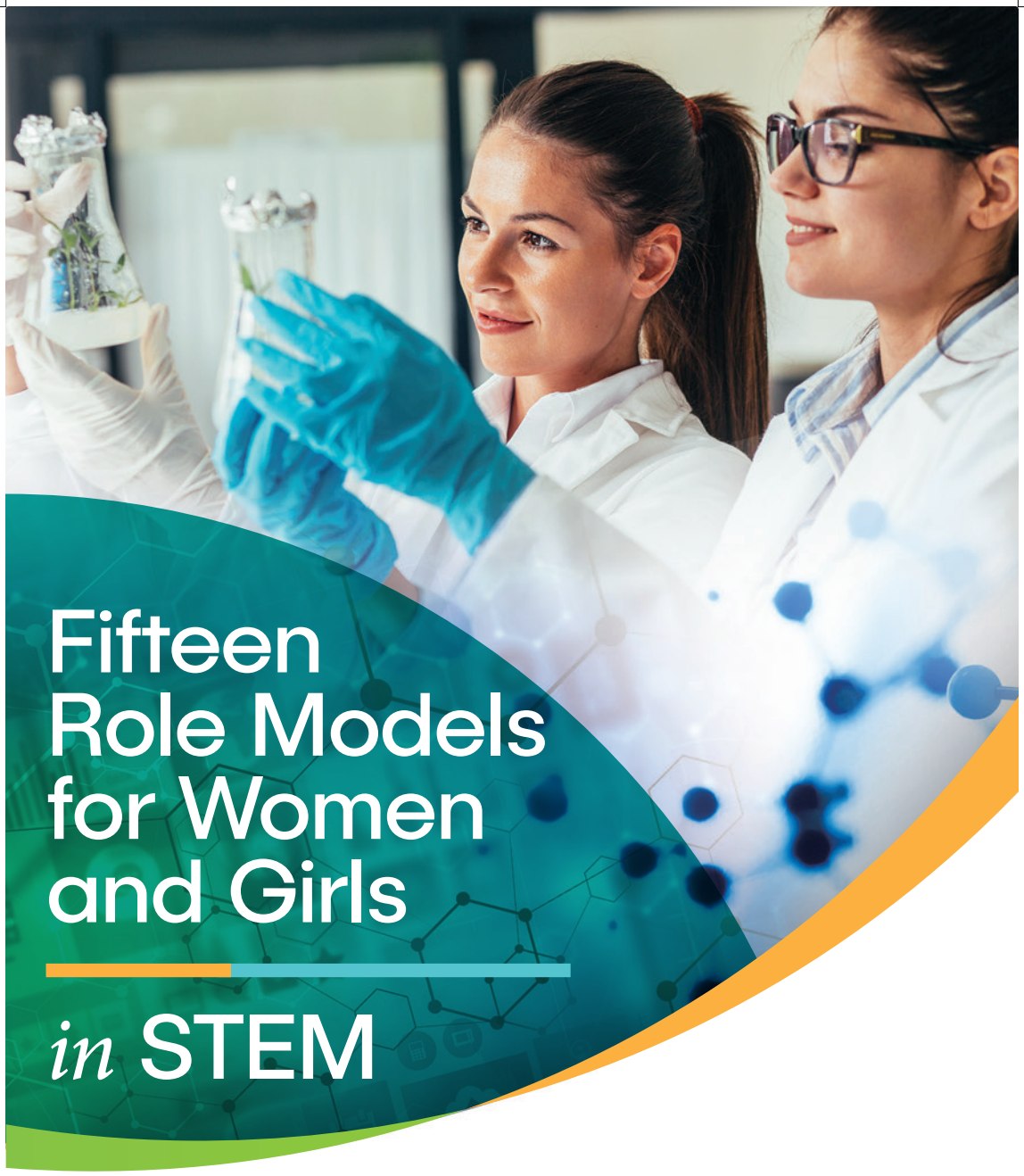

Fifteen Role Models for Women and Girls *in* STEM

APEC Asia-Pacific Economic Cooperation

Department of Gender Equality, Chinese Taipei

Foundation for Women's Rights Promotion and Development

Policy Partnership on Women and the Economy
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INTRODUCTION

The theme for women's economic empowerment is constantly undergoing changes alongside economic development and international trends. Today, ushered in by Industry 4.0 and Digital Era, the United Nations Commission on the Status of Women (UN CSW) has begun to focus on the transformation of women's roles as the workplace continues to change. At APEC, the importance of providing women with equal participation and competitive capacity has emerged amid a scenario of evolving industries and technological development.

Science examines the inherent processes of the air that we breathe, the water that we drink, and the earth on which we live. Technology transforms the outcomes of scientific investigation into accessible tools for our daily lives. Engineering applies those same outcomes to the larger scale of our daily needs – transportation, environment, mechanical systems. And Mathematics is the indispensable tool that enables the other STEM fields to reach their conclusions and create the products that we use daily.

The academic disciplines of Science, Technology, Engineering, and Mathematics (STEM) pervade every aspect of our lives. However, women's representation in the STEM field is far lower than men both during the educational stage and at the workplace. The cause of that includes lacking of peers, role models and fair opportunity for promotion in the workplace.

UNESCO also pointed out that gender disparity in STEM fields would be an impediment to reaching the UN's Sustainable Development Goals (SDGs). For this reason, "how to seek measures to foster equal participation for women in innovative industries and STEM fields" has become one of the key issues for

discussion for women's economic empowerment.

Recognizing the opportunities and profits related to STEM and technological innovation, we have implemented the APEC Innovation for Women and Economic Development Multi-year Project since 2013. By doing so, we have supported the "Innovation and Technology" pillar of APEC's Policy Partnership on Women & the Economy (PPWE) through various research studies and empowerment workshops.

We have emphasized that, the lack of gender equality in the science and technology fields not only reduces women's interest in participating in emerging industries but also prevents women from further contributing to an economy's indissoluble and inclusive growth. Therefore, in accordance with the 2017 APEC Women and the Economy Forum priorities, "Narrowing the gender gap in human resources development", We have put forward the APEC GIFTS(Gendered Innovation for Technology and Science, GIFTS) initiative as a sustainable proposal in order to promote women and girls' involvement in STEM fields for economic growth.

