



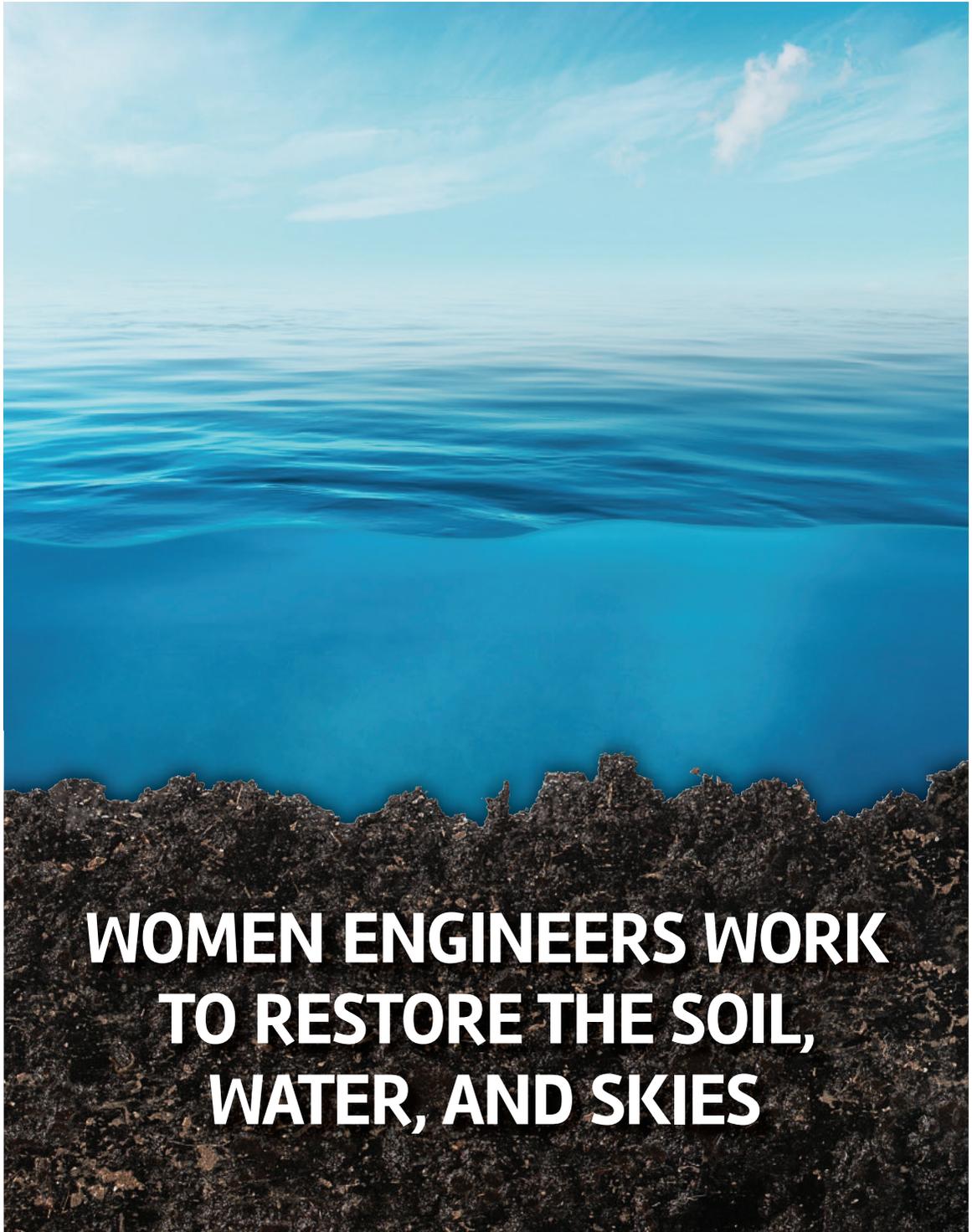
JUDITH RESNIK'S LIVING LEGACY

SWE STORIES, TALES FROM THE FOUNDERS'
FAMILIES: PART TWO

WE20 RECAP

WINTER 2021

MAGAZINE OF THE SOCIETY OF WOMEN ENGINEERS



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TO RESTORE THE SOIL,
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MAGAZINE OF THE SOCIETY OF WOMEN ENGINEERS

FEATURES



NAISTCO - SOMERCDEM

Women Engineers Work to Restore the Soil, Water, and Skies

Committed to finding ways to heal the environment, women engineers in bioremediation, aerospace, and civil engineering are making key contributions.

32 Judith Resnik's Living Legacy

The Judith Resnik Memorial Scholarship has helped dozens of young SWE members reach their goals of working in the aerospace industry. As we mark the 35th anniversary of the Challenger space shuttle disaster, in which Dr. Resnik lost her life, recipients of the scholarship discuss the impact it has had on their lives and careers.

38 SWE Stories, Tales from the Founders' Families: Part Two of a Two-Part Series: Focusing on Philadelphia

The Society of Women Engineers' 70th anniversary was an occasion to reflect on the family lives of some of SWE's founding members. The Conference 2020 issue of *SWE Magazine* presented stories, photos, and insights from the adult children of some of these pioneering women who lived in the New York City area. This second and final installment offers the same from the children of our founding Philadelphia members.

DIGITAL EXCLUSIVES

Additional, digital-exclusive content can be found on the *SWE Magazine* page on the All Together blog. To read the news story "Brilliance: An Equal Opportunity Trait," and "Soft Skills Prove Powerful for COVID-era Job Seekers," plus "Ask Alice," our Q & A column, please visit: <https://alltogether.swe.org/swe-magazine/>

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PODCASTS

SWE's Diverse podcasts address issues and events important to women in engineering and technology. The podcasts can be found on SWE's All Together blog (<https://bit.ly/2NIEG7J>), as well as on SoundCloud and iTunes.

SWE Stories: Tales from the Archives: Mentoring – Parts 1 and 2

<https://bit.ly/2XQ7YAg>

<https://bit.ly/3bN5XNj>

The Benefits of Mentorship with Cathy Meyn

<https://bit.ly/3c0L5Cz>

"Good Guys" Supporting Women in the STEM Workplace

<https://bit.ly/3su1DIV>

Engage with *SWE Magazine* articles



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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.

A Groundswell of Energy

Following the groundswell of energy from SWE's record-breaking WE20 virtual conference, the social media buzz included "afterglow" from the conference, thoughts on the impact of COVID and the difficulties of 2020, plus expressions of hope heading into the new year. The importance of mentoring, with January being Mentoring Month, was prominently featured. Personal stories expressing the value of being a mentor/mentee and news of SWE's mentoring program, including timelines and instructions on how to participate, were part of the mix.

One post from an article, "We Need to Talk About Using Pet Names for Women at Work," originally published in *Fast Company*, generated interesting discussion, with just a few of the many comments shown below.

JAMIE

The male equivalent of girl is boy. Imagine using boy to refer to men in the workplace. Problematic on all levels. Girl is also common in popular culture, so hard to get away from. Being a manager in an industrial plant in the Deep South, my way of encouraging respectful labels was usually to respond with a puzzled look and an "excuse me?" I never had to do that twice. Backing up other women who express discomfort is also important.

JANICE

I called a bunch of my male engineering colleagues at a previous company "boys" once. You would think I insulted their parentage and every-

thing else they held dear; they were so offended. They didn't call me girl after that tho.

MICHELLE

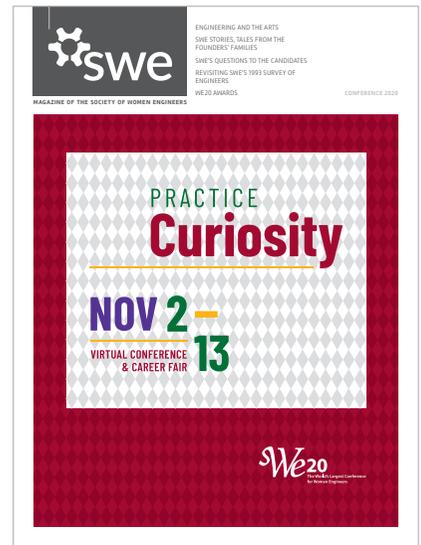
I find "Sweet-heart" very misogynistic.

SHOSHANA

Definitely speak up! If your coworker uses a name or pronoun that makes you uncomfortable, gently correct them 1:1. Some people just need to be broken of habits they won't stop on their own because they don't mean anything bad by it. If it continues and they don't seem like they are trying to be better, call them out publicly "hey, I asked you to call me x instead of y, please try to remember this."

LISA

"Girl" drives me crazy at work when I hear it. And I always remind the person either woman or her name. Say Her Name. ✨



Traditionally, the SWE Forum has provided an opportunity to respond to articles or comment on topical issues. Communications are included on a space-available basis; we reserve the right to edit for clarity or to meet space requirements. All opinions are those of the writer and in no way the responsibility of the Society of Women Engineers or *SWE Magazine*.

Send comments, opinions, or observations to swemag@swe.org or by regular mail to: Letters, *SWE Magazine*, Society of Women Engineers, 130 E. Randolph St., Suite 3500, Chicago, IL 60601.

Yet another way to engage with the material in *SWE* is through the Society's social media — Facebook, Twitter, LinkedIn, and Instagram, as well as the All Together blog.

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Fresh Beginnings



WHILE ONE PERSON
ALONE MAY NOT
SOLVE COMPLEX,
SYSTEMIC ISSUES
SINGLE-HANDEDLY,
THE EFFORTS OF
MANY DETERMINED
INDIVIDUALS
WORKING
TOGETHER CAN
AND WILL. FRESH
BEGINNINGS ARE
INDEED POSSIBLE.

It's customary to make determinations at the start of the year, to move beyond the shortcomings, problems, and issues of the past. But what about matters that are beyond one's personal sphere — how do we change those? An individual's determination may not seem adequate compared with complex problems such as threats to the natural environment, the climate crisis, lack of environmental stewardship, and related issues.

Our cover story, "Women Engineers Work to Restore the Soil, Water, and Skies," looks at the contributions made by women engineers across disciplines to solve these problems head-on. Encompassing bioremediation, civil, and aerospace engineering, these women are making a difference every day, both through their work and outreach efforts to inspire a new generation of potential engineers. While one person alone may not solve complex, systemic issues single-handedly, the efforts of many determined individuals working together can and will. Fresh beginnings are indeed possible.

Another feature, "Judith Resnik's Living Legacy," marks the 35th anniversary of the space shuttle Challenger tragedy. A senior member of SWE, Dr. Resnik was a member of the crew who perished and is memorialized through the SWE scholarship in her name as well as the prestigious Resnik Challenger Medal. We take a look at the contributions being made by some of those scholarship recipients, what receiving the scholarship has meant to them personally and professionally, and the fundraising drive to boost the annual award amount.

Our third feature, "SWE Stories, Tales from the Founders' Families: Focusing on Philadelphia," is the second and final part of our two-part series. To cap SWE's 70th anniversary, we reached out to the known adult children of the founders to find out what it was like to have a mom who was also an engineering pioneer at a time when few women worked outside the home. With Philadelphia and New York being the main locales, we focused on families from each city in separate stories — part one appeared in the Conference 2020 issue.

Our WE20 recap includes remarks from SWE Achievement Award recipient Jayshree Seth, Ph.D., as well as an overview of the event. As our first-ever virtual annual conference, it can't be overstated that planners and participants had many opportunities to "Practice Curiosity," which was the theme of the event as well as for this SWE year. The conference was a record-breaking and highly successful event, despite the challenges presented by the global pandemic. That the conference programming remains available until November 2021 is an added plus.

And please log onto our online edition for digital-only exclusives. To read the news story "Brilliance: An Equal Opportunity Trait" and "Soft Skills Prove Powerful for COVID-era Job Seekers," a complement to this issue's Career Pathways article, plus "Ask Alice," our Q&A column focusing this time on self-care, please visit <https://alltogether.swe.org/swe-magazine/>

Anne M. Perusek

Director of Editorial & Publications
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A CLOSER LOOK AT THE DATA

By Roberta Rincon, Ph.D., SWE Senior Manager of Research

More than 90 countries and economies participate in the Organisation for Economic Co-operation and Development's (OECD) Programme for International Student Assessment (PISA), which measures students' knowledge and skills in reading, mathematics, and science. PISA surveys are administered every three years to 15-year-olds, allowing participating countries to track progress toward key education goals.

One metric of interest to those involved in STEM equity research is the gender differences in mathematics and science performance. Research has shown that the gender gap in achievement in these subjects has narrowed significantly over the years in the United States (Hill, Corbett, and St. Rose 2010). The most recent PISA results, from 2018, show a small, yet significant, gender difference in mathematics performance for U.S. students. These are similar to the differences seen in Brazil and the United Kingdom. Finland and China, however, see the opposite, with girls outperforming boys in those countries. In science, the average gender gap is small, with girls outperforming boys in a number of countries. Figure 1 shows the gender differences in mean PISA scores in mathematics and science (girls–boys) among select countries.

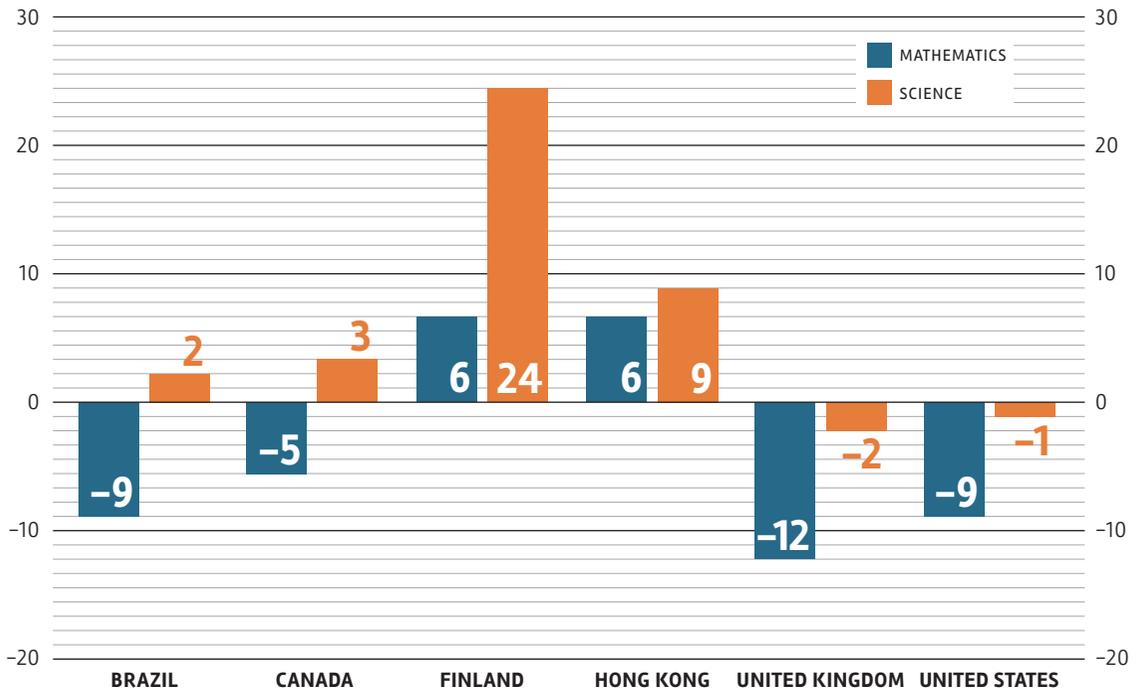
In considering the factors that influence girls' decisions to pursue STEM careers, math and science achievement and confidence are important. Even among students with similar performance results, however, a smaller proportion of girls than boys indicate interest in pursuing certain STEM careers — specifically, careers in engineering and technology. The PISA 2018 results show that girls express more interest than boys in pursuing careers in the health professions. Figure 2 presents select countries from the PISA 2018 report, illustrating the differences in career aspirations across multiple countries, by both gender and geographic region.

PISA 2018 results indicate that girls' interest in pursuing non-health-related careers in STEM is low across OECD countries, with an average of only 7% of girls reporting that they want to work in a science and engineering profession and 1% of girls reporting that they want to work in a technology profession. While small differences in mathematics and science performance exist, these alone cannot explain the large differences observed in STEM career expectations. Societal norms and gender stereotypes also influence students' career expectations and aspirations around the globe (OECD, 2019). Countering these norms and stereotypes by serving as role models, teachers, and mentors is one way women engineers and technologists can encourage more girls to have confidence in their abilities and pursue engineering and technology careers. ✨

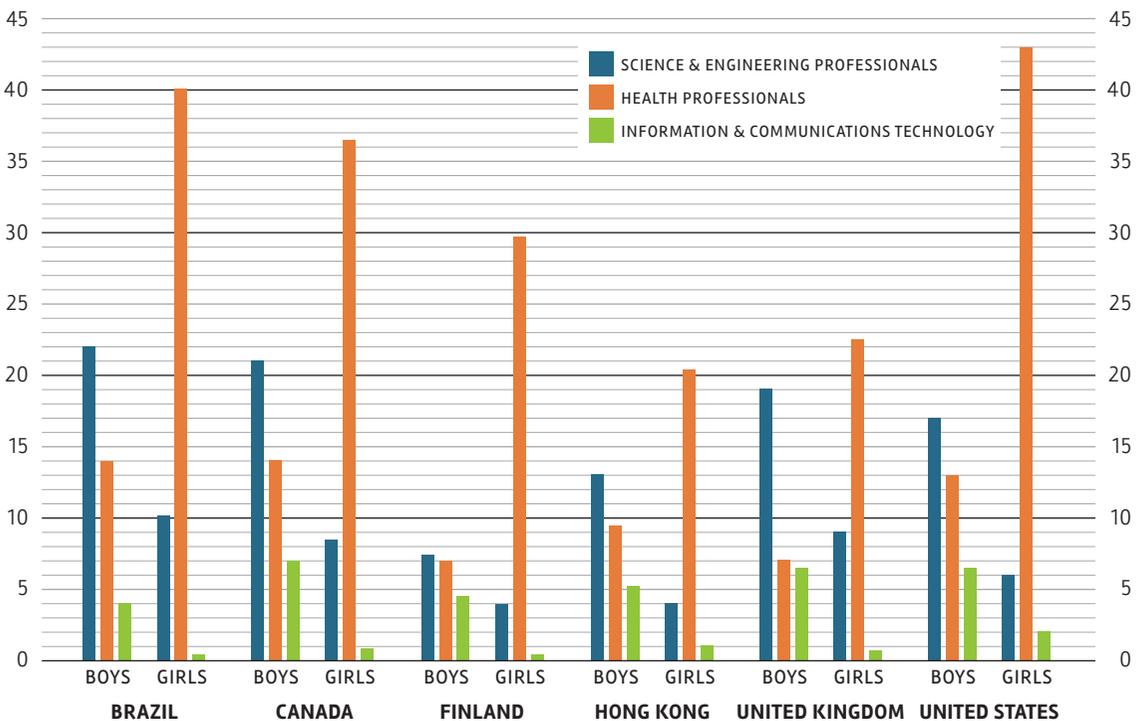
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Hill, C., C. Corbett, and A. St. Rose (2010). *Why So Few? Women in Science, Technology, Engineering, and Mathematics*, AAUW.

OECD (2019). PISA 2018 Results (Volume II): *Where All Students Can Succeed*, PISA, OECD Publishing, Paris, <https://doi.org/10.1787/b5fd1b8f-en>.

