! Supporting our partner organizations, I attended the last region conference in Region H at the University of Michigan in Ann Arbor. My first SWE conference was the 1995 Region H conference, so it felt like I was wrapping things up where it all began.

A blizzard threatened our annual Congressional Visits Day in March, but SWE plowed through with the largest number of attendees coming to promote SWE’s nonpartisan public-policy mission. Things turned international in late March with a trip to WE Local Pune, India, followed by WE Local Amsterdam in May. I continued on to San Diego,
where I was a panelist at the U.S. News and World Report STEM Solutions Conference. My year wrapped up with an end-of-June trip to Budapest, Hungary, to visit an international STEM camp in partnership with the U.S. Department of State. Without SWE, I would never have had these opportunities.

This year, we created a SWE President Facebook page. It’s been great meeting and interacting with members throughout the world through social media! And for those who are wondering, 100 percent of the posts on the SWE President accounts were from me. We also launched a podcast series, which has been a lot of fun to host. Podcast topics have varied, including men as inclusion partners, women in leadership, STEM public policy, and unconscious bias study results.

No SWE president’s farewell article would be complete without some tributes to those who made it possible:

- I couldn’t have served in this role without the support of my husband, Jens Griesshammer. He made sure I went to bed on time during the WE16 conference; organized things at home, including a major house remodel while I traveled; and generally was the most supportive partner I could have asked for.
- With the many demands of the role of SWE president, my employer, AmerisourceBergen, has been extremely supportive. From sponsoring the installation ceremony to allowing for my flexible work arrangements, they made it as easy as possible to work essentially two full-time jobs.
- The FY17 board of directors was an amazing team I am proud to have led. To all of our FY17 SWE volunteers, thank you for dedicating your time, sweat, and passion to bringing SWE’s mission to fruition!
- And to the SWE headquarters staff, thank you for making me look so good in all public relations arenas. They share a passion for our mission and work every day to make SWE a remarkable organization. They truly are the magic behind the scenes that keeps SWE going day to day!

And now it is time for me to join our ranks of SWE past presidents. It’s been an honor and a privilege to serve as the Society president. SWE is a strong, well-respected association, and we should all be proud of the work we do to serve our mission. Aspire. Advance. Achieve.

Jessica Rannow
SWE FY17 President
Tips for Remote Employees

Working from home evokes some appealing images — a flexible schedule, comfortable attire, no more stressful commutes. On the other side of the coin, remote employees face unique challenges that can undermine their best efforts.

By Lynda Grindstaff, F.SWE, SWE Editorial Board Chair

Last year, I received news that my company was no longer going to have a local office. At first, I feared the change (what does this mean for me?), was worried (could I be successful working from home?), and then concerned (what equipment do I need to set up my home office as a permanent work space?).

I had about five months to prepare for the change, but the biggest challenge was the thought process I experienced, contemplating how this new arrangement would affect my work and personal lives as well as my family. About three months before my office closed, I worked from home to sign for a package. It was one of my longest workdays, but in a different way than in the past. I found myself watching out the front window, hoping to see someone — anyone! I was craving human interaction so much hoping to see someone — anyone! I was watching out the front window, hoping to see someone — anyone!

I needed to replicate what worked for me at the corporate office in my new home office.

I also needed to minimize distractions and set limits to ensure I was successful and didn’t end up working 24/7. It’s easy to get sucked into the home “to-do” list or want to service every interruption from the children, but to be successful, I needed to balance my time just as if I were at the office. I sent the kids to day care and scheduled my days as if I were in my former space. I continued to run errands at lunch, on weekends, or in the evenings just as I had previously. I have a co-worker who also made the recent change and is having a hard time managing his distractions. He said he has been working ~4 p.m. – 1 a.m. to get his work done.

A friend suggested I make myself a priority. I needed to shower every day as if I were going into the office, continue to exercise, and ensure I ate well. At the end of the first week of officially working from home, and while I continued to shower daily, I averaged only about 400 steps by lunchtime, down significantly from the 3,000 steps I’d previously averaged by lunch time without working out. I had to rethink how I was getting my steps in since I didn’t have a large corporation to walk around. I found there is a whole industry dedicated to exercising while you work. They make under-desk treadmills and under-desk stationary bicycles, but I decided to go with a portable elliptical machine. It requires more of a stand-up pedaling motion, but helps me keep moving while I work. I also keep healthful snacks and a good supply of water on my desk to keep me fueled.