The underrepresentation of women in STEM is the result of many factors: social norms and expectations are different for women; women lack female role models; and many environments are still discriminatory. Accordingly, the APEC GIFTS initiative aims to provide best practices as female role models and a workshop to establish a nurturing environment, which emphasizes strengthening woman's STEM-related capacity building and exchange of best practices for industry transition and technology development.

Due to the aforementioned background, the APEC Best Practices Handbook is focused on "The Profiles of Women in the STEM Fields," in the hope that by interviewing exceptional women with different life experiences, readers will appreciate how their self-confidence enabled them to create advantageous environments. Furthermore, their experiences help to raise awareness on the lack of emphasis on women's representation in the STEM fields.

The 15 interviewees in this handbook include rising stars and influential members of society. They have applied what they learned and have made an

impact. They come from the academia, industry and start-up fields. Some are STEM role models who have undergone extensive life experience. This handbook seeks to achieve three goals: 1) Raise awareness on the lack of women representatives in the Asia-Pacific STEM fields; 2) Provide women in STEM fields role models in different stages of their career development; 3) Understand the unique development pathways within the STEM field, which will be serve as references for capacity building for Women in STEM.

The interviews endeavor to show that women's lack of participation in STEM is not just a gender issue, but also an economic issue. Just as The United Nations Educational, Scientific and Cultural Organization (UNESCO) has stated, "Unless addressed in a timely manner, women's inferior representation in STEM fields may prevent many economies from reaching their SDGs. By working in a STEM field, the women in this Handbook are thus major contributors to the sustainable development of the economies where they live and work. Their stories and suggestions are worth reading.

Kenyan jewelry entrepreneur pays it forward

Catherine Mahugu

Founder of Soko, an E-commerce Platform Facilitating Direct Trade between African Artisans and Customers Worldwide.

Catherine Mahugu calls herself an outlier, changing the normal course of how life is expected to be. At a time when entrepreneurship was considered a high risk in Kenya, she followed through with flying colors.

In school, while classmates saw teachers as figures of authority, she learned to see them as mentors, speaking up whenever a topic wasn't clearly explained to the students.

The founder of Soko, an e-commerce platform facilitating direct trade between African artisans and customers worldwide, believes she has a role to play to inspire younger women longing for their own places in the STEM field.

Set out to be different

Raised in a family with three other siblings in the Nairobi region of Kenya, Catherine has developed her interest in science since childhood, with her father and sister already in a related field. When she chose to study computer science, the family supported her. But her case was not a common scenario in her economy.

Catherine recalls that in her sister's civil engineering department, "in a class of 200, there were less than 5 women." And during her studies, she saw that

most women were not confident enough to feel that they could program.

"If it was a group work, majority of the guys would do the coding, the girls would prefer to present the group work" Catherine says.

"Gender-type jobs are prevalent in Kenyan society; some companies will allocate certain jobs depending on the gender of the applicant. STEM jobs are more likely for men. It is a male-dominated field."

Catherine explains that typically in a Kenyan family, men are the breadwinners. Women take care of the home and children. "Many women tend to consult their husbands when they want to start a business however that rarely happens in reverse. Women are yet to be the independent decision makers in majority of the households."

Catherine with her Soko team.

Citing studies about women as successful business leaders, Catherine says that they show how stereotypes need to be changed. These studies point to a "trickle-down effect" in businesses led by women, who tend to reinvest earnings back to their companies, thus benefitting the community and society. "We have an African saying, that if you invest in a woman, you invest in the community or society."

Soko is an example. Its website documents the social impact the jewelry supply chain platform has made. It has helped to increase the income of marginalized artisans in the developing world by 5 times.

From 2010, Catherine and her co-founders have nurtured Soko to meet Kenya's flourishing Internet infrastructure and high mobile penetration rate, and its business model has been proved successful.

Steer away from stereotypes

Some Soko products.

Catherine's high school had a mentoring system for its students. For one hour every week, mentors would check student's well-being, see how they are doing family-wise, health-wise, and education-wise.

"Already you have established a relationship with your teacher. A person you can confide in," she says. "This experience is instrumental in helping students raise questions, articulate their viewpoints, and engage in discussions.

Years ago, at business meetings, Catherine's presence as a young female leader would draw questions or comments such as "what made you study computer science?" or "you look like someone working in marketing."

"I do not enjoy the moment when a conversation is watered down because of my gender, my appearance or my marital status. Because they are irrelevant to the discussion we are having," she says.

She adds that at some point it gets "uncomfortable," and most people don't expect her to make a response. "But that's my nature. I am very vocal. If I find something that isn't appropriate, I will call you out instead of just keeping quiet about it."

By speaking up or engaging in a conversation under such circumstances, Catherine sets out to alter narrow-minded perspectives one day at a time. "I feel it is my role to change how people see me, or how people see young female achievers," she says.

However, she would love to see men engaged in efforts to inspire more women to enter STEM fields. "I advocate women empowerment but this is not just a woman's job. We also need men to contribute their perspectives. It makes a great recipe if you have a balance."

Creative at heart

Before Catherine tried her hands with entrepreneurship, she had some exposure to the corporate working environment. She recalls observing people do the same things constantly, and the question in her mind was "How could you improve some of the processes through innovation that the staff had been doing for years?"

In school, she took on some leadership roles. "But I felt they limited me; I wanted to be a leader in the real world. That's a different playground for me." Starting her own company was to test the waters, to reach her full potential. "School was great, but I really needed to test myself; that's how I ended up being an entrepreneur."

Life was intense during the early phase of entrepreneurship. Catherine says she pushed herself really hard, that "going home was just changing the location of the workplace." And then she had some reflections about work-life balance.

"Family matters, friends matter and health matters. We all need to juggle a number of balls in life. You can't handle one and let the rest fall on the floor, you must strive for balance" she says.