FIGURE 1: GENDERED DIFFERENCES IN MEAN SCORES IN MATHEMATICS AND SCIENCE (GIRLS-BOYS)

Source: OECD (2019), Tables II.B1.7.3 and 11.B1.7.5. **NOTE:** In mathematics, all gender differences are significant except Hong Kong. In science, gender differences are significant in Finland and Hong Kong.

FIGURE 2: CAREER EXPECTATIONS IN STEM PROFESSIONS

Source: OECD (2019), Table II.B1.8.19. **NOTE:** Jobs were classified according to the International Standard Classification of Occupations (ISCO-08).

SWE Member Appointed Puerto Rico's First Woman Secretary of Transportation and Public Works

SWE's Eileen M. Vélez-Vega, P.E., assumed her new role Jan. 2, following her appointment by the newly elected governor of Puerto Rico.

By Sandra Guy, SWE Contributor

GOV. PEDRO PIERLUISI'S STAFF



Newly elected Puerto Rican Governor Pedro Pierluisi announces the appointment of Eileen Vélez-Vega, P.E., as Puerto Rico's first female secretary of the Department of Transportation and Public Works. The announcement was made Dec. 7 at the Old San Juan Casino.

SWE board member and Latinos affiliate group sponsor Eileen M. Vélez-Vega, P.E., credits her 20-year involvement with SWE with giving her the confidence and leadership skills that are critical to a new and unexpected phase in her life: becoming Puerto Rico's first female secretary of the Department of Transportation and Public Works (DTOP).

Her appointment by newly elected Puerto Rican Governor Pedro Pierluisi, J.D., of the pro-statehood New Progressive Party, will put Vélez-Vega in charge of her native island's 10 airports, traffic safety, maritime ports, highways and roadways, mass transit systems, and the Department of Motor Vehicles, among others.

"SWE has been so effective in training me as a leader," Vélez-Vega said. "It's a huge part of me becoming a leader — all of the leadership, committee

meetings, and speaking opportunities. That's where I started. The sisterhood and support are here."

Vélez-Vega joined SWE as a student at the University of Puerto Rico at Mayagüez after she and a friend noticed a sign about a SWE meeting, and her friend insisted they attend. She earned her master's in civil engineering from Mississippi State University.

She was named one of SWE's New Faces of Engineering in 2008, and in 2013, she received the SWE Distinguished New Engineer Award, recognizing the first decade of her successful career. She was honored with the 2018 SWE Emerging Leader Award; chartered the first SWE professional section in the state of Mississippi; and served as Southeast Florida Section president, Region D governor, as a Society-level board member, and as sponsor for SWE's Latinos and Global Women Engineers affinity groups.

Due to the demands of her new position, Vélez-Vega has resigned her SWE positions and her private-sector job as vice president at Kimley-Horn, a much-lauded planning and design engineering consulting firm, where she has worked for 15 years, opened and grew the Puerto Rican office, and oversaw aviation and transportation infrastructure projects. As transportation secretary, she will chair multiple boards of directors in addition to her other duties.

Though Vélez-Vega, a civil engineer, didn't seek her new role, she said she's excited to get started overseeing work on desperately needed road repairs, roadway signage, and other infrastructure improvements left to languish more than three years after Hurricane Maria — the strongest storm in nearly 90 years — killed nearly 3,000 and caused \$90 billion

OPINIÓN
Roberto L. Prats Palerm
Gabinete de Eileen: retos de Puerto Rico



FLASH NEWS
John Lennon
A 40 años de su muerte, el legado del legendario genio musical sigue igual de vigente



6/ PUERTO RICO HOY
EL NUEVO DIA
NOMBRAMIENTOS

Una mujer al mando del DTOP

Pierluisi nombra a una ingeniera civil de la empresa privada con vasto bagaje en aviación para hacerse cargo de la sombrilla de Transporte



QUIÉN ES LA NOMINADA
Eileen Vélez-Vega es una ingeniera civil de la empresa privada con un vasto bagaje en aviación. Es la primera mujer en ocupar el cargo de secretaria de la DTOP. Antes de ser nombrada, fue presidenta del Comité de Aviación de la Asociación de Ingenieros Civiles de Puerto Rico y la Asociación Americana de Ingeniería Civil. Se graduó en la Universidad de Puerto Rico y obtuvo un doctorado de la Universidad de Columbia en Nueva York.

VENIR A SERVIR
Eileen Vélez-Vega es una ingeniera civil de la empresa privada con un vasto bagaje en aviación. Es la primera mujer en ocupar el cargo de secretaria de la DTOP. Antes de ser nombrada, fue presidenta del Comité de Aviación de la Asociación de Ingenieros Civiles de Puerto Rico y la Asociación Americana de Ingeniería Civil. Se graduó en la Universidad de Puerto Rico y obtuvo un doctorado de la Universidad de Columbia en Nueva York.

MEJORAN LAS FINANZAS PÚBLICAS

Pierluisi asume un gobierno sin problemas de efectivo

El gobernador electo será el primero, en casi dos décadas, que llega al cargo sin una crisis de liquidez, pues la cuenta principal del Departamento de Hacienda tiene un balance de \$9,405 millones

A pesar del panorama alentador, la mayor parte de los fondos se utilizarán para el pago a los bonistas, según propuesta en el plan de reestructuración, además de las pensiones y otros compromisos fiscales

DEPORTES

Los Mets alcanzan la semifinal del BSN en su primer año de retorno a la liga



PUERTO RICO HOY

La Policía refuerza la estrategia para hacer valer restricciones



PUERTO RICO HOY

Eileen Vélez-Vega: Una mujer a la cabeza del Departamento de Transportación y Obras Públicas



LA CIBRA

DESARROLLO PÚBLICO

El que viene a servir, viene a servir. Al gobierno se viene a servir, no a ganar dinero. Otra cosa es que no favorezca que haya una persona con tres cabezas



DESARROLLO PÚBLICO

El que viene a servir, viene a servir. Al gobierno se viene a servir, no a ganar dinero. Otra cosa es que no favorezca que haya una persona con tres cabezas



The appointment of Eileen Vélez-Vega, P.E., as Puerto Rico's first woman secretary of the Department of Transportation and Public Works made news headlines across the island.

in damage on the island. A big question mark is a backlog in federal disaster aid that's yet to be spent.

At the time of this writing, Vélez-Vega was in the process of making the transition to the new administration. "I'm recruiting my team and going through the transition period with the existing administration," she said. "And I'm looking at the funding that's available. I need a really good team. That's the only way that I have always been able to grow." DTOP employs more than 1,500 and includes five public corporations that employ hundreds more.

Vélez-Vega officially began her new duties Jan. 2 at a COVID-downsized swearing-in ceremony. The Puerto Rico Senate will also hold public confirmation hearings.

A PERSONAL AND INSPIRING JOURNEY

Her transition has proved to be a surprise in deeply personal, poignant, and even serendipitous ways.

It's an inspiring journey for Vélez-Vega's hometown of Sabana Grande, population 23,000, on the western side of the island.

It comes eight-and-a-half years after Vélez-Vega received a stem-cell transplant following her second

bout with Hodgkin lymphoma. She had survived her first Hodgkin lymphoma diagnosis in September 2010 when she was about five months pregnant with her now 9-year-old daughter, Anna Isabelle. She said she quit everything — her work and her extensive networking and leadership positions — for nearly four years to focus on getting well.

"In March 2014, I moved back to Puerto Rico [to start and run Kimley-Horn's office] and that's when I started getting involved again," she said.

Vélez-Vega, whose friends and family call her by her middle name, Marie, said a colleague, an advocate for women in STEM, contacted her to ask if she could put Vélez-Vega's name into a database of candidates for roles in the new administration.

At first, Vélez-Vega said she was extremely hesitant. After all, she's young, a high achiever whose career trajectory seems endless, and, though a voter and respectful of the political system, "not involved in politics."

Her husband, Airangel Berrios, a civil engineer with the U.S. Army Corps of Engineers, initially worried that such a high-profile role would be too stressful and disruptive.

Vélez-Vega also will make financial sacrifices to join the government.

But she recalled with a laugh that her mother reminded her that, when she was younger, Vélez-Vega had declared that, someday, she'd be Puerto Rico's secretary of transportation. "My mom said, 'You put it out in the universe and you got it.' I said, 'Yes, but I was kidding,'" Vélez-Vega said with a laugh.

Indeed, Vélez-Vega and her husband, who met in university and lived in Mississippi and Florida for 11 years while advancing their careers, always knew they wanted to return home to help what others saw as a politically and economically fragile place.

Their families still live in Puerto Rico — Vélez-Vega's parents at the home where she and her brother grew up, and her husband's family in a rural mountain hometown where they run a farm. "Ours are humble families who live the everyday life of working hard, making sacrifices, and making ends meet," Vélez-Vega said. "We were conscious of the struggle people were making every day."

And so they decided Vélez-Vega's chance to lead such a vital government agency was a blessing, she said.

She got the first phone call the weekend after

Thanksgiving to interview for the incoming government's personnel talent database. It was a quick and effective recruiting process. "All the time, I'm thinking, 'This isn't going to be me. They still have other options,'" she said.

Yet she said Gov. Pierluisi has been very encouraging, praised her SWE and other leadership roles, and respected her position that, no matter what political party people belong to, they deserve the best education and transportation systems possible.

The official nomination took place Dec. 7.

How is she coping? She said she "prays a lot"; practices yoga and meditation; enjoys playing with her daughter; and stays in close contact with her family, her friends, her colleagues, and even her former university professors. "Keeping a strong faith will be critical to keeping a sane, clear mind," she said.

And she hopes to be a role model for girls — not only now, but in the future — as the president of SWE someday.

"It would be such an inspiration for young Latinas and girls in Puerto Rico," she said. "I realize that this is a marathon — not a sprint." ✨

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Women See Political Gains in 2020

The 2020 elections saw small but significant steps for women's representation in Congress, in the Republican Party, in diversity — and in the White House.

By Christine Coolick, SWE Contributor

2020's election cycle was one for the history books — from the highest voter turnout in more than a century to a surge in mail-in voting, to the throes of a pandemic, it won't soon be forgotten.

And it was historic as well for the records it set for women's representation in Congress and in the White House.

U.S. congressional representatives elected this cycle include at least 141 women — 105 Democrats and 36 Republicans. This surpasses the previous record of 127, which was set in 2019, according to research by the Center for American Women and Politics (CAWP) at Rutgers University. (At press-time, there were still races with women candidates that hadn't been called.)

Many who track politics wondered whether 2018's record-busting election year was a trend in growth for women's representation in politics, or an anomaly. 2020's results show it's a trend that's continuing, albeit with gains that aren't as substantial.

Much of the surge of elected women came from the Democratic party in 2018, while the Republicans declined in female representatives that cycle — from 23 to just 13 — including only one new woman representative to the House.

This year, more of the growth in women's representation comes from the Republican party, which had a record year for women elected to the House. The Democrats, meanwhile, didn't surpass their 2018 record.

"I'd be cautious to say this was a good year for Republicans all around, but it was a better than expected year for them," said Kelly Dittmar, Ph.D., director of research at CAWP. Pre-election forecasts were wrong, and Republicans won more of the competitive seats they weren't favored to win.

The Republican women officeholders in Congress will still be outnumbered by Democratic women,

and they will still be underrepresented, but their outcome is notable nonetheless for not only making up for their losses from 2018, but also in adding more women overall to their ranks.

In terms of racial and ethnic diversity in the women elected this cycle, at least 51 women of color will serve in the 117th Congress, surpassing the previous record of 48, set in 2019.

A RECORD NUMBER OF WOMEN IN THE HOUSE

To date, 117 women won seats in the U.S. House this cycle: 89 Democrats and 28 Republicans. The previous record of 102 was set in 2019. This also sets a new record for female Republicans in the House, beating 2006's record of 25.

At least 91 women House incumbents won reelection this year. Five women House incumbents — all Democrats and freshman legislators who had flipped their districts in the 2018 midterms — were defeated.

"What we saw in the last two cycles is a large proportion of the women candidates running in especially competitive districts," said Dr. Dittmar, "so it's not shocking that these women elected in 2018 were going to be most vulnerable this year. There's good and bad about having women win in these competitive seats: The gain is you are able to take advantage of these moments. The risk is if they're not in safe seats, there's more vulnerability when we get to the next election."

In the 117th Congress, at least 17 Republican women will join the incoming class of new House members — exceeding 2010's record number of nine and greatly improving their 2018 results. The party's gain of House seats was due in large part to the success of female candidates. And while there's a notion that women in the Republican party tend to be more bipartisan or willing to compromise, Dr. Dittmar notes that is not true this cycle.

91

WOMEN HOUSE INCUMBENTS RE-ELECTED THIS YEAR

“They are all very conservative,” she said. “There’s really not a moderate among them.”

This includes gun-rights advocate Lauren Boebert and Marjorie Taylor Greene, who has been tied to the QAnon conspiracy.

The Democratic party also elected several new members who are far-left-leaning, including Cori Bush, elected from Missouri as the state’s first woman of color and first Black woman in Congress.

“She comes from an explicitly activist background, and you’re going to see that, and you’ve already seen it in her attention to Black Lives Matter. She was really on the front lines in Missouri after Michael Brown’s murder, and so she will bring that perspective for sure,” said Dr. Dittmar.

Washington joins Missouri in sending its first Black woman to Congress with the election of former Tacoma Mayor Marilyn Strickland. And the delegation from New Mexico has been noted as a historic all-women-of-color delegation.

Overall, women of color set a new record in the House, winning 48 seats — beating the previous record of 44.

A SETBACK FOR WOMEN IN THE SENATE

Within the Senate, seven women were elected in 2020: two Democrats and five Republicans. Six were incumbents winning re-election.

And while 18 incumbent women senators did not face re-election in 2020, Kamala Harris’ win as vice president brings that number down to 17. This means the Senate will include 24 women: 16 Democrats and eight Republicans. The record number of women in the Senate was 26, set in 2019. In a January runoff, Sen. Kelly Loeffler, a Republican, lost the seat she was previously appointed to.

None of the women elected to the Senate this year were women of color. The three women of color returning to the Senate — Tammy Duck-

CONGRESSIONAL REPRESENTATIVES ELECTED THIS CYCLE

105 DEMOCRATS
141
36 REPUBLICANS

worth, Ph.D.; Mazie Hirono, J.D.; and Catherine Cortez Masto, J.D. — were not up for re-election this year. And, before her election as vice president, Kamala Harris, J.D., was the only Black woman serving as a U.S. senator.

“It’s striking,” noted Dr. Dittmar, “that we could have one of our top legislative bodies with no Black women in it. Of course, that’s not that odd in U.S. history: Only two Black women have ever served in the Senate.”

WOMEN WON HOUSE SEATS

89 DEMOCRATS
117
28 REPUBLICANS

A SUBSTANTIAL FIRST FOR THE WHITE HOUSE

One of the most notable political stories from 2020 was Kamala Harris’ election as vice president — becoming the first woman, the first South Asian, and the first Black American to serve in the position.

“The same positive effects that we point to when we talk about women’s representation apply here, but at an amplified level,” said Dr. Dittmar. “It creates a sense of possibility, it makes individuals and constituencies perceive the institution as more accessible to them, and it has substantive effects — because you bring to the table somebody who has lived experiences and perspectives that are different than all of the white men who have come before her.”

Dr. Dittmar also notes that Harris is likely to expand representation in the executive branch by hiring a diverse staff.

RACIAL & ETHNIC DIVERSITY INCREASE OF WOMEN OF COLOR ELECTED

51
117TH CONGRESS

48
2019

And Cynthia Richie Terrell, founder and executive director of the organization RepresentWomen (formerly Representation2020), points out another important aspect of Harris' election to office. "Other countries have been shocked that the U.S. has done such a poor job of electing women and people of color. It really undercuts our authority globally when we have such unrepresentative elected bodies. Having a woman in power will not only help in an actual way by bringing more diplomacy and lived experience, but it will also help to set the stage and legitimize women in power in other countries as well."

STILL NOT NEAR PARITY

For the record-setting year that 2020 was, there's still some sobering news. In 2021, women will be about 30% of all statewide elected executive officials, 24% of the Senate, and 26% of the House. Many states have still never had a woman governor, senator, or representative.

"It's been fairly slow and incremental change for women's representation over the decades," said Dr. Dittmar. "Yes, we've made gains and they're not insignificant, but we're still far from parity."

In fact, Terrell breaks down the election results in these terms:

- 97 of the 107 incumbent women running won: a 97% success rate.
- 17 of the 44 women running in open-seat races won: a 39% success rate.
- 171 women — the vast majority of women candidates — ran as challengers. And just 10 won — a 6% success rate.

"A success rate of 6% is not encouraging," said Terrell. "That just isn't an efficient way to get more women in office."

STILL NO PARITY IN 2021

30%
STATEWIDE ELECTED
OFFICIALS

24% **26%**
SENATE HOUSE

The United States' rate of 26% women in the House of Representatives puts it in 70th place globally for percentage of women in its lower house of parliament — in line with such countries as Bulgaria, Iraq, Afghanistan, Kazakhstan, and Mali.

RepresentWomen looks at best practices around the globe for reaching gender parity in elected offices. Beyond simply trying to encourage more women to run, it's identified systemwide changes that might be more efficient in reaching gender parity in U.S. politics.

One notable reform it champions is ranked-choice voting: a departure from the United States' main winner-take-all system that results in plurality winners and split votes among like-minded candidates and like-minded voters. Ranked choice allows voters to rank candidates in order of preference.

Research shows that in ranked-choice voting districts, more women make it through the primaries and then on to run in open seats. Within major U.S. cities that use ranked choice, about half of the mayors and city council representatives are women.

"In terms of changing the voting system, it's probably the quickest way to increase the number of women, the number of people of color, and the number of younger people serving in office," said Terrell. And it's gaining traction: Five states used it in 2020 in their primaries, 19 cities use it nationally, and New York City will be using it for its next primaries. Most noteworthy is the fact that Maine is the first state to adopt ranked-choice voting for all state and federal elections — perhaps a harbinger of more to come. ✨

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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.

ROBOTICS EXPERT NAMED NEW ENGINEERING DEAN



Ayanna Howard

The Ohio State University (OSU) has named accomplished roboticist, entrepreneur, and educator Ayanna Howard, Ph.D., dean of the College of Engineering. Dr. Howard will join OSU March 1 from the Georgia Institute of Technology, where she

is chair of the School of Interactive Computing in the College of Computing, as well as founder and director of the Human-Automation Systems (HumAnS) Lab.

Dr. Howard will be the first woman to lead the OSU College of Engineering.

Her career spans higher education, NASA's Jet Propulsion Laboratory, and the private sector. Dr. Howard is the founder and president of the board of directors of Zyrobotics, a Georgia Tech spin-off company that develops mobile therapy and educational products for children with special needs. Zyrobotics products are based on Dr. Howard's research.

"Dr. Howard is an innovator whose skills and passion are a perfect fit with Ohio State's focus on convergent research and discovery," said President Kristina M. Johnson, Ph.D. "To attract a leader of her caliber shows both the strength of our engineering program and the acceleration of the university's overall research mission."

In addition to her role as dean, Dr. Howard will be a tenured professor in the college's department of electrical and computer engineering with a joint appointment in computer science and engineering.