The last area I needed to consider was what technology and equipment would help me be successful and ergonomically correct in my dedicated space. I had to decide between a speaker phone or headset; would I get a dedicated work phone line or use Voice over Internet Protocol (VoIP); was the lighting in the room conducive to working; and how could I personalize the space I would be in for 8+ hours a day?

As a permanent work-from-home employee now, I have two 27” monitors raised up, a split keyboard for ergonomics, a sit/stand desk, a portable elliptical machine, and a chair made for a petite person. Most of my calls are video calls with a VoIP speaker phone. My kids still go to after-school care, and I have their pictures and artwork hanging on the wall. I shower daily, eat better, have learned my neighbors’ patterns, and that there is a family of wild turkeys that walk in the front of the house daily. I have enjoyed the opportunity to use the time I would have spent commuting to do the dishes or throw in a load of laundry as well as pop dinner in the oven while I go pick up the kids.

Lynda Grindstaff, F.SWE, is a senior director of future innovation with McAfee. An active SWE Fellow and senior life member, she is chair of the SWE Magazine editorial board and has been recognized by the Society as an Emerging Leader.
Career Transitions—Pursuing Your Passion

Whether planned or unexpected, things happen throughout our careers that can take us in a multitude of directions. Approaching these transitions in a purposeful manner, focusing on the skills, knowledge, and experience each new role required, has been key to this woman engineer’s success.

By Deborah L. Grubbe, P.E.

When you graduate with an engineering degree, it’s difficult to know where you will end up after three or four decades of work. I believe career development is a result of the decisions and choices we make, combined with some amount of luck — including being in the right place at the right time.

I tried to take career transitions in a purposeful manner, while being sensitive to the skills, knowledge, and experience I needed to be successful in each new role. I had read that changing more than one of these factors — position, company, or location — makes for a more difficult transition. With all of these things in mind, I created a transitions map.

TRANSITION #1: CHEMICAL PROCESS ENGINEERING TO CONSTRUCTION

After three years of work experience for a major chemical company, I changed jobs within the organization, to a location within three miles of my first position. The work was related but not the same. What was unique about my new role in construction was that I would be the “first woman” to hold this position. In fact, my boss at the time told me I would be a “guinea pig,” because the management was not sure that women were able to do this work effectively.

I knew that being the “first” carried with it both good and bad. I needed to do a good job, because I knew that a lot of people would be watching me. Good and bad, ups and downs, the bottom line was that I loved construction work, and in the end, continued on a career path into construction and capital project management for the next 20 years.

TRANSITION #2: CAPITAL PROJECT MANAGEMENT INTO SAFETY

After 12 different job assignments in capital project management and operations, I was offered a change into corporate safety and health. There was a business need to have a lower-level executive in a corporate role who understood field safety work. As in my first transition, this one involved no change in company and no change in location, only a change in position and knowledge base. I had performed and understood what was required to do safety work from the execution side — learning the fundamental safety requirements for work with hazardous chemicals as well as those for construction work. Now I was going to have the opportunity to learn about safety management from the safety professional side. I had prior relevant experience, but also some learning to do. I asked questions, read documents and trade publications, observed others, and listened carefully. I was also afforded some unique opportunities that allowed me to establish myself as a safety professional. The most notable of these was an appointment as a consultant in safety culture to the Columbia Shuttle Accident Investigation Board, which led to nine years of service on the NASA Aerospace Safety Advisory Panel.

TRANSITION #3: CHEMICAL INDUSTRY TO OIL AND GAS INDUSTRY

Four years later, I received an offer for another career transition that I could not refuse! This time a different industry — a multinational oil and gas company — approached me through an executive search process and offered me a position in an executive safety role that was double my current salary and in a familiar location near where I had attended graduate school. Additionally, I was able to retire from my current firm. At the executive level, any transition would be difficult; however, an extensive interview process ensured an extremely supportive supervisory chain throughout my employment.

TRANSITION #4: MULTINATIONAL EMPLOYMENT TO SELF-EMPLOYMENT

In 1976 I won a scholarship from the American Consulting Engineers Council. From that exposure, the dream of running my own business was born — it only took 43 years to come to fruition. In going back to my “transition map,” I was looking at known work, known locations, and known industries — safety, construction, and oil and gas/chemicals. In early 2009 I hung out my shingle and have not looked back. Eight years later I am happy to say that results topped my expectations!