When stressed or in need of help, reaching out to others works well for Catherine. She emphasizes the importance of a support system; hers includes close friends to talk to, people in the same industry to bounce off ideas with, and masters of industries to seek advice from. "Your network is your net worth," she says.

Catherine recently finished the Keroche Foundation Mentorship Program, an intense 9-month and "priceless journey" at her hometown Nairobi.

"The mentees are a reservoir of brilliant minds, so I can easily bounce off ideas with them as my peers, from that I gained a lot. I was able to stand on the shoulders of giants," says Catherine, who sees Keroche's founder Tabitha Karanja a source of inspiration.

During the program, Tabitha Karanja took the participants to see her multi-million production enterprise.

"She (Tabitha) succeeds against all odds with multinational corporations,

and people trying to put her down," she says, adding that to have someone like Tabitha to look up to has benefitted her own growth.

She is hardworking, inspiring and has resilience, it was a great connection for me, and that's the reason why I wanted to do it."

In-depth empowerment

Catherine knows the importance of speaking up, thus she encourages her staff to be open and candid in cases of disagreement or conflict. In an open discussion, Catherine would tell her staff that she has removed her founder's hat, and assured them that whatever they said in the discussion won't be used against them.

She also instills a family spirit in the workplace because "the office is where employees spend three quarters of their lives. The least you could do is to make it as comfortable as possible for them." For her, a family is where one finds "unity" and "togetherness" and where a hierarchic structure is flattened.

In moments of uncertainty and fear, Catherine's solution is constructive honesty.

"If you are not sure what do to, you could say: well, I don't know the answer now, but I will reach out to someone and brainstorm," she adds. In life you may not have all the answers therefore it is important to hire people smarter than you.

In the meanwhile, Catherine recognizes the value to invest in her employees. She understands that employees have their own ambition, and that they may want to start their own company one day.

She has no worries, instead, she is happy to cultivate company evangelists. "You empower one person, and that person is going to empower 100 others with their own companies. That will be a great success for me," she says.

Catherine says her goal is to ensure a solid knowledge transfer. She thinks success is like science. "You can put a formula to it -- how you can empower other people to do things you are doing."

Back to genesis

While many might envy Catherine Mahugu's success at a young age, she doesn't enjoy being too comfortable. "It is like a red flag for me," she describes. With Soko, she has been able to make an impact on her staff and the artisans, but she looked further and beyond with "WaziData," her most recent establishment. "I specialize in ICT for development, and that knowledge is applicable in various fields," she says.

Catherine describes her founding of WaziData as "going back to genesis," to what sparked her to be an entrepreneur in the first place. Through this company that focuses on creating human-centered solutions and products that could improve lives, Catherine wants to make an impact on multiple sectors, with the use of ICT.

The Soko Holiday look.

"Wazi" means open in Swahili, and it embodies Catherine state of mind. This new venture opens her to collaborations in various fields and industries. For example, she has worked with Melinda and Bill Gates Foundation on improving the health of Kenyan young women. Currently she is working with a number of organizations.

At Safaricom, Kenya's largest telco company, she is involved in a project called "Blaze" to nurture young entrepreneurs through her role as a mentor and judge, concurrently she is also working with UNHCR.

"I got access to a great deal of opportunities, by being at the right place at the right time.

If I do that for other entrepreneurs, I will change the landscape of the economy, the landscape of entrepreneurs, and consequently, change the African narrative," Catherine says.

Eager to pay it forward, Catherine travels quite often to different corners of the world to tell her own business journey. "I believe we need to be our own story teller."

A woman physicist breaks through gender barriers

Yu-Jung Lu

Assistant Research Fellow of Research Center for Applied Sciences, Academia Sinica.

A previous study released by the American Institute of Physics in 2009 showed that women held only about 20 percent of bachelor's degrees in Physics. By comparison, women received 40 percent of bachelor's degrees in biology, chemistry and math.

The report did not identify any definitive cause of the disparity, but cited cultural pressures, problems with the curriculum and stereotyping as the possible causes. Such disparities are rare, especially in the US, a economy known for safeguarding women's rights in every field. But it's not easy to find women scientists in this island; Lu Yu-jung is one of the few who dares to follow the footsteps of Einstein. At 31, she is already an assistant research fellow at Academia Sinica's Research Center for Applied Sciences (RCAS).

Currently working on nonlinear plasmonics, actively tunable optical emitters and gain-assisted hyperbolic metamaterials, Lu earned international acclaim when her study was published by the journal Science in 2012, at the age of 26. Entitled "Plasmonic nanolaser using epitaxially grown silver film," the paper was a groundbreaking discovery that could be of great practical use in the near future.

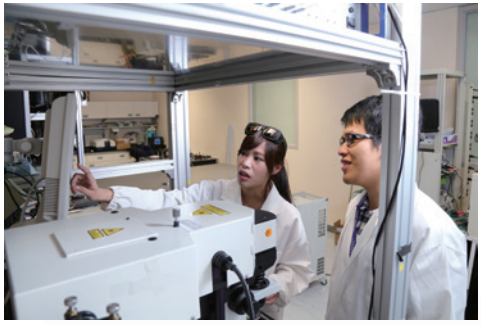
In 2013, Dr Lu received her Ph.D. in Physics from National Tsing-Hua University (NTHU) under Prof. Gwo Shangjr. She was also the winner of

several awards such as Taiwan Outstanding Women in Science—Chui-Chu Mon Fellowship, Chien-Shiung Wu Fellowship, The President's Scholarship of NTHU, Honorary Member of the Phi-Tau-Phi Scholastic Honor Society and Postdoctoral Research Abroad Fellowship.

Her research has been published in various journals, including *Nano Letters, ACS Nano, Applied Physics Letters* and *Science*. Her scientific success did not come easy and she definitely feels the low number of females in her field.

"There were only around seven or eight female students in my Physics class of 50 and in my graduate school, less than 10 percent were women," she says. Lu is the only one of two RCAS female researchers in Academia Sinica.