Dr. Howard earned her bachelor's degree in computer engineering from Brown University, her master's and Ph.D. in electrical engineering from the University of Southern California, and her MBA from Claremont Graduate University.

From 1993 to 2005, she worked at NASA's Jet Pro-

pulsion Laboratory, where she held multiple roles, including senior robotics researcher and deputy manager in the Office of the Chief Scientist.

She joined Georgia Tech in 2005 as an associate professor and the founder of the HumAnS Lab. The lab focuses on humanized intelligence, which uses techniques such as sensing and learning to enhance the autonomous capabilities of robots or other computerized systems.

AISES CONFERS HIGHEST HONOR



OKLAHOMA STATE UNIVERSITY

Cara Cowan Watts

The American Indian Science and Engineering Society (AISES) has named Cara Cowan Watts, Ph.D., the 2020 recipient of its Ely S. Parker Award. Now in its 37th year, the award recognizes an Indigenous professional who has achieved an exceptional

career while supporting education in STEM disciplines.

The Ely S. Parker Award is the highest professional honor bestowed by AISES. Recipients follow the example of Ely S. Parker, a 19th century Seneca Nation chief who broke multiple racial barriers while establishing an enduring legacy that continues to inspire today's Indigenous leaders.

Dr. Cowan Watts is CEO and principal owner of Tulsa Pier Drilling, a privately held small business with operations in Oklahoma and Arkansas. She built the company into an industry leader, and today it is one of the fastest-growing, 100% Native American-owned companies.

A former member of the Cherokee Nation Tribal Council, Dr. Cowan Watts helped start the Cherokee Nation Science and Engineering Fair to boost excitement about STEM. She supported the annual Cherokee Nation STEM summer camp and the Native Explorers program at the University of Oklahoma and was involved in bringing the AISES

National American Indian Science and Engineering Fair to Oklahoma State University. To encourage students' interest in STEM, the Cowan Watts family created an annual Excellence in Engineering Award for students in grades five–12.

Dr. Cowan Watts is a ninth-generation resident of Rogers County, Oklahoma, and a direct descendant of Old Settler Cherokee Chief John Rogers, who lived in the Cooweescoowee District of the Cherokee Nation. In her tenure as a tribal councilwoman, Dr. Cowan Watts made significant contributions to the Cherokee Nation in education, economic development, sustainability, tribal sovereignty, health care, water quality, and water rights.

Currently president of the AISES Oklahoma professional chapter, Dr. Cowan Watts is a lifetime AISES Sequoyah Fellow. She is a member of the Society of Women Engineers, the Tulsa Engineering Foundation, and the American Society of Agricultural and Biological Engineers, among others.

TWO OUTSTANDING RECOGNITIONS



Elsa Reichmanis

Elsa Reichmanis, Ph.D., professor and Carl Robert Anderson Chair in Chemical Engineering at Lehigh University, recently received two major recognitions.

She was elected a fellow by the National Academy of Inventors, a highly prestigious honor recognizing her accomplishments as an academic inventor. The academy acknowledged Dr. Reichmanis as an internationally recognized expert in the field of microlithography who has made wide-ranging contributions in the design and development of polymer/organic materials and processes for advanced electronics and photonics. Her career with AT&T Bell Laboratories (Bell Labs) spanned four decades and resulted in some 20 U.S. patents for innovations that played key roles in the personal computer revolution.

Dr. Reichmanis was also elected a fellow of the American Institute of Chemical Engineers (AIChE) in recognition of significant professional accomplishments and contributions in engineering. Dr. Reichmanis, who is a member

of the National Academy of Engineering, joined the department of chemical and biomolecular engineering in the P.C. Rossin College of Engineering and Applied Science in September 2020. Previously, she was Pete Silas Chair in Chemical Engineering at Georgia Tech.

Her research, at the interface of chemical engineering, chemistry, and materials science, spans fundamental concept to technology development and implementation. In the field of microlithography (which is central to the manufacturing of electronic devices), her work has contributed to the development of a molecular-level understanding of how chemical structure affects materials function, leading to new families of lithographic materials and processes that may enable advanced, very large-scale integration manufacturing.

Dr. Reichmanis started her independent career with Bell Labs, where she was Bell Labs fellow and director of the materials research department.

In 1993, SWE recognized her work with its Achievement Award, the Society's highest honor.

ACCELERATING SCIENCE AND TECHNOLOGY



Lin X. Chen

Two women, Lin X. Chen, Ph.D., and Julie Jastrow, Ph.D., are among five leading researchers from the U.S. Department of Energy's (DOE) Argonne National Laboratory who were recognized as Argonne Distinguished Fellows, the highest professional scientific rank accorded by the laboratory. The new fellows have earned international recognition for their work and demonstrate the type of leadership that enables Argonne to accelerate science and technology for U.S. prosperity and security.



Julie Jastrow

Guy Savard, Ph.D.; Deming Shu, Ph.D.; and Dileep Singh, Ph.D., complete the 2020 class of fellows.

Lin X. Chen, Ph.D., is senior chemist in Argonne's Solar Energy Conversion group, Chemical

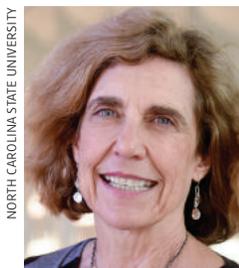
Sciences and Engineering division. She is also a professor of chemistry at Northwestern University. Following her postdoctoral research at the University of California, Berkeley, she joined Argonne as a staff scientist in 1989. While at Argonne, Dr. Chen has conducted pioneering research in X-ray transient absorption spectroscopy and constructed one of the first such facilities at the Advanced Photon Source, a U.S. Department of Energy (DOE) Office of Science user facility at Argonne, to capture short-lived transient molecular structures of photoexcited states. In 2007, she joined Northwestern University as a full professor, where she expanded her overarching research in both institutions. Her research focuses on fundamental light-matter interactions, including excited-state molecular structural dynamics in photocatalytic and photovoltaic processes.

In recent years, Dr. Chen also has led research teams working on understanding the roles of ultrafast and coherent electronic and atomic motions in photochemical reactions, as well as functional structural dynamics of biomacromolecules on multiple spatial and temporal scales. Her main tools for research are ultrafast laser and X-ray spectroscopy/scattering and other property/structural methods in collaborations with theorists and chemists interpreting and making molecules and materials.

Julie Jastrow, Ph.D., is a senior terrestrial ecologist and group leader for the Ecosystem Biogeochemistry group in Argonne's Environmental Science division. She is also a member of the Northwestern Argonne Institute of Science and Engineering and the adjunct graduate faculty in the department of biological sciences at Boise State University. Dr. Jastrow joined Argonne as a scientific assistant in 1975, transitioned to assistant scientist in 1979, and became a senior scientist in 2010.

Her research interests include plant-microbe-soil interactions and the biological and physicochemical factors affecting soil organic matter dynamics, soil structure, terrestrial carbon sequestration, and restoration ecology. Currently, she is investigating the vulnerability of permafrost-region soils to environmental change and the climate adaptation and sustainability of perennial bioenergy feedstocks.

EXTRAORDINARY IMPACT ON ENGINEERING



Frances S. Ligler

NORTH CAROLINA STATE UNIVERSITY

Frances S. Ligler, Ph.D., received the Simon Ramo Founders Award for her research, contributions, and leadership in engineering. She is the Ross Lampe Distinguished Professor of Biomedical Engineering in the joint department of biomedical engineering in

the College of Engineering at North Carolina State University and the School of Medicine and College of Arts and Sciences at the University of North Carolina at Chapel Hill. Conferred by the National Academy of Engineering (NAE), the 2020 award honored Dr. Ligler "for the invention and development of portable optical biosensors, service to the nation and profession, and educating the next, more diverse generation of engineers."

Previously, she worked for the U.S. Naval Research Laboratory for 28 years. She has served on the board of trustees of Furman University and currently serves on the academic advisory board for Plaksha University in India.

Dr. Ligler's current work is in the fields of biosensors, microfluidics, tissue-on-chip, and regenerative medicine. She has also conducted research in biochemistry, immunology, and analytical chemistry. She has more than 400 publications, including 35 U.S. patents and four books, and has served on editorial boards for nine journals. Her inventions have been directly commercialized in 11 biosensor products used in food production plants, clinics in developing countries, pollution cleanup sites, and areas of concern for military and homeland security.

Elected to the NAE in 2005, Dr. Ligler served on the NAE Council from 2014 to 2020. She is a fellow of the American Institute for Medical and Biological Engineering; the American Association for the Advancement of Science; SPIE, the international society for optics and photonics; and the National Academy of Inventors. In 2017, she was inducted into the National Inventors Hall of Fame for her inventions seminal to portable optical biosensors. ✨



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To learn more about Northeastern University's commitment and support of diversity and inclusion, please see northeastern.edu/diversity.

Pushing Forward to Empowerment

Women-owned businesses, whether large or small, have the ability to support and empower other women and marginalized groups. By doing so, these businesses can be part of the movement toward more equitable workplaces.

By Sandra Guy, SWE Contributor

Liz Elting, founder and CEO of the Elizabeth Elting Foundation, based in Manhattan, said a particularly positive aspect of starting one's own company — even if one's entrepreneurship is prompted by a pandemic — is the ability to support and empower women and other marginalized populations. And that's increasingly important as research shows young people are taking on significant caregiving duties that they believe could damage their long-term career opportunities.

An October 2020 report, "Something's Gotta Give," by S&P Global Market Intelligence revealed that:

- 63% of caregivers ages 18 to 24 said they felt their caregiving responsibilities led to their being penalized at work.
- Nearly 75% of caregivers ages 18 to 24 said they were having some or a great deal of difficulty balancing work/life responsibilities because of COVID-19.

The report resulted from a survey of 1,573 people, equally divided between men and women, working at companies with more than 1,000 people that approximated the 500 largest U.S. companies.

So in terms of being a business owner who can hire others and ensure fair work standards, "it's about being the solution instead of waiting for someone else to be," said Elting, who in 1992 started TransPerfect, a language solutions company that grew to be the world's largest. She sold her stake in the company in 2018.

"Jobs are down, and artificial intelligence is going to continue to replace jobs, post-pandemic," said Elting, who cited her recent read of *Ten Lessons for a Post-Pandemic World*, written by CNN host and *Washington Post* columnist Fareed Zakaria, Ph.D., as prescient.

"Women-owned businesses need to make it a priority to recruit and hire women, and help to

make sure they are ensuring equal pay, that women hold senior leadership positions, sit on boards of companies, and, outside of the business itself, focus on people's rights," Elting said. "The ability for women to gain more financial power begets economic power, and that begets political power," she said. "We have to invest in each other."

Elting said it's important to keep top of mind the long-term impact of pushing forward to empowerment. She cited:

- Studies show women are hired and promoted more often when the company leader or owner is a woman.
- Fewer women in the jobs pipeline translates into fewer being hired or promoted. It becomes a vicious circle.
- Fewer women in leadership roles means a lack of role models and reinforces stereotypes of women as primary caregivers.

Women's workplace roles also impact the economy and corporate commitment to diversity:

- The more women and diversity at a company, the higher the firm's return on investment and stock performance.
- The lack of women's financial independence shrinks the consumer spending base and puts more families into poverty.
- Another vicious circle, as fewer female leaders translates into fewer C-suite leaders (CEOs, chief financial officers, chief information officers, chief marketing officers, and chief technology officers) who may prioritize diversity and culturally complex work rules. ✨

For an in-depth look at the keys to advancing a career during the pandemic, please see our Digital Exclusive Career Toolbox, "Soft Skills Prove Powerful for COVID-era Job Seekers" at <https://alltogether.swe.org/swe-magazine/>

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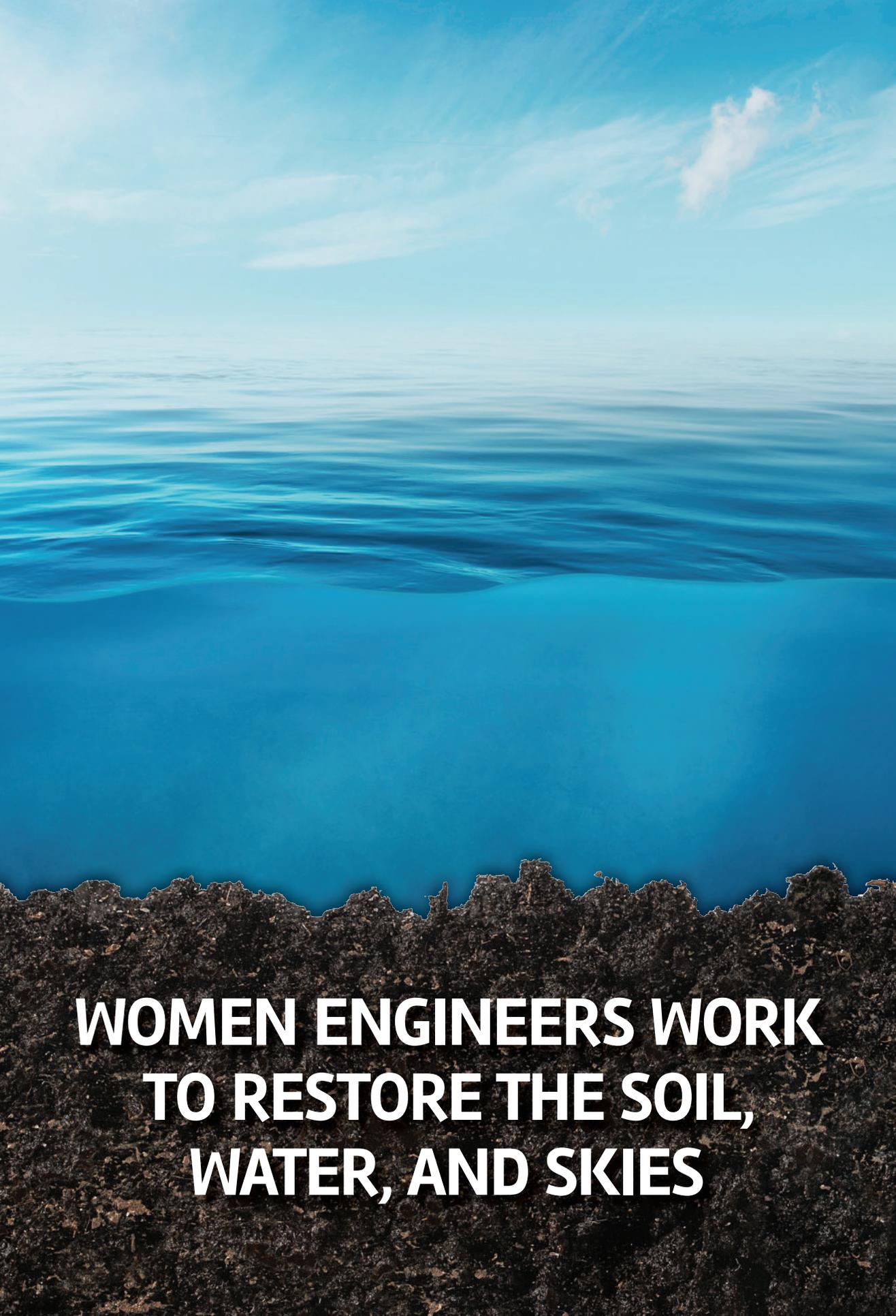
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**WOMEN ENGINEERS WORK
TO RESTORE THE SOIL,
WATER, AND SKIES**

In climate crisis lies the opportunity to heal our damaged environment. Women in bioremediation, civil, and aerospace engineering are up to the challenge, and sparking a new generation's sense of wonder and engagement in what happens next.

By Seabright McCabe, SWE Contributor

Many years ago, a young marine biologist wrote a letter to famed explorer, ocean conservationist, and Renaissance person Jacques Cousteau, asking if she might study with him. He said yes, and she spent a life-changing four months studying the effects of pollution on marine life in the Mediterranean Sea.

Since then, Laurie LaPat-Polasko, Ph.D., has branched into civil and environmental engineering, microbiology, and genetic engineering and has traveled the world, developing sustainable ways to clean up water and soil through microbial bioremediation. Currently vice president and national director of bioremediation for Matrix New World Engineering, she sees the sheer scope of the damage caused by chemical pollution — and offers hope and action to address it.

“To get microbes to biodegrade a contaminant, we need to understand what’s critical to their environment that will let them perform certain metabolic reactions,” Dr. LaPat-Polasko said. “Biochemistry and enzymes decide whether something can be biodegraded. But a lot of contaminated sites lack some of the major nutrients that allow bacteria to biodegrade substances. Just like we need nitrogen and phosphorus to make our ATP enzymes, bacteria need the same key nutrients.

“Now we have the tools to find very specific microbes that we know have the enzyme that biodegrades a certain contaminant, be it plastics or something else, and then we can look for that gene. So when we have the gene and the enzyme that codes it, we can take samples and see if that gene is present in the soil population.”

Dr. LaPat-Polasko pointed out the exponential growth of knowledge in the decades since her early experience with the Exxon Valdez oil spill. “It’s just like how DNA research and CRISPR revolutionized genetics,” she said. “Now we can actually engineer microbes to make them work faster and better.

My daughter’s doing her Ph.D. in environmental engineering, and now she’s taking a microbe that degrades one contaminant, then splicing in a gene from another microbe so it can biodegrade *two* contaminants. Super cool! If you like puzzles, this is one of the best in the world.”

CLEANUP TIME

Since the COVID-19 pandemic began, consumption of single-use plastics has increased by 250–300% in the U.S. alone, according to the International Solid Waste Association, adding to the mountains already choking landfills and waterways. The chemical compounds used to make plastic bags, Styrofoam, and bottles have deeply infiltrated our water and soil, even our bodies, for decades and they include polycyclic aromatic hydrocarbons (PAHs).

Dr. LaPat-Polasko described the PAH bioremediation of a coal gasification manufacturing plant’s contaminated site. She and her team collected soil samples and identified microorganisms in the native environment that might biodegrade the contaminants.

“Often, contaminants might not be readily used by the native microbial population, or there’s too few microbes there to make a difference,” she said. “At that site, we started applying a little bit of soybean oil surfactant to make the contaminant more bioavailable. Soybean oil also provides an easy-to-degrade carbon source that quickly increases the microbial population. As the oil starts to dissipate, some of those microbes start hunting for other carbon sources in the environment. And that’s when they go after the PAHs.”

The third phase of the PAH cleanup involved a 16-plot field-scale bioremediation system, which reduced total PAHs by 80% in only 16 weeks. Can this method be scaled up to Superfund-level sites? “It will be,” she said.

MORE MIGHTY MICROBES

Stanford and other universities are looking at ways to biodegrade plastics, and many of them are investigating microbes, even fungi. “Fungus has powerful enzymes,” Dr. LaPat-Polasko said. “If you put a Styrofoam cup in soil and cover it with fungus, it’ll slowly degrade over time. What’s quicker is solubilizing the cup to its chemical elements, until it’s kind of a liquid form that’s more accessible to microbial populations.”

While studying at Stanford University, Dr. LaPat-Polasko isolated a bacteria that degrades methylene chloride, a carcinogen in drinking water. “I thought that was the coolest thing in the world,” she said. “But I wanted to make the microbe work better and faster, which led to a Ph.D. in microbiology and genetic engineering.”