I don’t know what the future may bring; I am sure, however, that there will be another transition in there! After 40 years, I am grateful to the many colleagues who have helped me along the way. I can only hope that I have given back more than I have received, and I
In the end, you can smartly select your transitions, and I hope that your transitions are exciting and full of promise! ✨

Deborah Grubbe, P.E., runs her own safety consulting business after a 30-plus-year career in industry. She is a former member of the NASA Aerospace Safety Advisory Panel and an emeritus member of the Center for Chemical Process Safety. A registered professional engineer, Grubbe is also a chartered engineer in the U.K., a fellow of both the AIChE and the IChemE, and a member of the National Academy of Construction. She also served on SWE’s Corporate Partnership Council. In 2002, she was named Engineer of the Year in the State of Delaware, and in 2010, was the first woman to receive an honorary doctorate in engineering from Purdue University.

Pre-Suasion: A Revolutionary Way to Influence and Persuade

By Robert Cialdini, Ph.D.

Review by Catherine Rocky, SWE Editorial Board

The body of knowledge concerning the science of persuasion has grown dramatically and become increasingly focused on helping general readers communicate more effectively. Pre-Suasion: A Revolutionary Way to Influence and Persuade takes this approach to a new level. The author, Robert Cialdini, Ph.D., is a social psychologist and author of the classic 1984 business book Influence: The Psychology of Persuasion.

The primary goal of Pre-Suasion is to identify “what savvy communicators do before delivering a message to get it accepted.” In other words, what can you do to increase your chances of getting to “yes”? According to Dr. Cialdini, “What we present first changes the way people experience what we present to them next.” He further states that pre-suasion is “creating conditions for people to be receptive to a message before they encounter it.”

Dr. Cialdini emphasizes you don’t need to change anyone’s beliefs, attitudes, or experiences — you just need to present your message in a way that increases the listener’s receptivity at the moment of decision-making.

It is possible to enhance the effectiveness of a communication in the instant before it happens. There is a brief moment that Dr. Cialdini defines as a “privileged moment” when “communicators can elevate their success by knowing what to say or do just before an appeal.”

Accordingly, you need to have an opener, a way to frame a situation, or establish a mindset that will lead people to “concede, comply, and change.”

Dr. Cialdini’s theory of influence is based on six key principles, first presented in the earlier book. They are discussed in depth in Pre-Suasion and augmented by a new seventh principle.

The principles include: reciprocation — “people say yes to those they owe”; social proof — trust in what everyone else is doing/liking; commitment and consistency — not backing out on what we agree to; liking — complying with requests from people we like; authority — following people who look like they know what they are doing; and scarcity — how we are drawn to things exclusive or hard to come by. The seventh principle is unity — building a shared identity, or a “we” relationship, leads to more trust and, hence, cooperation.

Pre-Suasion is filled with stories, anecdotes, and lots of illustrations to help the reader better understand how the process works and how to use it in one’s life and organization.

It is important to note that Dr. Cialdini addresses the ethical use of persuasive techniques for the good, and not for nefarious reasons. Pre-Suasion is presented as a comprehensively researched, scientifically grounded study with an extensive list of references and discussion notes. A thoroughly intense and engaging read, this material is relevant for anyone. ✨

Catherine Rocky, national accounts manager with Terracon Consultants Inc., has a B.S. in geological engineering from South Dakota School of Mines and Technology. Rocky is past president of the Wichita Council of Engineering Societies. She is an at large member of Region i and a member of the SWE Magazine editorial board.
Get Your Professional Engineer’s License — It’s What Grandma Would Want You to Do

Generations of women before us came to understand that education and professional credentials are key. Their collective wisdom remains a guidepost.

By Pam Dingman, P.E., SWE Editorial Board

I remember my grandmother telling me as a child that a woman should educate herself because an education was something that could never be taken away. She fought hard in the late 1920s to go to college to obtain a teaching license. It was my grandmother’s voice that I continued to hear in the back of my head 20 years ago, when I was trying to make the decision on whether to take the professional engineers license exam.