Gaining prominence in a male-dominated world may be a woman's pride. But some males may simply focus on her feminine appeal. "Many people see me as just an eye candy, so I have to work doubly hard to prove them wrong," she says.



Lu's research has been published in various world-class journals.

Science and math are vital

As a young girl, Lu had always been fascinated by science and math. "I enjoyed the logic and the satisfaction of solving a math equation." Unfortunately, she didn't do well in her college entrance exams. Instead of gaining entry into some top universities known for research, she was admitted into a normal university in southeastern Pingtung City which trains students become public school teachers.

That apparent failure turned out to be a blessing in disguise because her scientific talents drew the attention of her professors and school authorities. She also didn't give up on herself even though she failed to perform well in the tests.

Lu stays up late to do experiments and would carry heavy equipment by herself without the help of others.

Compared with most of her classmates started doing well in class experiments when they reached their junior and senior years, Lu showed her love for doing experiments in her sophomore year. "I could stay awake for two to three days until I finally saw some results in my experiments," she says.

She focused on reaching conclusions, which others seemed to have missed. Her persistence would bear fruit. Experimentation is a tedious process of trial and error where only one out of every 10 trials yields the desired results. And arriving at a new discovery only confirmed her resolve to engage in scientific experiments.

Science and beauty are complementary

She has also gotten used to gender stereotypes in her field. She once met a German professor in an international conference. The professor told her that no one will be willing to do research under her because she was too young and a woman who puts on makeup.

"Why can't a female scientist looks pretty and attractive? Do we have to look asexual and nerdy?" "I always wanted to be a beautiful scientist since I was 18."

Some gender stereotypes consider women too weak to stay overnight for experiments so Lu would stay up all night to prove that she had what it took to be a good scientist.

Doing experiments is a labor-intensive activity, so she did all the hard work herself, including moving heavy equipment without the help of male colleagues. “Women are more attentive to detail than men and can easily succeed in the scientific world,” she says. “We have to convince others of our expertise.”

Sisters, do what you love

Looking back at her road into science, Lu feels grateful for a government sponsored fellowship that enabled her to continue her postdoctoral degree in the U.S. An “Overseas Postdoctoral Research Fellowship” granted by the Ministry of Science and Technology in 2014 allowed her to serve as a postdoctoral scholar at the Applied Physics and Materials Science of the California Institute of Technology, that she still regularly visits as visiting scholar.

“I support gender equality especially in the field of science,” she says. “I would like to see more women enter science as a career, and teach science, technology and mathematics; this will also encourage other women to do the same thing.”

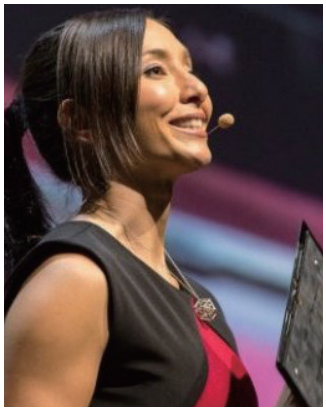
Her parents and husband have always been extremely supportive of her research work. She calls on young females to follow their heart and their interest in choosing their career. “It is important to do what you love.”

Those who are interested in science can join Science camps that provide more information. Aside from continuing with her research, Lu says she wants to become a professor to share with students the beauty of science so that more youth, especially young women, can have female role models to follow.

“The most important thing is never to give up,” she says.

In 2012, Lu visited a university overseas.

A woman of STEM who maximizes her talents



Michelle Dickinson

A senior lecturer in Engineering at the University of Auckland, New Zealand
Director of Nanogirl Labs Ltd

Dr Michelle Dickinson, a researcher and teacher of science and engineering, aspires to spread her love of science among those who perhaps have never thought of how these fields affect our daily lives.

A senior lecturer in Engineering at the University of Auckland, New Zealand and Director of Nanogirl Labs Ltd Michelle has always followed her dreams and never let traditional stereotypes scare her. Her unique insight into how nature and technology interact and lead to scientific developments is rooted in her background in Biomedical and Materials Engineering.

She strongly believes that everyone should have access to learning about science and how things work, no-matter what your age or education level is. "Science should be open, transparent, and a topic of conversation over the dinner table, not just the lab bench," she writes in her blog www.medickinson.com. "My vision is to create positive role models in the world that our children can aspire to be like."

"I'm very lucky because my father was an engineer, and when I was eight he gave me a soldering iron. This taught me how to be courageous and to learn new things and that we should never stop learning. I learned engineering from him."

At a young age, she started asking what things were made of, who designed them, why would anyone use a material to build a building. This fascination with the world

around her drove her to become a materials engineer. Materials engineers develop, process, and test materials used to create products, from computer chips and aircraft wings to golf clubs and biomedical devices. They study the properties and structures of metals, ceramics, plastics, composites, and nanomaterials (extremely small substances).

In modern materials science and mechanical engineering, the subject called Fracture Mechanics studies how cracks in materials grow and eventually break a thing. It analyzes the force that fractured the steel hull of a ship, the iron bar within the beams of buildings, or the plastic or rubber material of car bodies.

"I learned fracture mechanics because one thing I was very good at as a child was breaking things," she says. "I would open them up, see what was inside and then try and fix them."

"Fracture mechanics is really about breaking things and then you tell people how they broke. It was my dream shop. So when I found out that you could break things and never have to get told off, well that's for me."

When fracture mechanics is used to study or manipulate materials on an atomic or molecular scale, we have nano fracture mechanics. And this is one of Michelle's many areas of expertise. "Everything in electronics is getting smaller," she says. "When you drop your cellphone, it doesn't break and that's because we test all these components and try to make them as strong as possible."

Nanogirl reveals the greatness of science

Michelle sets up and runs New Zealand's sole nano-mechanical testing lab, which conducts research into breaking extremely small materials such as cells. She used to be painfully shy and afraid of public speaking. On the advice of a speaking coach, she invented the alter-ego "Nanogirl" as a way to overcome her nerves. She initially used the name "Nanogirl" to write a science blog, then as it became more popular, she started a YouTube channel and began to speak at schools and events.