For 25 years, Dr. LaPat-Polasko, who received SWE’s Prism Award in 2020, has spent 90% of her time designing bioremediation systems for soil and water, including projects in Brazil, Australia, and Europe, for many types of chemical contaminants. One dangerous group, perfluorinated compounds (PFACs), has captured her attention, and she’s working with a number of universities to find microbes to biodegrade them.

Her overarching goal is to clean up sites as quickly as possible with sustainable and green

remediation. “For 40 or 50 years, we’ve been pumping out tons of groundwater for pump-and-treat systems, which really takes a lot of energy,” she said. “Often, it was just taking the contaminant out of the water and transferring it to activated carbon. Then it would regenerate or be sent to a landfill, and those are not sustainable approaches.

“As time goes on, we’ve realized that bacteria, fungus, and microbes have a lot more power than we knew. We’re getting much better at harnessing their abilities. Everybody said we could never degrade PFACs. They said the same thing 30 years ago about chlorinated solvents, and now I do *in situ* bioremediation of trichloroethylene all the time. Over time, we’re getting better and smarter.”

MANAGING POLLUTION FROM INCREASING STORMS

Mary Steblein, P.E., of LaBella Associates, is a project manager and senior civil engineer intent on environmental health. “In high school, I joined a health, safety, and environment program run by Eastman Kodak. We toured their wastewater treatment plant, and it really opened my eyes to how engineers help control pollution and assist the environment. Right then, I committed to ensuring the environment doesn’t get any more damaged than it needs to be by our existence on this planet.”

Nourishing Next-Gen Curiosity

“The take-home message no matter what age kids I work with, is that anything’s possible. You just have to be willing to put yourself out there,” said Laurie LaPat-Polasko, Ph.D., vice president and national director of bioremediation, Matrix New World Engineering, describing one of her most effective outreach exercises for first grade through graduate students.

“For kids to appreciate and understand environmental pollution, they need to get their hands dirty. So I bring a blowup swimming pool, cooking oil and food colorings, and a lot of different equipment — [personal protective equipment], hard hats, suits, gloves, and respirators. I start by telling them that we’re all ‘doctors of the environment.’ And we’re going to clean up a gulf oil spill.”

She brings equipment, such as turkey basters, sponges, and absorbent materials, then splits the students into teams to figure out the cleanup. “Before they start, I talk about different ways to do it — the turkey baster represents big trucks that vacuum up as much contamination as they can,” Dr. LaPat-Polasko said. “Kids of all ages try to suck up this cooking oil with turkey basters, and it’s hilarious. I also bring long sponges, like the booms we use to contain surface spills. Then I ask for their ideas: ‘What else do you think we can use?’ Their creativity and ingenuity is amazing.”

A SWE member for more than 20 years, Mary Steblein, P.E., is actively involved in the Rochester Section. Her outreach through SWE includes “tool clues” badge workshops where engineers show kids the tools they use, and they try to guess the engineer’s job. “I show

Today, Steblein's work revolves around another problem complicated by climate change: more precipitation that starts out relatively clean and gets polluted as it hits the ground. "Stormwater is basically any runoff that doesn't get a chance to soak into natural materials, such as a wooded area or a lawn," she said. "It's generally flowing over impermeable surfaces, so any time you build a new parking lot or a new building or even a new driveway, water has to roll off it and go into some sort of receptacle."

Runoff picks up pollutants along the way — phosphorus and nitrogen from pesticides and fertilizers, bacteria, oil and waste materials from cars sitting on parking lots, plus sediment from construction sites, and litter.

"Stormwater conveys all these materials into rivers, streams, and lakes, unlike wastewater from homes, which goes to a treatment plant," Steblein, a certified professional in erosion and sediment control, said. "We do everything possible to provide treatment whenever we have new development, to try to keep those pollutants out of our waterways."

With more frequent, intense, and potentially higher-saturation storms, current infrastructure can be overwhelmed. "Our regulatory framework is taking this into consideration," Steblein said. "For example, here in New York, we reference Cornell

University's extreme precipitation website. When we're designing, we look at numbers for more recent rainfall and plan for the way storms are changing."

GREEN INFRASTRUCTURE

Thermal pollution also impacts stormwater. Warmer temperatures make impermeable surfaces such as pavement and cement hotter. Runoff absorbs some of that heat as it travels, transferring it to streams and lakes. There, it affects wildlife, adding more nutrients to those already present, and upsetting delicate ecosystems. Red tides and toxic algae blooms are prime examples.

"There are two different ways to approach this," Steblein said. "Most of my job lately focuses on regulation compliance when new development or redevelopment is under construction. In New York, we follow the EPA standards, so we design to a menu of practices."

In recent years, this menu has begun to include "green infrastructure" practices that help treat stormwater right at the source. "If you treat at the source, you're not piping it hundreds of feet to a retention pond to keep it from blowing things out downstream," Steblein said. "Green infrastructure uses soil and filtration to clean stormwater, letting it recharge the groundwater instead of running off. It helps keep the base flow in streams where

them my plans, engineer's scale, and hard hat, things I might need on a typical day," said Steblein, a project manager and senior civil engineer with LaBella Associates. "It wasn't until I got into the working world that I ever saw a set of engineer's plans. Early exposure is really important; kids need to see the tools of work."

Steblein has been counselor for the Rochester Institute of Technology's SWE section since 2003. She also keeps in touch with university students through SWE. "I want to make sure they know it's an option for them after college."

The higher she flies in aerospace engineering, the more Riona Armesmith, chief project engineer, hybrid-electric propulsion for Rolls-Royce, thinks about the next generation. "When I was more junior, I did a lot of engi-

neering education outreach, going into pre-university schools to get girls interested. There was a young girl back then who got a job at Rolls-Royce without knowing I worked there. When we met again, she said I was the reason she went into engineering, and that — it was the best feeling, to be honest."

Currently, Armesmith mentors young engineers who reach out online and early career women at Rolls-Royce. "I didn't really have any role models when I was younger. But I did have a woman physics teacher, who took me to a Women in Engineering event, where women from the Royal Air Force, and one from Goodyear, spoke. They made it sound so exciting, I knew engineering was what I wanted to do. Remembering that impact, I want to go back and do that for others — girls of all ages."

MATRIX NEW WORLD ENGINEERING



Laurie LaPat-Polasko, Ph.D., mixes carbon and nutrient sources to stimulate native and non-native bacteria for *in situ* bioremediation of a contaminated site.



AIRINSIGHT

Riona Armesmith, chief project engineer and head of aviation futures, Rolls-Royce

it should be, so that you're not seeing the effect of development further downstream."

Rain gardens such as the ones at private homes and properties, only scaled up for larger developments, such as residential complexes and mall parking lots, also have a role. Rain gardens are simple-to-maintain, planted areas where stormwater collects and soaks into the soil, helping clean and keep it where it falls.

"Constructed wetlands are another green infrastructure practice we are involved with, and engineers have a prescribed way of constructing and designing them that is proven to provide stormwater treatment," Steblein said.

"Our understanding of stormwater is evolving, and regulations are doing their best to keep up, but it also means that everyone else — town planners and boards, engineers that design and review the plans — has to get up to speed," she added. "The process doesn't move very fast, but it's continuously moving in the right direction."

HYBRID ELECTRIC PROPULSION FOR CLEARER SKIES

Riona Armesmith, chief project engineer, hybrid-electric propulsion, for Rolls-Royce, and who also

leads the company's new department, aviation futures, thoroughly enjoys her job. "This slightly expanded role reflects a range of technologies and more and more exciting potential for aerospace," she said. "Recently I've led the E-Fan X hybrid-electric propulsion project, which is now called Power Generation System 1 (PGS1). We're continuing development of all the technology for making hybrid electric propulsion work."

Rolls-Royce was in the final stages of constructing a new test bed facility for determining its hybrid-electric engine capabilities when the pandemic hit, further complicating the ability of a global team split across the U.K., Norway, and the U.S. to deliver a novel propulsion system without in-person contact. "COVID has pushed us further into agile work methods, something we'd already been moving toward. In some ways, we found that it's easier to work globally from home, and things like conference calls become a more level conversation. Agile development has been good for our complex engineering R&D."

It takes a lot of power to lift an aircraft into the sky, much more than to keep it there. In U.K. terms, each PGS1 2.5 MW engine can generate enough electricity to power 2,500 homes. And all that power poses some major challenges.

"The biggest challenge for any form of electric or hybrid-electric propulsion in aerospace is the weight of the energy storage," Armesmith said. "Whether it's batteries or another storage device, like hydrogen fuel cells, the system's weight is



SWE life member Mary Steblein, P.E. (right), speaks at a Cool Women, Hot Jobs program at the Young Women’s College Prep Charter School of Rochester, New York.



The PGS 1 team

ROLLS-ROYCE

heavier than jet fuel by orders of magnitude. The automotive market faces this too, but less so, since they’re not trying to get a car to lift off the ground.”

Whatever type of hybrid system emerges, there will be compromises. Simply retrofitting today’s aircraft means either carrying fewer passengers or carrying less fuel and losing range. What kind of compromise is economically viable when aircraft companies are already struggling?

Heat-generation management is another big challenge. “Obviously, you’re designing the electrical systems, motors, generators, cables to be as lightweight and efficient as possible,” Armesmith said. “At the megawatt scale, losing just a few percentage points of efficiency means quite a lot of heat to take out. With electrical systems, that heat can’t be very hot, unlike turbines, where the heat out is enormous. Especially in power electronics, there are real stop points to stay under; otherwise, you’ll destroy that device.”

Not exceeding those limits will be difficult, especially in a warming climate. “If it’s a very hot day on the ground and you’re putting heat out over a heat exchanger, you’re just exchanging it with more heat, and it’s harder to get off the ground,” Armesmith said. “We’re working on truly novel thermal management in order to deal with those issues.”

POISED ON THE EDGE OF POSSIBILITY

Armesmith and the PGS1 team are at a point where motors, generators, and electronics have

reached an exciting phase of the test work. “This is where we really find out if a 2.5 MW, 16,000 rpm, very-high efficiency electrical machine for aerospace is possible, or if we need to go back to the drawing board and find what we missed. Once it’s proven, the electrical system will be placed on an engine in the test facility for the first time. There’s no previous data to validate the computer models — we have to see if our models actually work.”

If they do, the next conversations will be about what level of aircraft modification can be negotiated. “Will companies retrofit for a novel propulsion system?” Armesmith wondered. “Do you change the wing, try to remove some of the existing hydraulic systems on board, and integrate the electrical network of the aircraft and the propulsion system electrical network, or will it be based on archetypes — already knowing the relative risks and trade-offs? There are economic factors to balance with the needs of society, going forward. And — as with everything aerospace, when you radically change the aircraft and propulsion system — it must be proven safe.”

Armesmith also sees potential for hydrogen-based and hybrid-electric with hydrogen propulsion being developed simultaneously. “It’s going to be interesting to see how that plays out,” she said. “I don’t see why you couldn’t hybridize hydrogen gas turbines, either. There are many technical challenges around hydrogen and hybrid electric, but one of the biggest is producing enough green hydrogen, sustainably.

“But there could be a very interesting technological leap forward if these issues can be solved.” ✨

Judith Resnik's Living Legacy

Shortly after liftoff on Jan. 28, 1986, an explosion tore apart the Challenger space shuttle, killing Judith Resnik, Ph.D., and her six shuttle crewmates. Now, 35 years later, Dr. Resnik's legacy lives on within SWE, through the lives of the recipients of the scholarship that bears her name.

By Jon Reisfeld, SWE Contributor



Ten days before the Challenger disaster, Judith Resnik, Ph.D., took time out from a hectic, pre-launch work schedule to write a brief, handwritten note of encouragement to a NASA colleague's young niece. She ended the note with

the following advice: "Study hard in school — it's really worth it! When you're older, you'll be able to do anything you want if you get a good education."

Dr. Resnik loved learning, both the indirect kind available through books and formal classroom instruction and the direct kind that can be acquired only through firsthand experience. She pursued both with dedication and conviction.

"She always did her homework," her father, Marvin Resnik, O.D., an optometrist, once told a reporter. "[Judy would say] the luckiest people are the ones who work the hardest. The director of NASA said that Judy was an astronaut's astronaut. She did everything right."

Bright, highly competitive, and disciplined, Dr. Resnik demanded excellence in everything she did. In school, she excelled in math, chemistry, French, and classical piano — which she studied and performed with great intensity. She graduated first in her class at Firestone High School in Akron, Ohio, and she received early acceptance to The Juilliard School, where she had planned to train for a career as a classical pianist.

Those plans changed abruptly when Dr. Resnik scored an 800 on the math portion of her college

SATs. She was the only female U.S. high school student that year to achieve a perfect score — and only the 16th young woman ever to do so. The test results clearly showed that Dr. Resnik's math aptitude — and potential — far exceeded her other formidable skills, even her talent at the piano.

With that in mind, Dr. Resnik enrolled in Carnegie Tech (now Carnegie Mellon University) in Pittsburgh, where she pursued a B.S. degree in mathematics. She later switched her major to electrical engineering when she found she preferred its less theoretical approach to problem-solving.

Dr. Resnik loved to pursue new challenges, something her mentor at Carnegie Tech, Angel Jordan, Ph.D., later said had motivated her to apply for, and ultimately join, the NASA Astronaut Corps.

In her pursuit of excellence, Dr. Resnik acquired both a master's and a Ph.D. in electrical engineering from the University of Maryland — expertise that later caught the eyes of NASA recruiters. Those advanced degrees helped Dr. Resnik reach low-earth orbit as America's second woman in space and as a highly respected member of NASA's shuttle team.

Since the accident, Dr. Resnik's love of education has been memorialized through more than 20 academic scholarships. Her namesakes now include several public schools, a university dormitory, a sculpture garden, a star, a crater on the far side of the moon and another on Venus, an IEEE award, and SWE's prestigious Resnik Challenger Medal. In 1998, she also was memorialized in the play "Reach for the Stars." Inspired by her life events, the play was performed throughout the Cleveland metropolitan area.

SWE's Judith Resnik Memorial Scholarship, established in 1990, has helped dozens of remarkable, young SWE members reach for the stars in their own lives, as they have pursued undergraduate degrees in aerospace and astronautical engineering. Many of them identify closely with, and admire, Dr. Resnik, who was an active senior member of SWE. And each, in her own way, embodies some of Dr. Resnik's most admirable traits.

FAILURE IS NOT AN OPTION

In 2011, toward the end of her senior year at Arizona State University (ASU), Alison Gibson realized that she had picked the wrong major. Cognitive psychology, with a focus on neuroscience, had been interesting but it wasn't aerospace engineering, the degree she had intended to pursue all along. She still hoped it would give her entrée to the space industry — and a shot at her lifelong dream of becoming an astronaut. It was a dream she gradually realized she wasn't ready to abandon.

Convinced that she could defeat the self-doubt that had derailed her plans the first time around, Gibson decided to do what most people would have considered unthinkable: She immediately enrolled as a first-year student in ASU's aerospace engineering program and began to pursue a second four-year undergraduate degree. Only this time, the odds clearly would be stacked against her.

Gibson had used up the full-ride academic scholarship Arizona had given her as a high-achieving, first-time, in-state student, and that meant she would now have to work her way through school while attempting to master aerospace engineering's far-more-demanding course work. "It was kind of crazy," Gibson acknowledged, in retrospect.

Nevertheless, she began working two research jobs and threw herself into her studies. To her surprise, Gibson discovered she could handle the work. She would ultimately graduate, in 2015, *summa cum laude*, with a 3.93 GPA. "I ended up ... feeling that it was a good fit for me," she explained. "I kind of thrived in that program."

Toward the end of her sophomore year, Gibson, who was then a SWE professional member, applied for the Judith Resnik Memorial Scholarship. She knew about Dr. Resnik's life and accomplishments and thought of her as a role model.



Alison Gibson, foreground, experienced weightlessness for the first time, in 2014, while doing undergraduate research aboard NASA's Zero-G plane. Astronaut Nicole Stott is behind her.

SWE awarded Gibson the scholarship at the start of her junior year. The financial aid and its attachment to the Resnik legacy made a huge impact on her personally, academically, and, ultimately, in her career. "The Judith Resnik Scholarship certainly made me feel like my dreams [of becoming an astronaut] were possible and inspired me to keep that vision clear," Gibson said. "And the fact that a group of people — the SWE scholarship committee — could see my passion on paper and believed I had potential was incredibly validating."

The financial aid, she said, helped make her a better engineer. "It profoundly impacted my development as an engineer by allowing me to apply classroom theory to hands-on projects. I believe that this additional research/project experience further refined my understanding of engineering concepts and made me a much stronger candidate for graduate school."

Gibson credits that extra hands-on experience, and the "big-picture understanding of engineering" that came with it, for helping her land two important avionics summer internships with SpaceX. Later, those internships and separate engineering research papers she had published while attending ASU helped Gibson qualify for graduate work in



Sara Miller stands in front of a massive Space Shuttle-Centaur G-Prime upper stage rocket on display at NASA's Glenn Research Center, where she interned 2016-2020.

Their parents dubbed their shared obsession “The Miller Family Space Race,” and nudged their kids’ dream along — with frequent visits to the San Diego Air and Space Museum and lots of space- and astronaut-themed birthday parties. The Miller children also slept under bedroom ceilings aglow with their mother’s hand-painted planets and stars.

“My parents really encouraged our shared interest,” Miller recalled, “and we just never gave it up” — although Miller did come dangerously close to abandoning

her dream early in her senior year at the Georgia Institute of Technology.

the Massachusetts Institute of Technology’s Man Vehicle Laboratory (renamed the Human Systems Laboratory in 2018), which focused exclusively on human spaceflight research. That opportunity, in turn, helped her obtain a permanent position at SpaceX after she graduated.

Today, Gibson works as a guidance, navigation, and control engineer for the SpaceX Crew Dragon spaceship program, where she helps develop software that controls the fully autonomous vehicle. Last May, when Crew Dragon delivered two NASA astronauts to the International Space Station (ISS) for the first time, demonstrating the vehicle’s ability to successfully take humans into low-earth orbit, Gibson was seated in Mission Control, where she served as the flight’s navigation officer.

“It was super exciting,” she said. “Ten years ago, if someone had told me this is where I’d be, I would have been very surprised — but also very impressed and excited.”

Gibson still has dreams of becoming an astronaut. “I would love to go to the moon. I think that would be an epic adventure,” she said.

STAYING THE COURSE

Since they were kids in rural southern California, Sara Miller and her older brother, Matt, dreamed of someday becoming astronauts and exploring space together.

Miller had been pursuing the academically intense, mission-specialist route to the astronaut corps pioneered by some of her favorite women astronauts: Sally Ride, Dr. Resnik, and Shannon Walker. All three women had completed Ph.D.’s in their respective areas of study — at a time when NASA’s educational requirements stopped at the undergraduate level.

Then, Miller received an offer of future employment from NASA’s Glenn Research Center in Cleveland, where she had completed several internships. The job would require her to help astronauts aboard the ISS configure solar arrays to power microgravity experiments. Miller received the offer early in her senior year, and if she accepted it would have reported for work after graduation.

Miller recalls being thrilled at the prospect of working there. “Earning a real paycheck,” she said, “ditching the late nights studying for midterms, and working with the astronauts aboard the ISS, was a tempting proposition, to say the least.”

She also was feeling run down from the effort it took to graduate with honors in Georgia Tech’s aerospace, aeronautical, and astronautical engineering program. “It was hard,” she recalled, “and I wasn’t sure, at the time, that I wanted to sign up for years more of it.”