I always wanted to take the P.E. exam; four years into my career, however, I was married, with a 3-year-old and a sick baby. I questioned whether preparing for and taking the exam was truly worth it. I was exhausted and frazzled. I made a “project schedule” of the topics I needed to study to be successful. I would study the scheduled topic of the week after the kids went to bed and on the weekends. I also learned to study while rocking the baby, doing laundry, or cooking dinner.

I knew I had to pass the exam so that I could earn more money for my young family; at the time, the cost of two children in day care was my entire first check of the month, plus $20. The firm I was working for typically gave a 10 percent raise to engineers who became licensed. I also knew I couldn’t be promoted without an engineering license.

And I knew I had to pass the exam the first time; as a young mother, I did not have time to study for the exam twice. This was one of many times early in my career that I found my professional life clashing dramatically with my personal life. At the time, I recall noticing that women did not get licensed at the same rate that men did.

In fact, according to an article written by Abbie Liel, Ph.D., P.E., STRUCTURE® magazine, October 2014, only 7.4 percent of women get their P.E. licenses. Dr. Liel also points out that only nine states reported data, which is heavily focused on structural engineering.

The Engineering Council of the UK, in March of this year reported that only 5.2 percent of the UK’s registered engineers were women. There is not a lot of data out there about the number of women who have P.E. licenses. Existing data and casual observation lead me to believe that the number is less than 10 percent.

Defying expectations, I did take the P.E. exam and passed it the first time. Like most people, my career and personal life have not gone as I had planned in my 20s. Having the P.E. enabled me to become a senior project manager and stockholder of the consulting firm where I worked, own a consulting firm, and run for the public office of county engineer — all impossible without a P.E. license.

Once you have your license, even if you decide to step out of engineering for a while to raise your children, don’t let it lapse. Karen Wilson, from the SWE Eastern Nebraska Section, took a break from engineering to raise her two children. Wilson said, “I had been told if I decided to go back to engineering, it would be easy to reactive my license. It was not.” Wilson’s advice: “Get your license and do not let go of it.”

I will always remember my grandmother’s advice on the importance of education for women. It was her teaching income that saved the family farm in a time of economic crisis. She didn’t live long enough to see me go to engineering school, but I heard her words whispered to me throughout school and my pursuit of a professional engineering license: A woman needs to be educated and professionally licensed. Take the exam for your future. It’s what Grandma would want you to do.

Pam Dingman, P.E., is the owner and CEO of Engineering Design Consultants and the elected county engineer for Lancaster County, Nebraska.

Further Considerations

Jason Kent, P.E., a contributing writer for Monster.com, notes that having a license also gives you an average of 5 percent more income than a nonlicensed engineer with similar experience. As you advance in your career, you will find that to be considered for many management positions, you must have a P.E. Early in your career, you might not know if climbing the corporate ladder is your thing; however, as a woman, I encourage you to not limit your future. I also encourage you to get your National Council of Examiners for Engineering and Surveying (NCEES) license as soon as you obtain your P.E. An NCEES license will give you the ability to simplify the process of obtaining licensure in other states, making the process faster if a project or employment opportunity comes up in another state.
When you say “I Am with SWE”, you indicate SWE is an important part of who you are. It also shows you support the work SWE is doing on behalf of women in engineering and technology. Your membership in SWE makes what we do possible.

Help us do!
AT SWE.ORG/MEMBER

We can’t do all that we do without you! Renew now for FY18 at swe.org/member.
Wendy Landwehr
SWE Fellow, FY18 Incoming Trustee, Served the Society in a Variety of Roles
1953 – 2017

Wendy Schauer Landwehr, SWE Fellow, FY18 incoming trustee, and FY17 awards committee chair, died June 20, 2017, at home. Born Aug. 11, 1953, in Chicago, Landwehr received her master’s in engineering from the Illinois Institute of Technology, launching a second career at Northrop Grumman Corp. in Rolling Meadows, Illinois. There, she spent 31 years as an engineer and project manager until retiring in 2016.

Landwehr’s first career with Marshall Field and Company was based upon her undergraduate degree in family and consumer sciences, earned from Eastern Illinois University.

When she joined Northrop Grumman, Landwehr was one of just a few women in the software engineering department. Assigned to the configuration management group, and tasked with setting up a configuration management system for the department, Landwehr developed the software tools, administered the process, and trained the engineers. This system became the cornerstone of the configuration management process used for the entire Rolling Meadows facility.