Her passion to create new ways for the public to interact with science can be seen through her television appearances, live Theatre Science Shows, science comedy podcast "Stupid Questions for Scientists" and science communication videos.

This ability to make the study of science interesting for mass audiences is rooted in a thorough understanding of her field and how her expertise could benefit others. The Dickinson nano-mechanical research lab specializes in nano-mechanical testing to measure the mechanical properties (hardness, modulus, stiffness, scratch resistance) of a wide range of materials. The lab changes the direction of its research based on new discoveries and advances in technology.

Michelle has not been spared the travails of working in a field dominated by men. In secondary school, she thought that like her, girls learned engineering from their fathers. "I remember my first day at university when there were just three of us studying engineering. I found it very difficult when I found myself in a world of men; the lecturers were also men and so there were no role models to look up to."

In her first job, she was the only woman and every time she attended a meeting with clients, she was mistaken as the receptionist, "because I was a woman; I would tell them no I was the engineer, and they would say oh we thought you were here to take minutes."

People judged her differently because of her gender. She found it difficult in the beginning because she felt that she had to prove herself while her male colleagues didn't have to do that. They were always assumed to be the engineers; that they would be smart and they would have all the information.

Engineering a lonely field for women

Why do less women go into engineering? Does the fault lie in the system or in the way women are brought up?

"I think there are lots of reasons, she says. I work a lot with children and I meet a lot of girls who hit the stereotypes – engineering isn't for me. Girls want to be beautiful, to be fashionable, and to be famous and they don't say 'I'd like to be an engineer and to have a tool set and to fix things."

In Australia and New Zealand, women are significantly underrepresented in higher education technology and engineering fields. Less than one in six students enrolled in information technology (15.5%) and in engineering and related technologies, 15.2% were women in 2015, according to Catalyst, a non-profit

organization with a mission to accelerate progress for women through workplace inclusion.

"Not very many and it can be quite lonely sometimes," says Michelle. "I think those are some of the challenges." How did she confront the challenges on her way to becoming an engineering role model for women?

With New Zealand TV presenter Brooke Howard-Smith who spins some eggs for science.Michelle's passion to create new ways for the public to interact with science can be seen through her television appearances and science communication videos.

"I would not say I've overcome them; I would say that I'm still working on them. There are challenges everyday. I would just be very forward about who I was in meetings, say that I'm the engineer and be ok with their faces of surprise."

Does that happen often? "All the time," she says. "Sometimes, I call out sexism in meetings."

Very commonly in a meeting, tea is served. Her colleagues would assume that Michelle would put the tea cups away. So she started not putting the teacups away to see what would happen. "And nobody puts the teacups away."

So she started to be clear when it was their turn to put the teacups away. "It's everyone's responsibility and you couldn't just rely on the female to do it. We want to hold people accountable and say we all need to do this."

Besides her father who inspired her to enter engineering, she received encouragement from other male teachers and colleagues. Plus other women engineers would help her deal with the challenges that came from being a woman in a STEM field.

"This has been incredible, I've had great lecturers, and my Ph. D. supervisor

supported me and treated me as an equal, making sure I had equal opportunities. I feel grateful for people in my life who have helped me and opened doors and helped push me through."

And now she's trying to do the same, and to make sure that every time she opens a door, she's also helping somebody come through.

But she's disheartened by the many women who drop out of STEM. Usually after the first two or three years, the girls tend to give up. She talks to them about it and some of them say they wanted to start a family and needed a flexible work schedule. Some of them say that in such fields there were very few women and they felt very lonely.

So they move to finance because there they could use their skills in engineering, mathematics, and analysis. There are many more females in banking because

Michelle Dickinson strongly believes that everyone should have access to learning about science and how things work, no-matter what your age or education level.

they find it very difficult to do flexi-time with engineering jobs since it is still very much a traditional 9 to 5 workplace. Another reason is the small number of female students who study physics and mathematics in secondary school in New Zealand. This means that fewer women apply for engineering studies since both subjects are required.

Besides her passion to make science more accessible for everyone, Michelle co-founded the charity OMG Tech in 2014 to provide children of all ages and backgrounds access to learning opportunities about technology. In October 2016, she resigned from her position at OMG Tech to concentrate on her Nanogirl activities.

A true woman of STEM, Michelle understands that women are more expressive with their feelings and passions.

"I think we listen to our feelings much more and tend to be more in tune with our emotions and gut instinct and scientists think this is almost a sub-conscious and hormonal release due to some experiences in our lives that are either positive or negative. And Science does not have the answer to such intuition."

Grooming the next Marie Curie

Komal Dadlani

CEO and Co-founder of Lab4U

In Lab4Physics, an App that allows users to do science experiments with their smart phones, you see a girl lifting weights, riding a skateboard or an Asian boy showing you how to use it.

"This is our inclusion strategy," says Komal Dadlani, CEO and co-founder of Lab4U, the creator of a series of evolutionary mobile tools that aim to democratize science.

The App is designed to let everyone identify themselves with science, especially women. As Dadlani explains, her team has put female identification in the app design, to make it "fun and engaging" for women.

Lab4U has three applications: physics, chemistry and biology. Dadlani cites recent statistics to show the growth of Lab4Physics, that since the first pilot in 2015, there are currently 21,595 students and 2,139 teachers registered, and that student's school performance has largely improved. Dadlani has received some awards including Toyota's Mother of Invention prize and Cartier Women's Initiative Awards.Society needs to value women more

Dadlani has been passionate about science since childhood. Her parents, who were immigrants from India, settled down in Chile. They fostered her curious personality.

In India and to some extent in Chile, the general social expectation was for women to study "easier" or "feminine" subjects. "Society needed a change," she said. Fortunately, her decision to study science won the support of her parents and teachers. But according to her, it was a "jumpy ride, an emotional

rollercoaster because it was very difficult and at the same time fulfilling."

Dadlani explained that for anyone to excel in science, one had to be resilient because experiments were not going to work the first time. Scientific trial-and-error experiments steeled her resolve. She decided to focus on the bright side.