As she contemplated her next move, Miller learned that she had received SWE's Judith Resnik Memorial Scholarship — an award with a direct connection to the one job that, she said, “still appealed to me more than any other: becoming an astronaut.”

Like Drs. Resnik, Ride, and Walker before her, Miller ultimately decided to stick with her original plan. She enrolled in graduate school at Georgia Tech, earned a master's in aerospace engineering, and is now less than two years away from completing her Ph.D. in planetary science and aerospace engineering as a National Science Foundation (NSF) fellow.

In graduate school, Miller experienced numerous successes. In 2018, the American Institute of Aeronautics and Astronautics (AIAA) gave her its “best student paper award” for work she submitted to its Propulsion and Energy Forum. The next year, she applied for and received an NSF fellowship — the most competitive fellowship in STEM — to fund her Ph.D. research into the fluid dynamics of the global ocean on Jupiter's moon, Europa. Then, in 2020, Georgia Tech's aerospace engineering department honored Miller with its Outstanding Graduate Teaching Assistant Award, and the *Journal of Spacecraft and Rockets* agreed to publish her paper on optimal mission uses for competing types of small satellite electric propulsion systems.

“None of these accomplishments would have been possible if I had not made the decision to start graduate school,” Miller explained. “I am extremely grateful for the impact that the Judith Resnik Memorial Scholarship has had on my educational journey.”

Miller still hopes she'll have the opportunity to travel to Mars and beyond as a NASA astronaut. “I would go in a heartbeat, if someone offered me a seat,” she said, “but it's no longer the only thing that would make me really fulfilled with my career.”

GETTING THERE

On paper, Melissa Pardo, a 25-year-old dynamics and controls engineer with San Jose, California-based Maxar Technologies, couldn't have looked less like a future candidate for an engineering degree. When she arrived in the U.S. in 2012, Pardo,

a native of Colombia, was a 17-year-old girl from a highly traditional Latin American background. In other words, in her family culture, girls with an interest in aviation became flight attendants, which her mother had initially suggested she do. They did not aspire to become commercial airline pilots or to pursue technical degrees of any sort. That was men's work.

Pardo spoke broken English, had an unremarkable high school transcript, and an unrecognized Colombian high school diploma. She and her mother and her two younger sisters lived with their new American stepdad in his hometown of Oologah, Oklahoma, a tiny hamlet of fewer than 1,200 people.



Two-time Judith Resnik scholarship recipient Tianna Stefano readies the sustainer (upper) stage of her senior design team's smart, two-stage, carbon-composite rocket to receive its solid-fuel rocket motor. The ambitious year-long engineering design-build project, which Stefano led and which featured additive manufacturing processes, took first place in the University of Arizona's 2014 Engineering College Design Day competition. Stefano credits the financial aid she received from the Resnik scholarships with freeing up her time to pursue such extracurricular activities. She said the positive recognition she received for winning the national scholarship “boosted my self-confidence and self-worth immensely and acted as a springboard to encourage me to take on more challenges.” Afterward, Stefano went on to graduate magna cum laude and to be named “Outstanding Aerospace Engineering Senior” for both her demonstrated work ethic and for the substantial contributions she made to her research and design projects.

Her academic credentials were limited. Colombia high schools stopped at the 11th grade, so Pardo had to attend free GED-prep classes at the local community college to fill in gaps in her education before taking the test. She passed it the first time. The idea that she could be just a few years away from graduating from San José State University with a 3.93 GPA in aerospace, aeronautical, and astronautical engineering — or that she could somehow acquire the financial wherewithal to help pay her own way through undergraduate school — seemed far-fetched, if not bordering on fanciful.

Yet, shortly after she arrived in Oologah, Pardo told her mother that she had decided to get a job and to pay her own way through university. In January of 2013, at age 18, she took her \$700 in savings, packed her belongings into her small car, and took off for California.

Heading for San José, Pardo hoped she could find work in a Hispanic retail store where her broken English might prove to be less of an issue. She rented a tiny, furnished room, talked her way into a sales job at a Hispanic furniture store and obtained a second job as a weekend photographer.

SWE Fundraising Drive Targets Judith Resnik Memorial Scholarship

Since SWE established the Judith Resnik Memorial Scholarship in 1990, the amount of its annual award has quadrupled, from \$1,000 to \$4,000. Yet, college tuition costs have risen far faster — by a staggering 5.41 times, on average, according to data compiled by the U.S. Bureau of Labor Statistics.

Consequently, the Resnik scholarship has lost about a third of its original value. To help reclaim some of that loss, SWE's board of trustees has launched a fundraising drive with an immediate goal of increasing the scholarship's annual award amount "to at least \$5,000."

The drive is part of a larger, general effort to reinvigorate SWE scholarship endowments across the board, said SWE board of trustees member Paula McDonald, who is spearheading the drive. "As the costs of education continue to rise," she explained, "we want to make all of our scholarships as impactful as possible." SWE currently awards hundreds of academic scholarships each year, she said, the vast majority of which are in the \$1,000 range.

The board of trustees announced the Resnik scholarship fundraising effort in November, during SWE's virtual WE20 conference. The drive honors this year's 35th anniversary of the Challenger disaster, which occurred on Jan. 28, 1986.

In an open letter in the 2020 conference issue of *SWE Magazine*, McDonald outlined the special significance the Challenger disaster holds for SWE members and for women engineers in general. "While tragic," she wrote,

"the Challenger mission was particularly inspiring to a generation of children who went on to pursue thriving careers in STEM fields, including myself!"

The Judith Resnik Memorial Scholarship gives a one-time \$4,000 award to any current SWE member, who is a student pursuing an undergraduate degree in either aerospace or astronautical engineering. Applicants are eligible only during their sophomore, junior, or senior years of college.

It takes a \$25,000 endowment to support an annually recurring \$1,000 scholarship. In the past, McDonald said, that figure may have discouraged SWE members from donating to scholarships, because they feared they would be asked to make large-dollar donations. That, McDonald stressed, is not the case.

"This appeal is not limited to major donors," she explained. "It's open to everyone. You can donate \$50; you can donate \$5 to the endowment. We welcome participation at all levels of giving."

Those interested in donating to the Judith Resnik Memorial Scholarship can do so online at www.swe.org/scholarships. Under "Donate" and "Select Funds" choose the Judith Resnik scholarship, indicate your desired donation amount, and then complete the pay-by-credit-card form.

SWE also accepts checks made payable to, "The Society of Women Engineers Endowment Fund Inc." Please mail them to: SWE Endowment Fund Inc., 500 Westover Drive, #15679, Sanford, NC 27330.

Eight months later, in the fall of 2013, Pardo paid nearly \$4,000 to cover her first-semester's tuition as an out-of-state first-year student at Cabrillo Community College in Santa Cruz. It took Pardo four years to complete her first and sophomore years while honing her language skills on the side. By the end of her first year, Pardo had traded her off-campus furniture store job for a position as a teacher's assistant in a materials lab class.

She also had become a fixture at the college's MESA (Mathematics, Engineering, Science Achievement) Center, a resource and support community for minority students pursuing STEM degrees. Later, professors there encouraged her to consider aerospace and aviation engineering. As she often did, Pardo researched the topics online. When she realized both areas applied to NASA engineers, she got excited. "I thought, this sounds interesting," she recalled. "I'm just going to do it."

"I never gave myself the opportunity to think about whether it was too hard or not. I simply went for it. Every class that I passed, every good grade that I got, gave me confidence to keep going. When I didn't do so well," she said, "I would feel devastated, but [thinking about] my four siblings gave me the strength and motivation to keep going."

By the end of her second year at Cabrillo, Pardo's engagement had so impressed the MESA Center faculty members that they recommended her for a STEM Level I Scholarship — worth almost \$7,000 — enough to take considerable financial pressure off her during her final semesters at the community college. All she had to do was to keep her GPA above 3.0 and take part in five extracurricular activities.

In 2018, San José State University took notice of Pardo's GPA and heavy involvement in student activities and offered her a full scholarship, which she said covered "almost everything." She transferred there and joined the school's SWE section. While checking out the SWE website, she came across its



Melissa Pardo working from home for Maxar Technologies, where she is a dynamics and controls engineer.

academic scholarships and applied for two, one of which was the Resnik scholarship. She won both and used them to help cover her room, board, and other school expenses.

The Resnik scholarship had a major impact on Pardo "not only as a student," she said, "but also as a person and a professional. Going through college without financial support from my family was challenging and, many times, overwhelming. Therefore, I heavily relied on scholarships to keep me focused on my classes and not to worry so much about money. The Resnik scholarship enabled me not only to graduate with excellent grades, but also to lead in my senior design project. Now that I have finally graduated," she added, "I am eager to inspire other women to pursue engineering, and I hope to get to a point in my career where I also can support other students through college."

It wasn't until her junior year that Pardo developed a passion for aerospace engineering and became aware of a special bond that united her with Dr. Resnik. "I was finally taking aerospace classes, and they were all fascinating to me," she said. "I discovered that aerospace engineering is always at the cusp of technology and innovation, and there is always something new to learn. I think that's what I love the most: learning." ✨

SWE Stories, Tales from the Founders' Families

Women engineering students in Philadelphia began organizing in the 1940s, eventually joining with their counterparts and working women engineers in New York and elsewhere on the East Coast. Forming one unified Society of Women Engineers in the spring of 1950, their combined efforts helped create educational pathways for future women engineers while opening doors for women in the profession. On the personal level, their work resulted in treasured memories and family legacies that extend across generations.

By Anne M. Perusek, SWE Director of Editorial and Publications



This image from the 1950 Drexel yearbook includes many of the organizers and participants in the 1949 conference and the 1950 founding weekend. From left, front row: J. Becker; the supportive dean of women, Dorothy R. Young; the group's faculty advisor, Professor A.W. Grosvenor; and E. Greiner. Back row, from left: P. Diamond, P. Evans, M. Welker, D. McNulty, J. Kleinschmidt, C. Dolan, and M. Martin.



On Saturday April 2, 1949 the dinner featuring "first lady of engineering," Lillian Moller Gilbreth, Ph.D., was held — a highlight of the conference. From left, Drexel Dean of Engineering Robert Disque, Alma Kuppinger, and Dr. Gilbreth.

A pivotal moment for SWE Fellow and founding member Alma Kuppinger Forman, P.E., took place when she attended a formal tea held by the dean of women students at Philadelphia's Drexel Institute of Technology. "It changed my life," Kuppinger Forman recalled years later when addressing a SWE conference. She noted that in her student days, going to tea meant dressing up and donning hats and gloves.

In the fall of 1945, Kuppinger Forman was one of 11 first-year women enrolled in the engineering program at what today is known as Drexel University. She joined five upper-class women plus another eight enrolled in the engineering school's evening program. Meeting one another at the tea was the impetus for subsequent gatherings on campus, sometimes over lunch and frequently in classroom buildings that did not have restrooms

for women students — typical for the era.

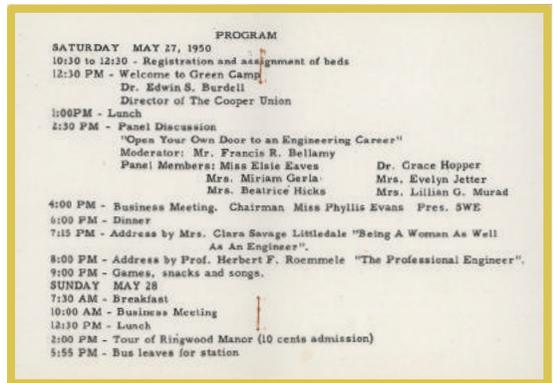
Four years later, in her senior year, Kuppinger Forman chaired a conference organized by the women at Drexel who invited women engineering students from other East Coast schools. The conference organizers called it the “first conference of women engineering students, sponsored by the Society of Women Engineers.” Because the conference included only students and predated the formal founding of SWE, it is no longer viewed as the first conference. It did, however, significantly set the stage for the May 1950 meeting at Cooper Union’s Green Camp of Engineering, where women engineers and engineering students from Philadelphia, New York, and the region spent a weekend “birthing” the Society of Women Engineers.

Joining Kuppinger Forman at Camp Green — as it was affectionately called — were a number of Drexel students and graduates, as well as other women from the Philadelphia area. Between the various speakers, panels, and strategy sessions, there was still time for recreation and bonding through sports and games.

The weekend closed with a tour of nearby Ringwood Manor, a bus to the train station, and the framework for a national organization. Over the next years and decades, dedicated members would work to fulfill the organization’s mission, eventually expanding it across the globe.

That formative weekend, Drexel student Phyllis “Sandy” Evans Miller was on the program to chair Saturday afternoon’s business meeting. At the time, Evans Miller was president of the student group at Drexel, where she had been one of the organizers of the 1949 meeting. Graduating from Drexel in 1950 with a B.S. in mechanical engineering, she went on to become the Society’s corresponding secretary in the early years. It is largely thanks to her writings that we have a clearer picture of SWE’s founding history.

Evans Miller authored a detailed report in 1951 and 1952, at a time when efforts were underway to establish a consensus on SWE’s founding date: Was



The May 1950 weekend at Camp Green included time for both serious work and recreation.

it the 1949 meeting at Drexel, or the 1950 weekend at Camp Green? The 1950 date was eventually chosen because the gathering included both students and working women engineers.

UNPREDICTABLE AND PROFOUND ENERGIES

By 1951, Evans Miller had married, moved to Pittsburgh, and launched her career. Hosting a gathering of women engineers at her home, the group formed the Pittsburgh Section that July, choosing Evans Miller as one of the Pittsburgh representatives to the board of directors. The following January, an article by Evans Miller was published in the *Journal of the Society of Women Engineers*, volume 2, number 2, titled “Rocket Motors.”

Evans Miller worked in the Atomic Power Division at Westinghouse Electric Corp., where one of her assignments was the mechanical drive train for the Nautilus submarine. Prior to that, she was



As reported in the *SWE Newsletter*, November 1960, the Pittsburgh Section held a picnic the previous August on the farm of Dorothy Rahn, section president. Among those enjoying the outing were, from left: Phyllis Evans Miller and her infant son, David; Margaret Kipilo and two of her five children; and Constance Craver. It was reported that "those attending brought their own picnic lunches and then shared with the others."

employed at the Naval Air Development Station in Johnsville, Pennsylvania. Her love of rockets and fascination with the possibilities of human space flight may have placed her a bit ahead of her time, but would prove to have far-reaching effects.

"My mom kept me home from elementary school to watch the Gemini and Apollo launches," reported David W. Miller, Sc.D., currently vice president and chief technology officer at The Aerospace Corporation and the younger of her two sons. He recalled that when the school phoned regarding his absence, her stern reply was that he was receiving a better education by watching the launch.

He and his brother Jon, an actor in New York, don't remember their mom working as a mechanical engineer but do recall that, growing up, all family vacations had to include an educational component. "She heavily steered my career in the aerospace field," Dr. Miller said. During World War II, she was learning to fly and had hoped to be part of the civil air patrol until her father pulled her from the program out of concerns for her safety. "When I turned 16 years of age, she brought me to the local airport and told me it was time I learned to fly," he said, adding with a laugh, "That evening, my dad sat me down and said it was time for me to learn to pay for it."

Dr. Miller attended the Massachusetts Institute of Technology, where he earned his bachelor's, master's, and Sc.D. in aeronautics and astronautics. Prior to joining Aerospace, he was director of the Space Systems Laboratory and the Jerome C. Hunsaker Professor in the department of aeronautics and astronautics at MIT. He remains on the faculty there, on a temporary leave of absence. Additionally, he spent five years, including two as vice chair, on the Air Force Scientific Advisory Board. He also served as NASA's chief technologist at its headquarters in Washington, D.C.

Relaying an insightful moment with an MIT colleague and astronaut, Dr. Miller shared that the conversation turned to how each had chosen their career paths. When Dr. Miller described his mom's influence, the response was, "Oh, this wasn't your career choice." And Dr. Miller replied, "No, I think you're right," adding that "I haven't regretted it."

Evans Miller was an advocate of STEAM before the term existed, promoting the arts along with science, technology, engineering, and math. When Jon Miller aspired to earn a Master of Fine Arts with a focus on theater, it seemed that his dream would not come true, and he began law school instead. As it happened, the drama department at Ohio University called at the start of the academic year, offering a late acceptance. Being a lover of the arts and having her son's best interests in mind, Evans Miller called him to let him know about the offer. Leaving law school, he entered the program, opening the way to his acting career.

In a touching gesture, Dr. Miller carries in his wallet a 1951 article reporting on his mother's work. Titled "Women Engineers Study Rocket Motors," the article references Evans Miller's feature story on rocket motors in the then-current issue of the *Journal of the Society of Women Engineers*, and her contributions as a founding member of the Society.

Recently, in what one might call an instance of energies coming full circle, SWE and Dr. Miller were brought together. While a number of women engineers at Aerospace have been and presently are SWE members, the Society's current president-elect, Rachel Morford, met Dr. Miller at a company event. She was delighted to learn that his mother had been a founding member who played a key role in the Society's early days.

TWO ENGINEERS IN THE HOUSE

A large, wooden drafting table in the basement of her childhood home stands out as one of Dianne Forman's early memories. From there, her mother, Alma (Kuppinger Forman), worked on various consulting projects. "I would sit with her, making 'rabbit holes' from a circle template. In the afternoon, when school let out, a neighbor's daughter would come and take me to the park," Dianne said.

Alma married E. Ross Forman, P.E., whom she met as a fellow engineering student at Drexel. Before Dianne was born, Alma had been one of two women engineers at Dustin, where she designed turbines. The other woman was close friend and SWE founding member Doris McNulty, P.E. — known as "Aunt Doris" to the Forman children.

Several years later, a brother, Bruce, was born. "With two young children, my mother stopped working but was always active in the community," Dianne recalled. Eventually, Dianne developed an awareness that her family might be a bit unusual. "With engineers in the house, and both of them proud P.E.s, dinner conversations were different. It dawned on me one night, when the conversation had turned to gear ratios and we were all following it." Plus, "there was always talk about SWE."

Additional indicators of a less-than-typical household became apparent when a guidance counselor did not recognize the family's commitment to higher education and told Alma that Dianne wasn't college material. "Wrong person to tell that to," Dianne said. "My mom tutored me in physics that summer using a little chalkboard set up in my bedroom. I learned several valuable math skills that summer that have stuck with me my whole life. By the way, I graduated *cum laude* from college. I do not recall the name of the counselor in high school but have always wanted to show her my college diploma."

Thanks to "Aunt Doris" McNulty, Alma embarked on a new career as a college instructor. McNulty was working full time for an engineering firm and teaching nights at a local community college when, in the middle of the term, her company sent her to a job in Italy. Alma was called in as a replacement, and later began teaching at Drexel and eventually ran the engineering computer graphics lab at Temple University. "Though not



Celebrating SWE's 10th anniversary during the 1960 Society of Women Engineers Eastern Seaboard Conference in Philadelphia were, from left: SWE's first president, Beatrice Hicks; her husband, Rodney Chipp, the inspiration for SWE's Rodney D. Chipp Memorial Award; and Alma Forman.

planned," Dianne said, "teaching enabled her to actively participate with the new, up-and-coming young women engineers of SWE."