Landwehr joined SWE in 1996 as part of a Society membership drive at Northrop Grumman and promptly received the Chicago Regional Section Newcomer Award. She held a variety of SWE leadership positions. During her term as Chicago Regional Section president, the section membership increased to more than 300. She also injected new life into the student liaison committee, targeting the seven collegiate sections within the section’s territory. Her Society-level focus was largely on awards and procedures. She served as Region H governor in FY11.

A co-founder of Northrop Grumman’s Women Engineers group, Landwehr was also a member of the advisory board for the School of Technology at Eastern Illinois University. She served on the board of directors of the Association of Old Crows — an organization for individuals with interests in electronic warfare, electromagnetic spectrum management operations, cyber electromagnetic activities, information operations, and other information related capabilities.

Landwehr was an avid gardener in her spare time, volunteering at the Chicago Botanic Garden and recently receiving certification as a master gardener from the University of Illinois. She and her husband, Martin, also enjoyed skiing throughout the United States, Canada, and Europe. They visited all 50 states, collecting more than 300 passport stamps from national parks and historic sites.

In addition to her husband, Landwehr is survived by her mother, a sister, a brother, and nieces and nephews. Services were held June 28 at St. Peter Lutheran Church in Arlington Heights, Illinois.

— Anne Perusek
Sources: SWE archives
Chicago Suburban Daily Herald

Recent Deaths
SWE Fellows and pioneer members Jo Webb, P.E., and Margaret Pritchard, P.E., died recently and will be memorialized in the upcoming conference issue, along with SWE senior life member and 1999 Achievement Award recipient Shirley Schwartz, Ph.D.
Elaine Pitts
SWE Fellow, Combined Packaging Engineering and Public Relations for a Dual Career
1917 – 2017

Elaine Pitts, F.SWE, died March 4, a few months short of her 100th birthday. A member of the 1981 class of Fellows, Pitts was honored for her technical contributions as a packaging engineer, her service to the Society, and for advancing women in engineering through the example she set.

Her Fellow nomination package included a letter from the Philadelphia Section, noting Pitts’ extensive service not only to the Society, but also to other organizations and her profession. Of these and many other accomplishments, the letter said: “She has demonstrated what women engineers can do.”

Pitts was also known for mentoring young women engineers, being generous with her time and spirit.

A native of Chicago, Pitts studied industrial engineering at the Illinois Institute of Technology and design at the Art Institute of Chicago, working as a packaging engineer in the mail order and retailing fields while a student. She began her career in 1947 at Aldens in Chicago, changing positions to work at Spiegel, where she became a senior packaging engineer. Pitts joined Sperry and Hutchinson in 1953, advancing in many roles to the position of vice president in 1970. Over the years, her responsibilities frequently included consumer affairs, leading to an unusual career: packaging and public relations.

Of this, Pitts once remarked, “Industrial packaging must be designed for maximum protection of the merchandise and minimum costs during handling and shipping. If products are packed protectively so that merchandise may be transported quickly and inexpensively, the result is better value for the consumer.”

Pitts served SWE at all levels, from the New York Section, to Society-level committee chair in public relations, nominating, and admissions, to name a few; as well as the executive committee (equivalent of today’s board of directors), and the board of trustees, and chaired the long-range planning committee. She worked on the First International Conference of Women Engineers and Scientists, held in New York and organized by SWE in 1964.

In addition, Pitts was an active member of the Society of Packaging and Handling Engineers, serving as national board chairman. She was also president of American Women in Radio and Television, and of Women Executives in Public Relations.

In 1978, Pitts was the first woman to receive the prestigious John W. Hill Public Relations Leadership Award from the Public Relations Society of America, “for distinguished service to the public relations profession.” The Society of Packaging and Handling Engineers also named her Member of the Year.

Pitts particularly enjoyed working with 4-H clubs across the United States in one of her public affairs roles. She was recognized with a Partners in 4-H citation from the Federal Extension Service. She also received awards for distinguished service from both the National Association of Distributive Education Teachers and the Office Education Association.

Retiring from Sperry and Hutchinson in 1980, Pitts left New York City for California. There, she established her own firm with a partner to provide professional assistance in packaging and public affairs.

Remaining active in her community, Pitts joined Rotary International at age 94 and, despite using a walker, participated in a service trip to Mexico to donate wheelchairs.