"Ninety-nine of your experiments were not failures; they were 99 ways to learn not to do something." It was a glass-half-full mindset that helped her during her studies. "I think it prepared me for life, because life is not perfect."

Dadlani considers herself lucky for having immigrant parents, who left their own economy, came out of poverty and struggled for their children to have a better environment.


Dadlani's parents were immigrants from India.

Growing up, she had to face issues that came with being the daughter of immigrants, a vegetarian in a meat-loving economy, and for having dark skin color. She was a woman in a male-dominated field.

Even now when she pitches Lab4U to potential investors, one common question she has been asked was whether she had male co-founders. "I do have male co-founders. I don't know if I'd been able to raise money if I was alone. Most venture capital investment in STEM come from male investors for male entrepreneurs."

Succeeding in a chauvinistic world

In Chile or Latin America in general, the society has a strong chauvinist orientation. Women pursuing careers in a STEM field have to deal with this reality. "It is not because women don't have talents; the opportunities are not the

same for us so we need to prove ourselves a lot more than men," says Dadlani.

She cites the "STEM leaky pipeline" studies that show how women in upper primary school are highly interested in science but steer away when they reached their teenage years. "There are social and motivation problems", she says.

"People think being in a lab, being a physicist or an engineer is a male job." She cites the Lego games for boys and dolls for girls. "Society is not inspiring girls to think out of the box, to be curious, or to be builders; society is motivating girls to look after babies."

In her opinion, increasing presence of female role models could change the situation bit by bit. Good examples are female presidents in Latin America, and female scientists in the movie Hidden Figures. Dadlani believes having them as role models to inspire younger women would change and shift the mental paradigm.

For her, it's also a numbers game. "The day we are able to prove there is a female Mark Zuckerberg, female Steve Jobs, female Elon Musk, or female Bill Gates, things would change. If girls can't imagine it, they won't desire it," she says, and "desire grows interest."

Mentored every step of the way

In her life, different mentors and advisers helped her through short-term, mid-term and long-term struggles.

The first were the masters, established professionals who have struggled and achieved. "Someone you look up to and inspires you; someone who shapes your life," she says, "they give you a long-term vision."

The second type of mentor is 5 to 10 years more experienced than her and offered practical examples on how to solve the problems. The third are her peers; these could be her co-founders or fellow entrepreneurs. Together they collaborate, and brainstorm for solutions to untangle challenges they probably all have.

"No man is an island. Innovations happen when you think out of the box, and see things from a different point of view. The only way to do it is to have

more minds, more points of view looking at the same problem," she says.

Dadlani met one of Lab4U's advisers at Silicon Valley. In the beginning, she just wanted to have coffee with her and get feedback about her company from someone with experience.

Since Lab4U's first pilot in 2015, 21,595 students and 2,139 teachers have registered.

"And then we had another coffee. We started building that relationship, where she (the adviser) started helping the company a lot," says Dadlani, who spent four years building up solid relationships for Lab4U.

Alignment in vision and mission as well as rapport, are the indicators that tell Dadlani that someone was meant to be her mentor.

"You don't go to a conference, listen to someone, and then ask: hey would you like to be my mentor?" she jests.

"Every relationship takes time, energy and interest," she adds. Last year, she moved to Silicon Valley after considering the advice from a mentor who told her, "you have a Ferrari, and in Chile, you don't have highways to drive the Ferrari."

To find more opportunities to grow Lab4U, Dadlani now spends half of her time in Silicon Valley and the other half in Chile.

Overcome gender bias in men

To empower more women to participate in STEM fields is not only the work of devoted female role models like Dadlani, who stresses "equal mindset shift" and "openness."

"We also need to have more men overcoming their gender bias, so they can

give women more opportunities, and sponsor and invest in more women."

There are distinct gender differences. Dadlani cites some studies she has read about science education. If you ask a boy what he intends to do with the science he has learned, the answer would be to build something cool, whereas a girl would answer that she would like to help people.

"Women have a certain level of empathy that men develop later or do not develop at all," says Dadlani, who pushes for an egalitarian society.

"I believe having a good balance between men and women in science will give us a better world of equal opportunities with technology that is not destructive but constructive," she says.

Dadlani met her co-founder Alvaro Peralta in a start-up event in their university. The reason why they teamed up was that they saw the same problems in science education---a serious shortage of lab equipment and lack of capable instructors.

Commenting on team formation, Dadlani says it was "serendipity." "I am a biochemist and he is a software engineer. It was a good combination."

In the core leadership of three, Dadlani is the only female co-founder, but she feels the team ambience is balanced. "I am lucky to have understanding co-founders who believe in gender equality."

When it comes to conflict resolution, she thinks good communication is rule number one.

"Be very transparent with your team, with your personal interest and professional interest. You need to trust your team, because they have the best interest for the company, and for you as a person," she explains.

Dadlani says that for anyone to excel in science, resilience is needed.

Her co-founders initially disagreed with her decision to move to the U.S., but their investors wanted it and so did Dadlani. "In the end, we had to adapt to the situation for the best interest of the company; on other occasions, others will have to adapt."

World changer

The same year Lab4U was founded, Dadlani's mother passed away due to cancer. She believes these two major life events were related. Recalling how frustrated she felt over the absence of an absolute cure for cancer, she came to the conclusion that the world needed more people thinking how to solve its biggest challenges, for example, cancer, climate change, depression, and energy problems.

"We need people who want to make a difference in the world. We need to empower everyone who wants to experiment, to learn science, to become the next Marie Currie," she says. And this is exactly why Lab4U works to give everyone a chance to have a lab in their pocket. "The next Marie Curie could be anywhere in the world," she adds.

At an age when social expectations would encourage her to take on some female roles like wife or mother, marriage is not in Dadlani's list of current priorities.

"My father, my aunts and uncles want me to get married, but I want to change the world."

Women should see the bigger picture, Filipino academic suggests

Leah Alvino Macatangay

Dean at the College of Engineering of the Central Colleges in the Philippines

Five years ago when Professor Leah Alvino Macatangay assumed the position of Dean at the College of Engineering of the Central Colleges in the Philippines, she had three female staff. She now has a staff of twenty-eight men and women.