While they were growing up, the Forman children made firm decisions about future careers. "Both my brother and I were not going into engineering, even though we built forts in the backyard and made buildings with my brother's girder and panel set. No, we were not going to do what Mom and Dad did," Dianne said. Things turned out differently, however. "In my adult life, I ended up working as an electrical designer for an AE firm, while my brother went back to college and got a second degree in mechanical engineering and has had an engineering career."

Dianne noted that once she became an adult, from time to time she would come across information concerning a renowned woman engineer only to discover, with some surprise, that it was someone her mom knew.

PRIDE ACROSS GENERATIONS

Gaetana (Tina) Melilli Walecki was still a student when the Camp Green meeting took place. She



Caroline McCormick cherishes the SWE bracelet that belonged to her grandmother, Gaetana (Tina) Melilli Walecki.

ended up transferring from Drexel to Temple University because the radio and television portions of Drexel's electronics engineering program were discontinued. While at Temple, she worked on the production of the UNIVAC at Eckert-Mauchly Computer Corp. and graduated in 1952. After marrying and having children, in 1964 she went back to work at Beckman Instruments in Cedar Grove, New Jersey, where she developed her own inventory system for all the instruments the company built.

Walecki's daughter, Patti Walecki McCormick, her grandson Timothy McCormick, and granddaughter Caroline McCormick individually shared memories and perspectives with the SWE archives. "She was always proud that she worked on the very first computer," for business applications, Patti wrote. "Through the years, we heard many stories of what it was like to work with such men as Pres Eckert and John Mauchly. Grace Hopper, too. As kids, we really didn't understand what she did, but we understood that it was a special thing to be a woman in engineering back in those days."

Regarding the impact her mother's career had on the family, Patti wrote:

"It certainly influenced me and my sisters on women's roles. She was a role model for us and told us we could be whatever we wanted to be ... As for women's rights, the one thing I remember her saying over and over was, 'Because you're a girl, you're going to have to work twice as hard to get half as far as a man.' She said it matter-of-factly; there was no complaining or bitterness. If I would complain about

The Biggest TV Set in South Philly

Patti Walecki McCormick shares a family story that her mother was fond of telling. "While working at Eckert Mauchly, she met the man who was to become our dad. They worked on some very tedious project together and decided they were compatible. As a courtship project, they ordered an RCA TV kit to assemble together. They adapted it to a bigger CRT screen, and my grandfather (Mom's dad) built a cabinet for it from an old Victrola cabinet. They were very proud of their project, but no one was prouder than my grandfather of his daughter, the engineer! The entire neighborhood would come over to watch the biggest TV set in South Philly. In fact, when Mom and Dad married, my grandfather insisted on keeping the set. I think he just wanted to continue to show friends and family what a smart daughter he had."

The TV set remained in the family until recently, when it was donated to the InfoAge Science and History Museum in Wall, New Jersey.



the seeming unfairness, she would just say, "That's the way it is."

Patti was very proud of her mother but would have preferred to have her home and more available, which led her to decide against having a career. Instead, she worked part time while raising her four children. "I have no regrets," she said, adding that:

"I'm still very proud of what my mother accomplished. As for her grandchildren, that's another story ... Her legacy influenced several of her grandchildren to attend and graduate from Drexel University. Two grandsons are engineers; one granddaughter and one granddaughter-in-law graduated with engineering degrees. Two grandsons are computer programmers, and one granddaughter became a teacher. All graduated from Drexel and, I think, were directly influenced by their grandma."

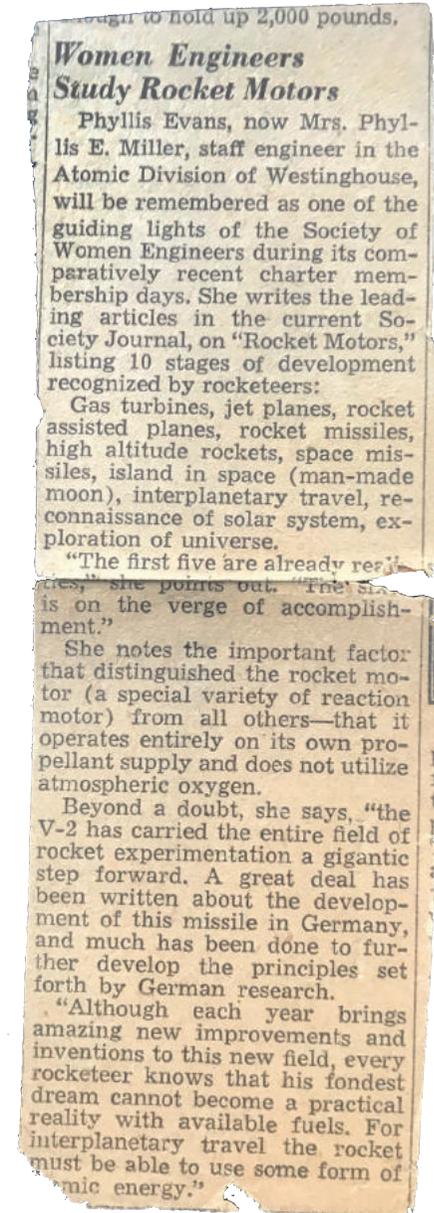
Grandson Timothy McCormick, P.E., was working as a civil engineer in Florida when he reached out to the SWE archives several years ago, identifying his grandma in the iconic group photo taken at Camp Green and hoping to frame a copy as a gift to her. He updated SWE's records with some recent details on her life.

Like her mother Patti, granddaughter Caroline McCormick responded to a survey issued by the SWE archives and *SWE Magazine* during the 70th anniversary year. "I didn't talk to her much about her work growing up. It wasn't until I started looking at colleges and majors that my family told me about her important contributions to engineering," she wrote.

Learning about her grandmother's accomplishments "was inspiring," she added. "I wasn't sure if I could do it, as everyone else in my family that had gone to Drexel for engineering had been male, but if she could do it, I knew I could do it."

In terms of the impact her grandmother had on her views of women's roles and women's rights, Caroline wrote:

"She was always very strong willed and did not back down from any challenge. She let her opinion be known and was proud of her accomplishments. I think that made me more confident in my decisions and look at women as stronger figures than maybe I would have otherwise. I ended up going to Drexel for materials science and engineering. Two of my cousins and my brother went to Drexel before me, and then several



The article David Miller, Sc.D., carries in his wallet, describing the contributions his mother, Phyllis Evans Miller, had made to engineering and to SWE.

other family members went to Drexel following me."

Caroline summed up her grandmother's influence: "She inspired me to take a chance on myself, to not be afraid to take on a profession in a male-dominated industry, and to stand up for what I believe in." ❀

We20

The World's Largest Conference
for Women Engineers



TOTAL
ATTENDEES

18,825

450+

ATTENDEES CHECKED-IN ON
THE WE20 GLOBAL WEBPAGE

WE20
SESSIONS

71K+

 VIEWS

8,800 professionals



7,200 collegiates



2,800 recruiters/
exhibitors



Visitors to
Awards Hall

7,500

2,700+
comments and
congratulatory notes

WE20 VIRTUAL CONFERENCE RECAP

NOV 2-13
VIRTUAL CONFERENCE
& CAREER FAIR

KEYNOTE
SPEAKER
EVENTS



4,500+
Attendees

1,300+
PHOTO BOOTH PICS



SOCIAL MEDIA HIGHLIGHTS: from 11/2-11/13



— 608,385

Impressions

— 6,315

Engagements

— 152,799

Followers

#

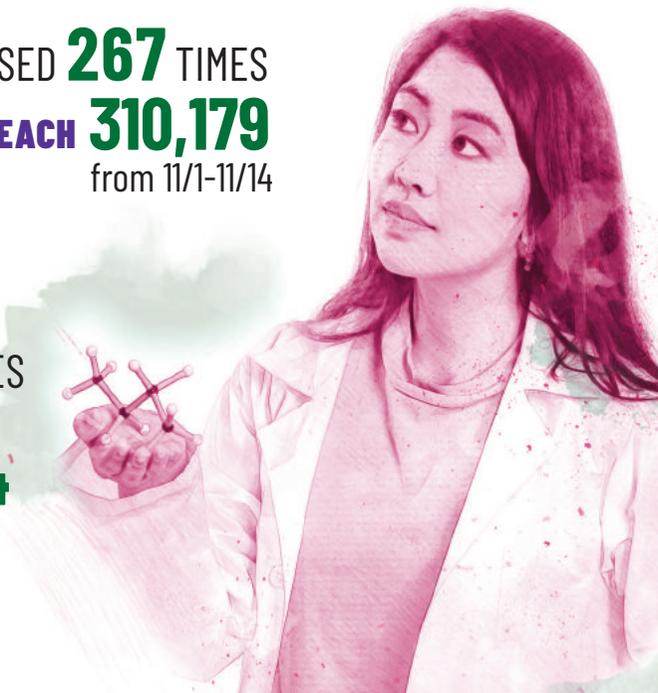
PRACTICE

Curiosity

USED 267 TIMES
REACH 310,179
from 11/1-11/14

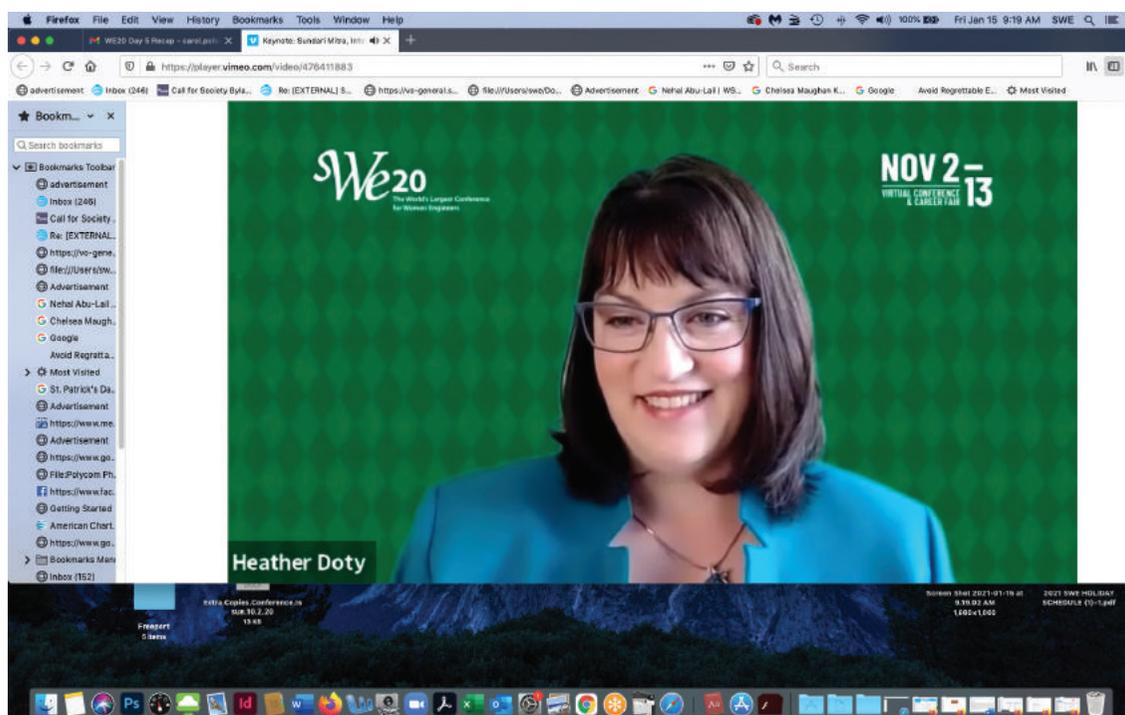
#WE20

USED 767 TIMES
REACH 3,042,624
from 11/1-11/14



WE20: Practicing Curiosity

In its first-ever virtual annual conference, the Society of Women Engineers brought together a record 18,825 women engineers, collegians, and stakeholders for two weeks of professional development, networking, and celebration.



FY21 SWE President Heather Doty introduced keynote speakers and facilitated Q&A sessions following the presentations.

As COVID-19 persisted in 2020, organizations across the globe were forced to postpone, cancel, or rethink conferences and other large events. SWE chose to do the latter, and the results surpassed expectations.

Reimagining WE20 as a virtual conference meant converting in-person events and activities into experiences attendees could take part in from the comfort of their homes or offices — while feeling connected to something much larger.

To avoid digital fatigue, the conference was extended to three weeks, including one week for SWE business meetings, and offered myriad opportunities for attendees to “practice curiosity.” These included four keynotes; five mega sessions;

workshops and panels; a networking lounge; and a virtual career fair that boasted some 2,800 recruiters/exhibitors — and much more.

Sessions were presented as live, semi-live, or on-demand. The ability to “chat” in the live and semi-live sessions proved a popular and effective means for attendees to network and share tips and support. By the end of the conference, WE20 sessions had garnered 71,000 views.

For attendees looking for a break from sessions and meetings, WE20 offered a scavenger hunt; a leaderboard challenge in which attendees accumulated points by visiting various areas of the conference; a virtual photo booth; plus daily yoga and meditation.

We20

The World's Largest Conference
for Women Engineers

In her opening keynote, Laura Maxwell, senior vice president of supply chain for PepsiCo Foods North America, discussed how women engineers can overcome self-doubt and learn to take risks. Drawing from her experiences in boxing, which she described as a “journey of self-discovery,” Maxwell encouraged her audience to trust their capabilities, practice curiosity, take risks, and “smash that self-doubt — better yet, give it a knockout.”

In this year’s State of Women in Engineering event, Michelle Brown, COO for Pinsight, shared findings from Pinsight’s 2020 report “Repairing the Broken Rung: Overcoming Bias in the Leadership Pipeline.” Brown’s presentation expanded on research shared in *SWE Magazine’s* State of Women in Engineering 2020 issue.

A virtual tour of the SWE archives gave viewers a glimpse into the Society’s massive collection of historical records and artifacts. SWE Archivist Troy Eller English led the tour, highlighting stories and objects such as footage of SWE’s founding meeting and artifacts that have flown in space with a SWE senior member and Achievement Award recipient. The archives are housed in the Walter P. Reuther Library at Wayne State University in Detroit.

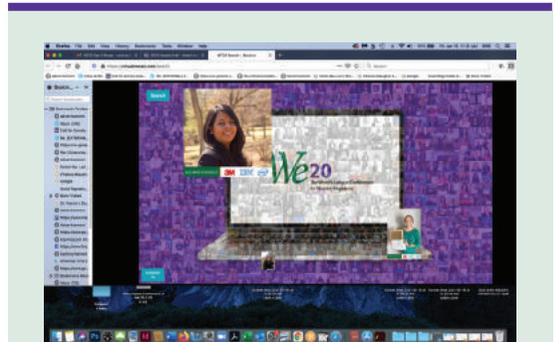
Since 2015, *SWE Magazine* has celebrated the contributions of women engineers through its presentation of Women Engineers You Should Know. Each year, the women selected for this recognition are nominated through SWE’s social media channels and are featured in the spring issue of the magazine. Through a virtual mosaic that includes photos and brief biographies, WE20 showcased the group of women who were chosen for this tribute in 2020. The mosaic can be viewed at <https://virtualmosaic.com/weysk>.

This year’s SWE Achievement Award recipient, Jayshree Seth, Ph.D., was recognized for “visionary, sustainability-focused contributions to adhesives, release, and fastener technologies; for creating,

championing, and teaching new methodologies for product and technology development; and for deeply influential STEM advocacy.”

In her acceptance remarks, Dr. Seth recalled her childhood, when she didn’t think of herself as the “science and engineering type.” She described her journey from a little girl in India who “just wanted to help people and improve lives and make the world a better place” to her current role as corporate scientist and chief science advocate for the 3M Company. Dr. Seth’s printed acceptance remarks appear in this section of *SWE Magazine*. To view a video of Dr. Seth delivering her address, please visit <https://bit.ly/3i8AHJT>.

All content on the virtual event platform will be available for one year following WE20, giving attendees the option to view sessions and events at their leisure. ✨



Celebrating the 2020 SWE Award Recipients

In lieu of a formal banquet, recipients of various awards were announced during each of the keynote sessions. A virtual Awards Hall showcased photos of individual and team recipients displaying their awards. The format allowed visitors to leave comments and send congratulatory notes to the recipients. The Awards Hall has received more than 8,100 visitors and more than 2,700 comments and notes of congratulation for the recipients. To view the Awards Hall, please visit <https://we20awards.swe.org/>.

The Art of Applying Science to Life

2020 Achievement Award Remarks

Jayshree Seth, Ph.D.

3M Company

THANK YOU SO MUCH!

This has been another one of those pinch-me moments in my journey. I find myself asking, “*Is this really happening? Did I just win one of the most prestigious awards for engineering?*”

And the reason I say that is I never thought of myself as the “science and engineering type” when I was a little girl. I just wanted to help people and improve lives and make the world a better place.

And now I know, based on much research that is out there, that it’s pretty typical for young girls to have these kinds of “communal goals.” Decades later I saw it in my daughter, too. No surprise, as a young girl, I naturally gravitated to fields where this contextual pull is strong, and with STEM careers I couldn’t easily make that connection.

What I *did* have is very strong parental guidance regarding engineering education, but I didn’t get into the hometown engineering institute, the very campus of which I grew up on. At the time, it wasn’t common for girls from my town to leave home for an education.

It’s thanks to my progressive parents, I ended up at Regional Engineering College Trichy, thousands of miles from home in another part of India, and became one of the very few girls who left home and that too for an engineering education.

I worked hard, which is something I have always done. That is something in my control, the effort I put into everything I do. Long story short, I ended up in the U.S. for graduate school, at Clarkson

University in Potsdam, New York. Let’s go, Tech!

I started my master’s program there, the only woman in our lab, but that was not in the forefront for me. By that time, I think deep down I had already accepted that in many ways I was blazing a trail, in a largely male-centric field. But what I did encounter was a strong sense of what I now know is something many women and underrepresented minorities often feel, a “communal goal

AWARDS | SPECIAL SECTION



ACHIEVEMENT AWARD

Jayshree Seth, Ph.D.

3M COMPANY

For visionary, sustainability-focused contributions to adhesives, release, and fastener technologies; for creating, championing, and teaching new methodologies for product and technology development; and for deeply influential STEM advocacy.

As a corporate scientist and chief science advocate for the 3M Company, Jayshree Seth, Ph.D., uses scientific knowledge, technical expertise, and professional experience, both inside and outside 3M, to advance science. Dr. Seth is one of only four women ever promoted to corporate scientist and the first female engineer to attain this position, the highest technical level within 3M. In this role, Dr. Seth leads applied technology development projects for one of 3M’s largest industrial businesses charged with developing new technologies and sustainable products. In 2019, Dr. Seth was the fourth woman and first woman engineer inducted into the 3M Carlton Society, which is the 3M hall of fame, honoring the very best among the scientific community. She has 68 patents on a variety of innovations, and many more pending.

Dr. Seth has been instrumental in developing environmentally-friendly products for 3M’s core platforms. Among her recent notable achievements are the elimination of solvent from packaging tapes, formulation of pressure-sensitive adhesives that adhere to recycled corrugated boxes and increasing bio-based content in 3M products. She also developed self-wound silicone transfer tapes, thereby eliminating a disposable liner in the construction. She is a certified design for Six Sigma black belt, and developed innovative methodologies for scientists and engineers engaged in product and technology development now widely used within the company.