She also was instrumental in a successful campaign to save and expand her local library in Foster City, California. When she turned 99, community members there honored her with a birthday party.

Pitts’ husband, Paul, preceeded her in death.

The Spring 2017 issue of SWE Magazine features Pitts as one of the “Women Engineers You Should Know.”

— Anne Perusek
Source: SWE Archives
“Together we are making a measurable difference.”

Members of SWE’s Corporate Partnership Council (CPC) work with the Society to recruit and retain women in engineering and technology around the globe.

CPC members receive access to thought leaders, the latest research on recruitment and retention, and best practices in the field. It’s a mutually beneficial relationship, that ultimately benefits thousands of talented women and their organizations.

TO JOIN THE CPC, VISIT SWE.ORG/CPC.
S\text{enior life member Lois Bey,}
longtime resident of Las Vegas, died May 8, 2017. A chemical engineer who held the distinction of being the first woman to graduate in chemical engineering from the Illinois Institute of Technology, Bey completed her degree in 1950 and joined SWE in 1953.

Bey’s career path was a triumph of perseverance in the face of tremendous obstacles. Her oral history, conducted as part of the Profiles of SWE Pioneers: Oral History Project, discusses the difficulties of her early life, the overt sexism she experienced, along with the importance of joining SWE; and how the support she received from members was integral to her decision both to attend graduate school and her persistence in the profession.

She worked for a succession of companies, including Ewald Laboratories and the Armour Research Institute (now IIT Research Institute), with responsibilities ranging from lab technician to assistant engineer. From 1956–1960, Bey was employed as a sales engineer for F.M. De Beers Associates, where she sold and maintained equipment.

Bey began working for Baxter Laboratories in 1960, after which she earned a master’s degree in library and information science. She successfully combined both her degrees toward a career as an information specialist in chemical company research and development departments at Baxter and later at Stepan Chemical Company until her retirement in 1993.

During IIT’s centennial celebration, Bey was presented with a memorial plaque that read: “In recognition of her pioneering role as the first female graduate in chemical engineering at IIT, her commitment, and her contribution to the chemical engineering profession.”

She was also an active member of the American Institute of Chemical Engineers and the American Society for Information Science.

\text{–Anne Perusek}

\text{Sources: SWE Archives}

\text{Remainning a Consistent,}
\text{Credible Voice}

\text{T\text{imes of change and transition are never easy or smooth, whether in industry, within government, or even in our own families. Nowhere is that more apparent than in Washington, D.C., as we transitioned to a new administration. SWE is a nonpartisan organization with members from all sides of the political landscape. To fulfill our mission, we work with the new administration, as well as those with whom we have existing relationships — in Congress, the federal agencies, and the executive branch — on issues of importance to our organization, our members, and other stakeholders.}}
likely to change as it is considered and amended by the U.S. House and Senate, the proposed cuts signal alarm for women in engineering and technology.

If passed unaltered, the proposed FY18 federal budget will negatively impact the pipeline of engineering talent that is critical to increasing access to jobs to strengthen the U.S. economy. The proposed budget also cut or significantly reduced funding to dozens of agencies that provide critical research. For example, the total FY18 budget proposed for the National Science Foundation is $6.65 billion — a decrease of $840.5 million from FY17. In addition to funding critical research, NSF funds programs that strive to increase the participation of individuals who are traditionally underrepresented within the STEM profession.

To address these concerns, SWE issued a call to action asking members to contact their elected officials to advocate against the cuts proposed in the FY18 budget, using templates in SWE’s Legislative Action Center found on www.swe.org. We also signed on to recommendations from the STEM Education Coalition, of which SWE is a member.

Next, we continued to support Title IX implementation. SWE signed on in support of the Patsy T. Mink Gender Equity in Education Act (GEEA). Introduced by Sen. Mazie K. Hirono, J.D. (D-Hawaii), on the 45th anniversary of the enactment of Title IX, the GEEA seeks to provide more resources for educational institutions to implement Title IX.

Originally passed in 1972, Title IX prohibits discrimination by federally funded education programs based on sex. Despite being passed more than three decades ago, the need to fully implement Title IX still remains urgent to ensure equality for women, especially in engineering and technology education programs where women are underrepresented. According to Hirono’s office, the GEEA legislation would “provide resources, training, and technical assistance to fully implement Title IX and reduce and prevent sex discrimination in all areas of education” along with specific recommendations for how this can be accomplished.