As their leader, Macatangay often finds herself facing senior male colleagues who are more experienced and who have done more research projects than she had ever done. Disagreement is inevitable, especially in the early days of her tenure.

She coped with everything by having a "firm attitude." Gradually, her professionalism at work and enthusiasm improved the quality of teaching and she gained the trust of her colleagues. "I always do my best," she says. Her determination has grown her capacity to face various challenges and to inspire her students to reach their full potential.

Succeeding in a field where most are men

Macatangay's dream as a child was to become an astronaut. Unfortunately, there were no schools in the Philippines that offered such a degree of study.

She then chose to study industrial engineering. Her parents, who are both chemical engineers, were her earliest role models. Seeing how her mother did it, Macatangay had no doubt pursuing a similar path. Her parents are proud of her as well.

Compared to other engineering specialties, there are already more women in industrial engineering but men are still the majority. The position of the Dean is usually taken by men. Macatangay's impressive credentials have made her more than qualified for the job.

As an expert in industrial engineering, she has more than 25 years of experience in the field, having worked as consultant to a number of multinational firms on their supply chain and operations. In addition, she has developed in-depth knowledge in social enterprise and start-ups during the eight years she worked at the Entrepreneurs School of Asia. She has been a professor in charge of curriculum and administrative affairs, besides teaching. She often attends seminars, conferences and training courses to keep up with the latest trends in the industry, so that she could provide her students the most updated information.

Women work hard for those they hold dear

Macatangay believes in the value of social enterprise. She says that in the Philippines, people who have received higher education are not sufficient to sustain the nation's development and growth. PhD degree holders, to some extent, are meant to serve the economy. This thinking drove her to write her PhD thesis on social enterprises and their strength to solve a range of problems faced by developing economies. Those problems include poverty, the health

With friends while waiting for a seminar. (Photo by Anna Abalahin)

system, unemployment, and lack of education resources, environmental and ecological issues.

She cites Mr Muhammad Yunus from Bangladesh. Yunus gave up a teaching position in the U.S. to return to his hometown. He gave loans to 42 women who suffered from usurious loans and about to lose their livelihood. With Yunus' help, they set up small businesses to feed their families.

Macatangay says that women are capable of nurturing others and maintaining relationships without detriment to their career development.

All of the 42 women repaid their loans, Macatangay says, proving that women would do their best and work hard for those who they hold dear to their hearts. "The world needs such a driving force to push for change, and social enterprise provides a model to solve the imbalance of supply-and-demand issues."

Women are good at multi-tasking

Macatangay believes women are good at multitasking, and always take care of everything –––– family, career, romance, health and social network. For her, women's nature to nurture others and maintain relationships with them shall not affect their pursuit of career development. More specifically, to take good care of both family and career is an "eternal struggle" for women.

"We (women) have to prioritize and find out what's the primary goal in life, and then decide how to allocate our strengths," Macatangay says.

This March Macatangay moved back with her parents, who are in their eighties with declining health. They pay frequent visits to the hospital. To take care of her parents, Macatangay has to shorten the time she could spend with her students and reduce her business trips. She does her best to arrange her

schedule and not take work home.

Others make changes at work for their marriage, Macatangay does it for family reasons. She suggests that when women face multiple challenges from work and family, they should immediately develop a self-managing system. What she would do is prioritize items on the to-do list, allocate time accordingly so to make the best use of her time with efficiency.

With parenting, Macatangay believes it is important to develop children's independence and sense of responsibility, and give them the chance to learn how to take care of themselves.

"Do not put all the pressure on yourself," she says.

Drop your fear of mathematics

For those who plan to study science and engineering, Macatangay suggests that they drop their fear of mathematics, retain their curiosity for the world, and accept challenges with open arms. Science and engineering are typically considered as fields only for men, and more women entering this playground could break the stereotype, says Macatangay.

For those who are to join the workforce in science, she understands that most women have mixed feelings. Many of them choose to stay in the office. Macatangay suggests that, instead, women should be more confident in the pursuit of their goals and dreams, despite objections or doubts from their male peers.

Her experience has shown that men are usually ambitious in the workplace, and they are more likely to focus on science and engineering from an early stage and then follow through. Therefore, she says women need to be more determined, building a solid confidence and courage to achieve their goals.

Furthermore, Macatangay encourages women to set their goals on a different level than self-fulfillment and satisfaction. In her eyes, setting goals for the big picture such as the family, the society, the nation or even beliefs would bring women more happiness and sense of achievement.

Transforming makers into entrepreneurs

Nguyen Thanh Phuong

Co-Founder & Fab Facilitator of Fablab Hanoi

Nguyen Thanh Phuong, co-founder and director of FABLAB Hanoi, dreams of seeing more applications of science and technology in life.

"I realized that in Vietnamese universities, we learned a lot of theory, but we didn't know how to put them into practice", she says. "Fablab seeks to fill in this gap and empowers people to change from makers to entrepreneurs"

And why transform makers into entrepreneurs? "Normally, makers make things as a hobby", she says. "But if they cannot make money from it, they won't be able to keep on making. Therefore, makers must transform themselves into entrepreneurs"

"Fablab is a pre-incubator; we support startups from conceptualizing a product idea to the production of a prototype. Incubators do more than that."

In 2016, they started with 4 full-time staff and 7 student volunteers. They took on seven projects that they sought to guide from product concept to actual production.

Hazang, a name taken from a province in Viet Nam is one successful project. It is also the brand name of bluetooth sound speakers made of bamboo.

Two young French engineers wanted to combine the centuries-old craftsmanship of Vietnamese bamboo products makers with electronics. Put the speakers on top of shelves and let the shine of the bamboo light up your

living room, said Phuong. Each speaker is hand- made and takes several weeks to make. The manufacturing process requires very few tools, only the deft hands and attention to detail of craftsmen.

Fablab also succeeded in pre-incubating Micromen Mechatronics Viet Nam (MME). A maker of 3D printers, Fablab helped promote their brand name. The owner of MME now works with Fablab as a team member.