In 2008, Dr. Seth was appointed 3M’s first-ever chief science advocate, charged with communicating its importance in everyday life, breaking down barriers, and building excitement around STEM careers. Dr. Seth has been interviewed in national and international media

and has also been featured in her role as a scientist in 3M brand campaigns and commercials. Dr. Seth has written many articles on a multitude of topics and is a globally sought-after speaker. She was chosen to deliver the closing keynote at WE19, and travels worldwide to inspire women in — and into — STEM careers.

Among her many 3M initiatives and roles, Dr. Seth served on CEO Inclusion Council and chaired 3M’s Asian employee network in 2019, with over 750 members. She has received numerous 3M awards, including a record-setting 17 intrapreneurial grants. She was selected by the National Academy of Engineers to participate in the 2008 U.S. Frontiers of Engineering Symposium. Dr. Seth is a recipient of the 2019 International Women & Technologies Le Technovisionarie® award for sustainability. She was honored for her leadership, accomplishments, and community contributions as a 2020 Woman of Distinction by Girl Scouts River Valley. She is highly regarded as both a member of the 3M technical community and as a role model for women engineers around the world. Dr. Seth was honored with a Distinguished Alumni Award from her alma mater in India.

Dr. Seth holds a B.S. in chemical engineering from NIT, Trichy, India, and an M.S. and Ph.D. in chemical engineering from Clarkson University, New York, and has more than 15 publications. A few are co-authored with her husband, whom she met in graduate school. Dr. Seth’s husband also works at 3M and they enjoy extending the science, creativity, and innovation to their kitchen. They have two adult children and will soon be empty nesters. Dr. Seth enjoys experiencing other cultures and reading and writing about science, innovation, and leadership.

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incongruity” if you will. And as a result, I made the very scary decision at the time to switch fields for my Ph.D. In some ways, I was starting over but inspired by something I could build a context around, centered around my mindset. Fortunately, I had an amazing advisor and very collaborative lab mates who helped me along the way.

I then got a job offer from 3M after a summer internship there. It was in a completely different area from my doctoral work, but by that time, somewhere deep down I guess I also knew that my communal goal mindset would guide me to learn and grow and contribute. I accepted.

I ended up in this culture of innovation at 3M where empowerment and collaboration were embedded in the structural systems, integrated in the procedural elements, and woven into the cultural fabric itself. I had

wonderful peers and amazing bosses, who shaped me and were willing to be shaped by me. I realized that I may not have had a specific expertise, but I had the knack for identifying the problems to solve

and developing context around them, keeping a communal mindset, to inform, influence, inspire, and then collaborate with people to solve them. It was what I call the *art of applying science to life*.

And I have been very successful in both communal and agentic goals in my career, in fact, beyond my imagination. So now, in my role as 3M's first-ever chief science advocate, I take this message wherever I go.

Everyone can be the “science and engineering type.” Don't let pervasive stereotypes about what science is, what scientists do and who enters, persists, and excels, deter you. I am a living example — we need a communal mindset and we need diversity of thought and experiences to solve the problems we face, as humanity. And the reason I share this today is also because I meet many young folks who are stressed about planning and orchestrating each, and every step, of their journey. I want to say it will work out. Remember it's not

just your education, but what are you learning; it's not just your vision of some destination, it's your exposure, your engagement and your experiences along the way that may end up defining you. It certainly did for me ... and here I am today.

So, I dedicate this award, to my parents: my dad, a trailblazing engineer in his own right, and the reason both my brother and I are engineers, and my mom, who always quoted lines that instilled in us that the objective of our journey is not to find a destination but to keep forging a path where none exists.

And to my incredible and supportive husband, my kids, or should I say *freshly minted* adults who keep it “real.” And to all my gurus and my extended family and friends, spread over many continents, who have been cheerleaders for me along the way.

And of course, everyone at 3M.

And to all the girls who want to change the world and solve real problems that matter, this is for you. We need more people with communal goals and aspirations in STEM

DON'T LET PERVASIVE STEREOTYPES ABOUT WHAT SCIENCE IS, WHAT SCIENTISTS DO AND WHO ENTERS, PERSISTS, AND EXCELS, DETER YOU. I AM A LIVING EXAMPLE — WE NEED A COMMUNAL MINDSET AND WE NEED DIVERSITY OF THOUGHT AND EXPERIENCES TO SOLVE THE PROBLEMS WE FACE, AS HUMANITY.

than ever before with all the sustainability challenges we have ahead of us.

To all the young women who wonder if they should consider STEM or leave STEM because humanities may feel more intuitive, this is for you.

I have given you my “*schpiel*” ... mark my words the real *shtick* is SSTEM, Science Humanities Technology Engineering and Math. So, bring that much-needed mindset.

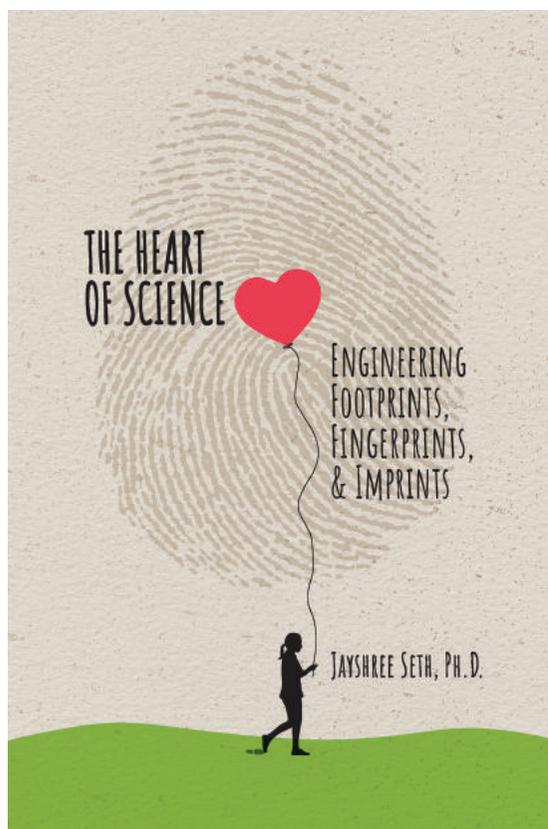
For all the professional women in STEM or those poised to start and are wondering if they can succeed in a corporate career, this is for you. Let me tell you, you can change the rubrics; you must alter the metrics and you will transform the optics.

Thank you again, Society of Women Engineers. It's #2020, the year of reckoning — I say it's time for women to lead in engineering our society.

Thank you!

The Heart of Science

A new book by 2020 SWE Achievement Award recipient, Jayshree Seth, Ph.D.



SWE's 2020 Achievement Award recipient, Jayshree Seth, Ph.D., has written *The Heart of Science: Engineering Footprints, Fingerprints, & Imprints*, a book that explores big ideas through a collection of insights, reflections, and tips gleaned from her successful corporate career in research and development.

In the book, Dr. Seth explores the relationship between society and science and engineering, offering her unique perspective on topics surrounding advocacy, interdisciplinary contexts, thoughtful leadership, and inclusive progress. She also draws from her childhood experiences, and those of her children, as source material on the lessons she has learned during her career journey.

Published by the Society of Women Engineers, *The Heart of Science* was launched in a live video session during WE20. In the video, Dr. Seth and SWE Executive Director and CEO Karen Horting, CAE, discuss the book, including what inspires Dr. Seth, especially during these challenging times, and what led her to publish her career advice for women in STEM. The live discussion can be found in the on-demand section of the virtual auditorium.

The book is available in both paperback and ebook formats and can be purchased at <https://amzn.to/3ieyQDk>.

All proceeds from the book will go to the Jayshree Seth Scholarship for Women of Color in STEM, to be administered by the Society of Women Engineers. The scholarship is designed to help underrepresented minorities advance in STEM education and professions related to engineering and technology. It will be awarded annually to support a woman pursuing an undergraduate or graduate degree in a STEM field. ✨

Keeping Diversity Top of Mind



MINDFUL OF THE FEEDBACK WE RECEIVED AT OUR TWO TOWN HALL MEETINGS, WHERE DISCUSSIONS FOCUSED ON OUR LEADERSHIP PIPELINE AND NOMINATING PROCEDURES, WE TOOK STEPS TO MITIGATE THE LIMITATIONS OF OUR PROCESS.

We began the SWE fiscal year at the onset of a reckoning on racial injustice in the United States and the world, and with a global pandemic that is yet to subside. Having reached the halfway point, it's time to review our journey toward greater diversity, equity, and inclusion. I'll begin with the recently released slate of FY22 candidates — our most diverse ever.

Mindful of the feedback we received at our two town hall meetings, where discussions focused on our leadership pipeline and nominating procedures, we took steps to mitigate the limitations of our process. To develop a broader and more diverse pool of candidates and final slate, we focused on outreach to potential candidates and examined the language used to describe qualifications. We asked current leaders and SWE members to extend the call for nominations to varied networks. We had conversations with people who might not have otherwise seen themselves in Society-level leadership roles. As a direct result, several entered the pool. Others decided that the time is not right, but it is something they would seriously consider in the future.

We also requested that candidates furnish demographic data. While optional, in the past SWE did not pursue this information. We realize we have work to do, and we can't identify the holes in our process without the data. We hope people will increasingly furnish this information so we can measure progress and recognize where we fall short.

Our timeline did not permit a retooling of the nomination process — that will follow the special election to replace Eileen Vélez-Vega's position on the board. We are sad to lose her valuable input but delighted by the reason — her appointment as Puerto Rico's first woman secretary of transportation and public works. We congratulate her on this trailblazing role!

Another key area is DE&I training. Local leaders have frequently asked how they can do better, recognizing that in most cases a person's first experience with SWE is at the section level. Consistent training, from the section to committee and Society levels, as well as staff, will ensure a clear DE&I framework. The rollout begins at the end of January.

We are adding partner organizations to the awards language and criteria. This means that participation in our partner organizations (NSBE, SHPE, AISES, oSTEM, NOGLSTP, or similar) will be added to the criteria and judging rubric — consistent with SWE's mission and strategy.

Lastly, I encourage you to revisit the WE20 content, available until November 2021, and continue to "practice curiosity," our theme for WE20 and FY21.

Heather Doty
FY21 SWE President

Building Belonging Across (Virtual) Borders

Diversity, equity, and inclusion are key elements for cultivating a welcoming workplace and organizational culture. To make these efforts successful, however, a fourth element — belonging — is at play.

By Renee Oats, Ph.D., and Nicole Woon, SWE Editorial Board

Belonging is the idea of being accepted and having our contributions heard and valued by those around us. It's feeling like we matter. In our work environments, it's a sense of security and support, which allows us to build meaningful connections with others. Belonging is also deeply tied to commitment, motivation, and pride for the work we do.

Having a range of perspectives in the room leads to more innovative ideas and healthy discussion, which adds value to our companies. Hoi Ning Ngai, Ph.D., associate director for employer engagement and business advising at the Bates College Center for Purposeful Work, shared in an email interview that “we should be able to push back and challenge each other's thoughts and ideas — being open doesn't mean we have to wholeheartedly accept things we don't agree with. Organizational cultures that openly and consistently recognize individuals and what they have to bring to the table, and support productive discourse and debate among those individuals, are ones that will more likely retain them over time. Ultimately, it's in those environments that we simultaneously feel heard and experience growth.”

It's no mystery that having a feeling of belonging leads to greater engagement and deeper relationships with others and increases retention in a community. It builds personal creativity and resilience. People can bring their full selves to work and not feel they need to act differently between their workplaces and at home. There is also an emotional and financial cost when belonging is not fostered. Research in the field of evolutionary psychology has documented how experiencing social exclusion has the same physiological and neural patterns as physical pain. Moreover, a 2019

study conducted by BetterUp Inc. found that “high belonging was linked to a whopping 56% increase in job performance, a 50% drop in turnover risk, and a 75% reduction in sick days. For a 10,000-person company, this would result in annual savings of more than \$52M” (Carr 2019).

REMOTE WORK COMPOUNDS THE ISSUE

Changing and ultimately improving work culture is a challenge on its own. Throw a virtual workplace environment into the mix, and building a sense of belonging becomes even more difficult. With safety measures in place to combat the COVID-19 pandemic, many organizations have deployed work-from-home policies for their employees. This can decrease the feeling of belonging as many employees are in a mandated state to work remotely or at a distance from peers, offices, and facilities. Many teams transitioned from seeing colleagues in-person daily to once or twice per week during video conference calls. For some, physically going to the workplace provided an outlet from home life, and engaging in assignments or tasks helped the time go by. For others, it was a social outlet to talk with teammates, collaborate with larger audiences, and connect with the world outside their personal spaces.

Being away from your work colleagues can increase isolation that may be felt more immensely as we distance ourselves from other loved ones. Additionally, the lack of a consistent communication routine and the reality of increasing electronic communication can change the dynamic of your work team. Tacit knowledge might be trickier to share with the lack of informal hallway conversations; a strong internet connection or viable phone signal can be hard to come by; and screen fatigue

may make us less likely to want to connect with others virtually. These factors compound to feeling disengaged from your team and a lack of camaraderie with your teammates. To help combat this and improve a sense of belonging, employers should include routine meetings and regularly communicate expectations and upcoming tasks. Dr. Ngai advises, “Whether in person or virtually, it’s important that teams meet on a regular basis — at least weekly, if not twice or three times — and that those meetings aren’t all task focused. While not every team needs to feel like or operate as a family (we all know that’s not everyone’s preference!), it’s helpful to acknowledge that we all have lives outside of work.”

This may also involve personal direct interaction with your team or colleagues.

Lisa Patrick, a business development consultant and founder of The Thought Leadership Roundtable, recently reflected on how to navigate the remote environment and strongly advocates one-on-one interaction. Even a 10-minute conversation builds connection and trust; “creating a safe place for [people] to be

authentically themselves is a key element of growth for everyone involved — and ultimately the business” (Patrick 2020).

It’s also important to dedicate time for relationship building between newer hires and veteran employees. This is especially helpful for those onboarding to feel welcome and included. Dr. Ngai adds, “It’s nice for different members of the team to check in on new colleagues now and again during the settling-in period so that those colleagues feel like they have a community of folks to reach out to with questions and concerns. It helps for them to know that everyone wants them to be successful. This is especially the case in virtual environments where feelings of isolation creep in more easily.”

VIRTUAL ACTIVITIES FOSTER A SENSE OF BELONGING

Employers may want to evaluate their creativity or flexibility in which they connect safely with their workforce and should be accommodating to all employees, including those who may not be technologically savvy. Consider virtual coffee chats or socially distanced lunches, and use conversation starters such as a fun fact of the week or something new you did this week. This shows interest in your employees’ lives outside of work and helps you get to know them better beyond their work titles. Patrick also proposes being proactively inclusive and present in the moment, which aids in building respect, mental wellness, and stronger connections.

Try hosting virtual events, such as an at-home holiday decoration contest or trivia night, or promote outdoor, safely distanced physical wellness events such as virtual walk/run events. Another way to encourage a sense of belonging is to recognize your co-workers’ hard work through virtual awards or shout-outs. Sharing

praise for a job well done during a meeting or email correspondence helps promote a successful work environment and motivates your workforce to keep charging away. And food for thought if you are constantly using technological software to communicate: Today’s tools — whether Zoom, Google Meet, Microsoft Teams, Slack, or another app — could provide a different means to connect with your workforce. Features such as breakout rooms, screen sharing, and raising-hand actions keep interactions active and more engaging.

To assist with engagement at home, be mindful of your at-home work environment, as this can impact productivity and affect your sense of belonging. Design a space that minimizes at-home distractions and puts you in the mindset to

“ORGANIZATIONAL CULTURES THAT OPENLY AND CONSISTENTLY RECOGNIZE INDIVIDUALS AND WHAT THEY HAVE TO BRING TO THE TABLE, AND SUPPORT PRODUCTIVE DISCOURSE AND DEBATE AMONG THOSE INDIVIDUALS, ARE ONES THAT WILL MORE LIKELY RETAIN THEM OVER TIME. ULTIMATELY, IT’S IN THOSE ENVIRONMENTS THAT WE SIMULTANEOUSLY FEEL HEARD AND EXPERIENCE GROWTH.”

– Hoi Ning Ngai, Ph.D., associate director for employer engagement and business advising, Bates College Center for Purposeful Work

complete tasks. Establishing set hours can help you better organize your day and maintain that work/life balance. Communicating your evolving needs often and early with your team and supervisors creates a more transparent environment, which in turn can make people more likely to open up.

Our organizational culture and our sense of belonging will almost indefinitely be impacted through this global pandemic. Creating an environment where team members feel they belong doesn't happen overnight; it requires intentionality, empathy, and sincerity. It takes an all-hands-on-deck approach to acknowledge diverse cultural needs, integrate solutions that build belonging, and advance our growing organizations' missions in this virtual, and at times, isolating landscape. ✨

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Renee Oats, Ph.D., is a mechanical engineer for the Department of the Navy and a most recent alum from Michigan Technological University. Dr. Oats has nearly a decade of SWE experience, including her current roles on the editorial board and the integrated marketing advisory board.

Nicole Woon is a SharePoint program manager at Microsoft and graduated from the University of Pennsylvania with an M.S.E. (mechanical engineering) and two B.S.E.s (bioengineering, entrepreneurial management). An active SWE life member, she currently serves on the editorial board.

Reinventing Your SWE Section During 2020–2021

One of the many challenges faced by our SWE members is how to “reinvent” the way in which sections stay connected with their members with regard to professional development, social interaction, and outreach. We reached out to our members and discovered many ingenious ways the sections are staying engaged and connected during these challenging times.

By Mary C. Verstraete, Ph.D., F.SWE, SWE Editorial Board Chair

A few years ago, *SWE Magazine* added “Reinvention” — a column focused on how women were making changes to their careers, work/life balance, and family and social lives. Little did we expect to have such a plethora of topics to cover as we have in 2020, as we are reinventing nearly everything we are doing on a daily basis, including how to keep SWE members connected to their sections and one another.

Professional development activities are perhaps the easiest to accomplish in a virtual manner,

thanks to Zoom, Facebook chat rooms, and software that allows for group meetings. This was evident most recently during WE20, SWE's first-ever virtual annual conference. Numerous live and prerecorded sessions were offered to attendees, including Q&A sessions, a variety of professional networking events, and keynote talks. The SWE San Diego Section offered a WE20 live watch party for the session “Sorry, Not Sorry: Speak with Intention in the Workplace.”

Offering so many sessions recorded and available

for viewing on demand is a great way to engage members. Many sections reported holding virtual book club events by selecting a book to read and review, providing a link to purchase the book in whatever form a member prefers, and then coming together virtually to discuss different chapters, key messages, or, if available, a list of talking points. TED talks can also be viewed with a lower time and financial investment. SWE Orange County held two Zoom sessions to allow members to “Ask a Manager” and “Ask a Recruiter,” encouraging members to interact and help one another understand a variety of workplace and interviewing topics. They also hosted a Q&A session on professional licensure to allow professionals and collegians to discuss the reasons to obtain a PE license.

Outreach activities have been a bit more challenging, and many sections have engaged with local Girl Scout groups for assistance in marketing and sign-ups for virtual events. Online mentoring of collegiate sections/members and SWENext groups is accomplished more easily either one-on-one or with a group. Again, technology comes to the rescue with Zoom “rooms” and other small group discussion areas. The Hawaiian Islands Section held a virtual auction and marketplace featuring one-of-a-kind items from artists and makers to raise funds for the Mae Nakatani Nishioka Scholarship Fund. Arizona State University’s SWE section has started a national, online tutoring initiative to help educate K-12 students learning from home, and other SWE sections, including SWE Boston, have joined them in this effort.