WHITE HOUSE MEETING

Most recently, we had the opportunity to meet with the policy team at the White House working to implement the agenda championed by Ivanka Trump. I was able to share details of SWE’s STEM Re-Entry Task Force. The returnship concept was of great interest. This, hopefully, will lead to collaboration as they look for creative ways to drive forward the Working Families Agenda, which aims to keep more women in the workforce through family-friendly policies and return more easily after a career break.

In addition, the team was eager to engage with our K-12 outreach work, including SWENext and “Invent It. Build It.” A STEM event for girls is planned for later this year at the White House, and SWE may have the opportunity to nominate members as role models. I left the meeting feeling positive about the opportunity for SWE to help influence meaningful change for girls and women in STEM through collaborative efforts with Ivanka Trump’s team.

TEXT ALERTS

If you are looking to stay up-to-date on all of SWE’s public policy efforts, you can now do so through text alerts. Text SWE Advocate to 56512 to sign up.

Karen Horting, CAE
Executive Director & CEO

Employers in bold are members of the SWE Heritage Club.
When the Professional and the Political Collide

“...I do not wish to remain affiliated with any group who profess to be engineers, whose officers interpret their by-laws to restrict that group from taking any stand in civic affairs that vitally affect the position of the engineering profession in its community,” wrote Elise Hosten McGough while tendering her resignation in a March 12, 1957, letter to Detroit Section Chairman Geneva Van Horn.

At issue was a candidate for Michigan state highway commissioner — a civil engineer and registered land surveyor who had not yet received his professional engineer’s license. Local chapters of the American Society of Civil Engineers (ASCE) and the Michigan Society of Professional Engineers (MSPE) lobbied for John C. Mackie’s removal from the ballot because the position’s requirement for a “competent highway engineer” had previously been interpreted to mean a “registered professional engineer.”

McGough called for the SWE Detroit Section to do the same, but section leadership declined, believing such actions fell outside the scope of its bylaws and were more suited to the ASCE and MSPE. Asked to intervene, SWE national president Miriam Gerla summarized the situation in an Aug. 1 letter to the board of directors: “In this case the Detroit Section was following the By-laws statement of purposes and limitations closely. Elise believed this conservative stand rendered the Detroit Section ineffective when it should have been strong.” Ultimately concurring with the section’s decision to stay out of it, Gerla continued, “The question of the role the SWE should play in political or civic issues is one which has been confronting us more often as we have grown.”

In order to protect its tax-exempt status with the IRS, SWE took what many in leadership believed to be a prudent approach and refrained from engaging in political debates or lobbying until its vocal support of the Equal Rights Amendment in the 1970s. — Troy Eller English, SWE Archivist

Detroit Section Director Geneva Van Horn and Vice-Chairman Elise Hosten McGough represented the section during a 1953 meeting of the national board of directors. McGough served as Detroit Section chairman (now called president) from 1954 to 1956, but resigned her membership a year later when Van Horn declined to involve the section in a political battle concerning professional engineering licensure.

The Michigan Supreme Court ruled in John C. Mackie’s favor after local engineering organizations lobbied to remove the Democratic candidate’s name from the 1957 ballot for Michigan state highway commissioner because he was a registered land surveyor rather than a registered professional engineer. He served two four-year terms as highway commissioner and was recognized in the Michigan Transportation Hall of Honor for aggressive leadership that made Michigan a leader in the construction of the nation’s interstate freeway system during the 1960s.

Professional engineering licensure was an important signifier of the profession’s status to the public, but SWE members also viewed licensure on a more personal level. In summarizing the professional development session at SWE’s 1960 Eastern Seaboard Conference, the SWE Newsletter noted that, “It was unanimously agreed that the title P.E., in the case of a woman, does much to further her prestige” among male colleagues.
Earn the credential that’s recognized wherever engineering takes place. The process of becoming a P.E. prepares you to make an impact, increases your earning capacity, and enhances your professional prestige.

In short, the P.E. is your key to greater career freedom and more opportunities. This is the time to stand out. And nothing says outstanding like professional engineer.

“A P.E. license has benefited my career. Being a P.E. proves your experience and competence, which is important in the profession, no matter the discipline.”

Heather Dougherty, P.E.
Federal Research Engineer
Ph.D. Candidate, Virginia Tech

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