Perhaps the most-needed interactions this year were social. We all longed for more personal contact, and sections responded with a variety of fun activities and events. Southern New Jersey was challenged in its first year as a section and succeeded with a team trivia night. The participants broke into Zoom rooms to answer questions based on women’s suffrage and SWE history. SWE swag was mailed to the winners and a door prize was offered. The Dallas SWE Section hosted virtual yoga (as did the WE20 conference), a networking “bruncheon,” and a Halloween pumpkin-carving social, all virtually.

Ice breakers are also great ways to include everyone in a virtual environment, asking each attendee

to introduce themselves, their company and position, their background, and a fun question about themselves (e.g., what is your favorite ice cream/pizza topping/hobby/etc.). Encouraging each person to then “pass” the turn to someone by name avoids the awkward silence or mass of people talking at once. During a networking session at WE20, everyone was asked to turn their microphones on until they introduced themselves and passed their turns. Then, by muting themselves, everyone was aware of who had yet to be introduced. The Chicago Regional Section hosted a virtual holiday cocktail-making party in December. By RSVPing, attendees received a link to the meeting and a list of recipes so they can get everything needed before the party. A collegiate section was reported to have developed a virtual escape room for members to participate in. Watch for more information in the All Together blog. In February, the Orange County Section will host its virtual Galentine’s Day Paint Night. Through the platform Painting to Gogh, attendees can all order the same painting kit, watch the tutorial together, and then paint along with one another.

These challenging times have forced all of us to find creative ways to stay in touch and stay connected with our SWEsters. Recently, four of us who normally meet for breakfast on the last day of the WE conference instead met in a Facebook room and chatted informally, sharing personal challenges, holiday plans, company policies and how they have changed in 2020, and simply let one another know we miss seeing the others and promising to get together virtually more often.

We may all be tired of Zoom meetings and the like, but maintaining these personal connections is vital to our health and well-being. So keep on being creative with your activities, and we hope this article gives you a few ideas for your section to remain connected. As they say, “Necessity is the mother of invention.” ✨

Mary C. Verstraete, Ph.D., F.SWE, is an associate professor emeritus of biomedical engineering at The University of Akron. She is chair of the SWE editorial board, was named SWE’s Distinguished Engineering Educator in 2007, received the Society’s Outstanding Faculty Advisor Award in 2011, and became a SWE Fellow in 2016.

Over the Moon



Computer-animated film (October 2020)

Screenplay by Audrey Wells; additional material by Alice Wu and Jennifer Yee McDevitt

Review by Marcie Mathis, SWE Editorial Board

“Over the Moon” is a 2020 American-Chinese computer-animated musical family fantasy film about a girl named Fei Fei. The film was produced by Pearl Studio and Netflix Animation, and animated by Sony Pictures Imageworks. The cast of voices is led by Cathy Ang (Fei Fei) and includes many names you may recognize, such as comedian Ken Jeong (space dog Gobi), Margaret Cho (Auntie Ling), and Sandra Oh (Mrs. Zhong).

On one level, the film is about an adventure interspersed with humorous moments, but overcoming loss and rediscovering hope are also part of the story.

Fei Fei is smart and creative, with the dreams and fantasies of a young girl. She is fascinated by the stories her mom tells her about the Moon Goddess Chang’e. Following her mom’s illness and death, Fei Fei decides to build a rocket to visit the moon, where she hopes to find proof that the moon goddess of her mother’s stories is real.

Fei Fei learns that engineering does not solve everything. While building a rocket took her to where she needed to be, life is complex and requires problem-solving beyond the physical and mechanical. Her rocket gets her to her destination, with a little help from some mythical creatures. But things are not as she expected, and along with her adventure, she learns life lessons about love and loss and change. She also learns that, as much as she likes to do things by herself, even she needs to work as part of a team sometimes.

The film is animated, but please note the Motion Picture Association of America rated “Over the Moon” PG for “some thematic elements and mild action.” Thematic elements include the loss of a parent and bullying. Since I don’t have kids myself, I looked online and found very mixed reviews by parents of young children. Because parents know their kids best, my recommendation is for parents to preview the film before having their young children watch it.

FEI FEI LEARNS THAT ENGINEERING DOES NOT SOLVE EVERYTHING. WHILE BUILDING A ROCKET TOOK HER TO WHERE SHE NEEDED TO BE, LIFE IS COMPLEX AND REQUIRES PROBLEM-SOLVING BEYOND THE PHYSICAL AND MECHANICAL.

I enjoyed the film and found the music fun. I also appreciated some of the life lessons it covers. I especially liked the strong, smart female character Fei Fei. While the film is myth and fantasy, it included many good examples

of diversity and multiculturalism. I recommend it as a good animated film with a resilient female character who deals with loss and change, by using determination and problem-solving. ✨

Marcie Mathis graduated from the University of Washington with a bachelor’s degree in electrical engineering. She has spent most of her engineering career as a civilian U.S. Navy employee and works at the Puget Sound Naval Shipyard and Intermediate Maintenance Facility in Bremerton, Washington. She joined SWE in 1988 as a student and serves on the multicultural committee and as a member of the editorial board.

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BE HUMBLE

$x_n = x^* - f(x^*)[x^* - x^*] / f(x^*) - f(x^*)$

$\partial^2 \phi / \partial x^2 + \partial^2 \phi / \partial y^2 = -p/\tau$
RAISE THE BAR

$\phi(0,y) = 0, \phi(1,y) = 0, \phi(x,0) = 0, \phi(x,1) = 0$

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The Ups and Downs of Virtual Meetings

The COVID-19 pandemic has demonstrated that many of us can perform our jobs from home, thanks to the advent of virtual meeting platforms. While this is good news, there are downsides as well.

By Emily Ongstad, Ph.D., SWE Editorial Board

Like many employees of essential businesses, the ways in which I work shifted drastically with the onset of the pandemic. Having a career in research and development with a pharmaceutical company meant my work would continue — and even intensify — in the pandemic world. Where buzzing conference rooms and break rooms existed in most office buildings, capacity was reduced across sites, physical distancing was instituted, and most of our meetings moved to virtual platforms such as Zoom or Microsoft Teams.

At the time of this writing, it's been about eight months since we've made this shift, and frankly, I'm exhausted. I realize I'm writing from a place of privilege: I'm fortunate to still have my job, I'm in good health, and I don't have children whose child care or school has been completely disrupted.

At first, I welcomed the Teams meetings. Because I work at one of the smaller research sites for my company, feeling truly connected with the major site has always been a challenge. As my company embraced Teams, I felt a stronger connection to many of my international colleagues. Because our other research sites are mostly in Europe, my mornings tend to consist of back-to-back meetings, with my afternoons more open for project work.

Yet, I soon found myself to be stiff and sore and totally worn out after just a morning of work. This feeling of exhaustion is far from unique and represents a considerable challenge of virtual meeting platforms. Interacting with others visually through lagging or low-quality videos makes us constantly search for connection during the exchange. And when we're not able to find those feelings of connection, we're left instead with feelings of anxiety and exhaustion.

People express empathy and build social relationships by involuntarily mimicking facial expressions and emotions. Facial expressions rarely come

across clearly on Zoom, diminishing our ability to understand and emotionally connect with one another; this can make us feel lonely and reduces our chances of building trust with co-workers.

BENEFITS DESPITE DRAWBACKS

Despite the challenges of virtual meetings, there are also some distinct advantages to these platforms. Many companies that previously required employees to come to the office have now increased flexible and remote-work options. Senior leaders and executives who spent a majority of their time traveling are also grounded. These changes have the potential to reduce the environmental impact of business travel and the number of work-associated travel and commuting hours so that we have more personal time.

Video meetings have not only allowed us to continue our work with minimal interruptions, but also provided a way to connect with family and friends. It's been almost a year since I've seen my family, and it's so hard to know that it could be another year before I see them again. If I can't share holiday and birthday celebrations, or watch my nephews and godchildren grow up in person, I can at least do these things connected by video call. Though I appreciate the technology that allows us this connection, I eagerly await the day when the office returns to some sense of normalcy, and I can hug my family and friends again. ✨

Emily L. Ongstad, Ph.D., is a senior scientist for AstraZeneca. She holds a B.S. in biomedical engineering from Michigan Technological University and an M.S. and Ph.D. in bioengineering from Clemson University. An active member of SWE, she was named a 2020 SWE Distinguished New Engineer; serves as Members at Large FY21 president; and is a member of the editorial board.

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2020: Looking Back and Looking Ahead



THOUGH THE YEAR WAS A ROLLER COASTER OF EMOTIONS, AS I REFLECT ON THE MANY PIVOTS WE MADE TO MEET THE NEEDS OF OUR MEMBERS, I AM FILLED WITH PRIDE WHEN I SEE ALL THAT WE ACCOMPLISHED DURING SUCH CHALLENGING TIMES.

To meet the magazine's production schedule, I am writing this article just a few weeks shy of the end of 2020. Like most of the world, I will be happy to see this year end. This time last year, I was with our partners, affiliates, and members in India conducting roundtables and planning for our WE Local conference that was to take place in Bengaluru in late April. All part of my normal travels for SWE. Who could have predicted that in just a few short months, we would all be grounded and dealing with a global pandemic?

The world changed and the Society responded! Though the year was a roller coaster of emotions, as I reflect on the many pivots we made to meet the needs of our members, I am filled with pride when I see all that we accomplished during such challenging times. In March, we postponed our remaining WE Local events globally and our eXXec program planned for June, all with no financial penalties for SWE. As large conferences scheduled for later in 2020 began to pivot to virtual, we started planning for a hybrid annual conference. As summer drew closer, however, and there was no end to the pandemic in sight, we made the difficult decision to host WE20 virtually. For those who were looking forward to gathering in New Orleans, we have good news: We plan to be there for WE25 — beignets and chicory coffee for everyone!

But how about WE20? It was SWE's largest conference to date, with 18,825 participants. There were more than 200 workshops and panels, engaging mega sessions, and inspiring keynotes. I loved seeing the dynamic chat conversations during the live and semi-live sessions. Attendees were sharing best practices, offering advice, and making connections. Well, that sounds like a typical SWE conference! Since we could not host physical banquets to honor our award recipients, instead each keynote recognized a set of awards and respective recipients. Then we got really creative and developed the virtual Awards Hall. To date, there have been 8,100 visitors from 34 countries who have left more than 2,700 comments and notes of congratulation to our honorees. If you have not visited yet, I encourage you to see this amazing group being recognized this year at <https://we20awards.swe.org/>. And don't forget: The WE20 content is available for a full year. That means there is still plenty of time to take advantage of all the great content.

A COMMUNITY OF SUPPORT

To better understand the impact of COVID on women in engineering, SWE conducted two studies, one in the U.S. and one in India. Here are just a few of the issues we saw from the data: Nearly one-third of SWE collegiate members who had summer job offers had them rescinded or postponed. Similarly, almost a quarter of the students who graduated in the spring of 2020 had their job offers rescinded. And for our professional members, more than 37% expressed concern about losing their jobs within the next six months due to the pandemic, and 70% expressed concern about the ability to find another job if they were to lose their jobs in the near future. To see the full reports on both studies, visit <https://research.swe.org/>.

To further enhance support for members, following a successful pilot in

June we rolled out a full implementation of an online mentoring platform. This is a great way for members at all career stages to connect with other members for advice and career coaching. Conducted as cohorts throughout the year, we encourage our late-career and retiree members to sign up as mentors. You will build meaningful connections by supporting other members. We also collated all the terrific content we have available for both mentors and mentees. Visit <https://swe.org/membership/mentoring/> to view all the resources in one place.

Lastly, in late November we unveiled an updated membership database. If you have not yet logged in to the member portal, I encourage you to do so. All you need is your primary email address that SWE has on file and you can log in and reset your password. As part of this system upgrade, we have eliminated access to some member data to strengthen our data protection practices. But if any SWE leader needs additional data, it can be requested from headquarters via a link in the leadership portal. With any new system, we are still working to troubleshoot. With a streamlined

join process and better data protection, however, I am confident this system will help us better serve our members.

To support SWE sections and affiliates, we added the ability for these groups to obtain a G Suite account. This is available at no cost and provides a platform for local groups to meet and maintain engagement with members and leaders.

BEST WISHES

As the first wave of the COVID-19 vaccines roll out across the globe, I am hopeful that 2021 will be a safe, healthy, and more prosperous year for all of us. Gathering in person will likely resume, and folks will return to schools and offices. But I don't need a crystal ball to know that SWE will be here, providing a community of support and responding to the changing times as we have for the past 70 years. Be well and happy New Year to all.


Karen Horting, CAE
Executive Director & CEO



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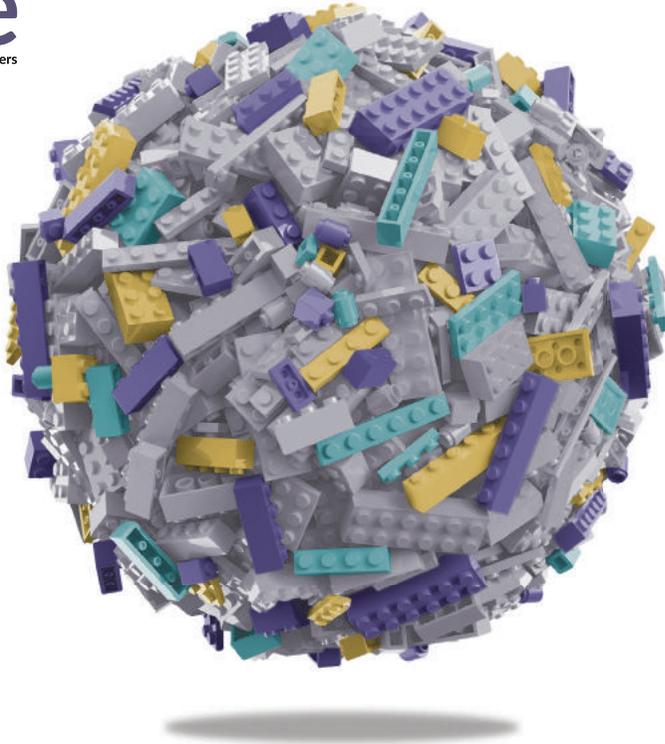
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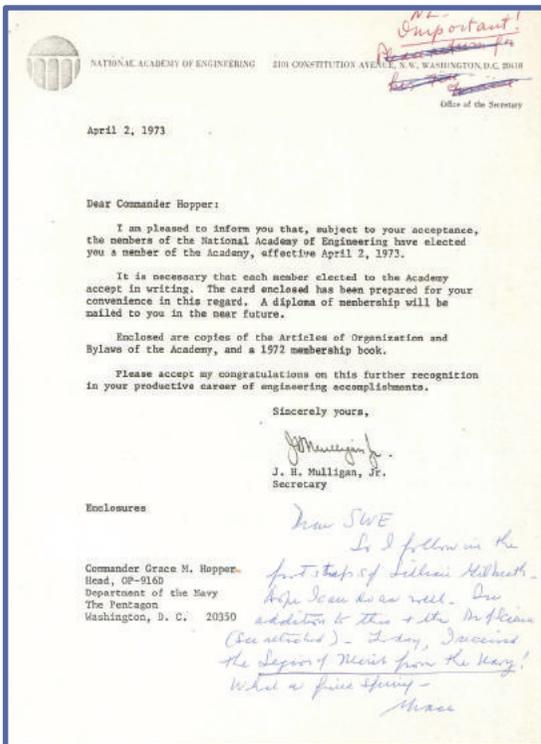
'SO I FOLLOW IN THE FOOTSTEPS OF ...'

"So I follow in the footsteps of Lillian Gilbreth. Hope I can do as well," mused then-Commander Grace Murray Hopper, Ph.D., in a handwritten note to SWE at the bottom of a 1972 letter welcoming her to the National Academy of Engineering. The NAE was founded in 1964 to provide engineering leadership and expert advice to the United States government in support of the nation's welfare. As the second woman elected to the NAE, following Dr. Gilbreth's election in 1965, Dr. Hopper and her pioneering career in computer programming and the U.S. Navy certainly met the purpose of the NAE and left her own remarkable footprints in engineering history.

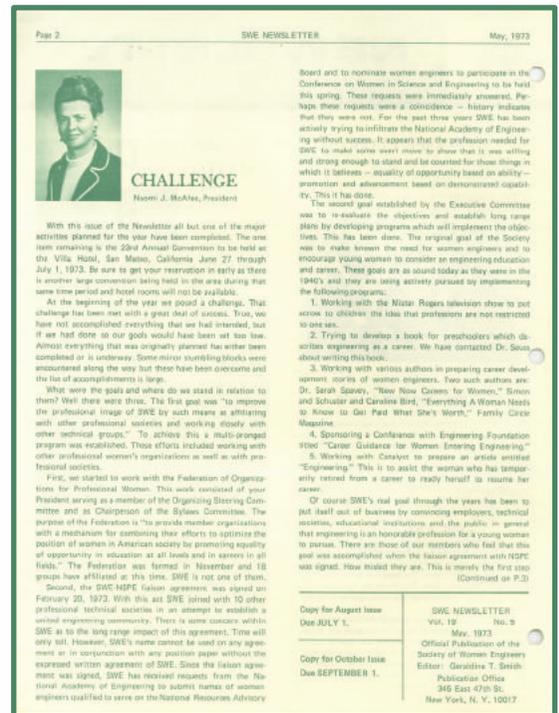
SWE hoped that its members elected to the NAE would tread a professional path for many more women to follow. "In your position in the Academy,

one of the contributions that you could make is to suggest or recommend women who have been outstanding in their fields to serve on various committees," SWE President Naomi McAfee, F.SWE, wrote in a 1974 letter congratulating SWE senior member (and future Achievement Award recipient) Mildred Dresselhaus, Ph.D., on her election to the NAE. "I realize this is a really long range plan, but it is only through that type of activity that we will eventually get the visibility required." ✨

– Troy Eller English, SWE Archivist



Dr. Grace Murray Hopper's election to the NAE was just one of the honors she received that year. In her April 1972 note to SWE she wrote, "In addition to this & the [honorary] Dr. of Science...today, I received the Legion of Merit from the Navy! What a fine spring."



"For the past three years SWE has been actively trying to infiltrate the National Academy of Engineering without success," President Naomi McAfee, F.SWE, explained in the May 1973 SWE Newsletter. She noted, however, that shortly after signing a liaison agreement with the National Society of Professional Engineers that spring, SWE had received multiple requests from the NAE for names of qualified women engineers to sit on its committees and programs. "It appears that the profession needed for SWE to make some overt move to show that it was willing and strong enough to stand and be counted for those things in which it believes — equality of opportunity based on ability — promotion and advancement based on demonstrated capability. This it has done."

If we are to thrive as a global company,
everyone who walks through our doors
must feel welcome.*

- ARNE SORENSON, MARRIOTT'S PRESIDENT AND CEO



Increased diversity & inclusion opens doors to greater innovation in engineering and technology. A partnership with SWE gives Corporate Partnership Council (CPC) members the tools they need to recruit, retain and advance a diverse and inclusive workforce. In exchange, CPC member organizations become part of the largest movement to support and empower women in engineering and technology.



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*<https://www.wsj.com/articles/the-business-case-for-more-diversity>

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