Creativity with meaning

In 2015 before formally registering Fablab, Phuong and her team conducted workshops where they trained attendants on how to put their ideas into practice. They identified those with manual skills and helped them develop those skills.

"We organized monthly events and training sessions," she says. They soon

Phuong and her FABLAB Hanoi team in an IoT event competition held in December 2016.

FABLAB Hanoi team in an internal training.

felt the need to officially register Fablab with the government and increase their staff from 5 to 11. Phuong quit her job as an IT project manager and devoted all her energies to Fablab.

They advised workshop attendants to produce items that applied digital technology to machines such as CNC (computer numerical control) machines, 3D printers …

Their students start young, all keen on learning how to put theory into practice.

"At Fablab, we have a group made up of children from 8 to 15 years old; another group of high school students and university students"

"They enjoy creating simple systems such using their mobile phones to water plants and how these could be developed to irrigate farms."

Phuong and her Fablab Hanoi team do individual and group mentoring. Sometimes university professors and secondary school teachers invite them to share the Fablab vision with students.

"I share with them the need to infuse meaning into anything they create," she says. Is this purposeful creativity the only thing needed for entrepreneurs to succeed?

"I think an inner motivation is also needed for success; they should know why they want to do something."

"It's not easy to discover this inner drive. But when you answer the question why you want to do something, difficulties can never stop you."

At Fablab, people connect with other people. They acquire experience especially in building communities. They learn how to do things themselves instead of always depending on other people. "DIY has much value," says Phuong. "People learn how to use their skills to help others."

A mother to young entrepreneurs

Jane Shih

Co-Founder & CEO of WeTogether.co
Managing Director of Girls in Tech Taiwan
City Director of Ladies that UX Taipei

What skills do women need to succeed in STEM? Jane Shih, co-founder and CEO of WeTogether.co and managing director of Girls in Tech Taiwan, says that technical skills are basic.

"But curiosity is just as important because it strengthens one's self-learning capability. If you're curious, you will want to learn, and connect the dots that could lead to the solution of a problem." "Resilience is another trait that women need. When you run into failure, you need the inner strength to bounce back."

The Hour of Code activity trains students to flex their creative muscles, experience the work of coding, and learn the basics of programming.

In a 2013 interview with NASA Public Affairs, U.S. astronaut Nicole Stott talked about engaging her family when she had to go on space missions for four or five months. "You want to make sure that your family is involved in that adventure that you're about to have." Stott is a wife and mother of a young son. Shih had a six-year old son.

"I remember reading an article

why NASA seems to prefer moms when they recruit astronauts. I think this is because moms have higher levels of sensitivities and resilience," says Shih. "For me, work sharpens a woman's abilities and giving birth to a child polishes our personalities."

During the Smart Learning Workshop in September 2017.

Founder of Women Who Code, a professional community for women in tech, Shih said that besides nurturing a high degree of tolerance and resilience, women need to build up inner qualities. "You can propose a hundred projects and get rejected a hundred times, but if you're resilient, you can bounce back."

A passion to help women excel

In 2012, Shih worked for eBay in Silicon Valley as a senior manager, responsible for technology operations. She worked directly with the vice president for the Data Center.

An American multinational corporation and e-commerce company, eBay Inc. provides consumer-to-consumer and business-to-consumer sales services via the Internet. It is headquartered in San Jose, California. "Every day I worked with the engineering team to manage the budget," says Shih. "In our department, out of 600 employees, there were only 11 women."

"I then remembered what Facebook COO Sheryl Sandberg wrote in her book *Lean In: Women, Work, and the Will to Lead* -- men still run the world." In Lean In, Sandberg cited that of 197 heads of state, only 22 were women; of the top 500 companies by revenues, only 21 were headed by women. In politics, women held just 18% of congressional offices.

"I asked myself how women could become role models within their companies. I think part of the problem is upbringing; women tend to stay in the background. We're not outspoken and prefer to listen," says Shih. The things that boys and girls used only served to boost a propensity to be compliant. "Young girls play with toys colored pink; we don't play with rockets."

Soon after her return home, Shih founded WeTogether.co at the end of 2014. A networking platform for technology professionals, the company seeks to support women in technology. "This is my passion," she says. "I understand how important it is for women to join and grow in the tech industry."

In 2015, she launched Taipei Women in Tech and set up local chapters for some international NPOs related to Women in Tech and Entrepreneurship. As managing director of Girls in Tech Taiwan, and city director of Ladies that UX Taipei, Shih is living out her dream of connecting women in STEM.

AngelHack is a global, connected community of coders, innovators, and changemakers. Its hackathon offers many games and activities that keep participants on their toes.

"I want to help fill in the gap of female role models within the technology industry," she says. Girls in Tech strives to connect women in the industry in order to help them advance their careers.

"We have achieved the gradual creation of an 'ecosystem' on this island. This would encourage more women to start their own companies." Women Who Code has more than 4,000 active members across various technological communities. It is a global nonprofit organization dedicated to inspiring women to excel in technology careers by creating a global, connected community of women in technology. The organization tripled in 2013 and has grown to be one

of the largest communities of women engineers in the world.

"We provide an avenue for women to pursue a career in technology, help them gain new skills and hone existing skills for professional advancement." "We foster environments where networking and mentorship are valued."But will technology ultimately affect the unique quality of women to focus on people?

"I think it will certainly have an impact. But there are examples of how this focus on life blends well with technology. Take Yoojung Ahn as an example. She was never a car designer. She was designing consumer devices to fit into a person's hands."

Ahn designed Google's self-driving car in 2013. She designed it for passengers and pedestrians, not really for drivers. "As you said, men are focused on machines, but women designers think of the safety of everyone."

"I think this is a woman's perspective."

Flexible work hours needed

"We need to track how many women really go into STEM. Here, we have a good record in terms of male and female equality. Forty percent of students who study science and technology are women. This shows how the government here encourages women to enter STEM. But there's no tracking out of college.

"In the U.S., I realized that the big challenge was how to manage people from different cultures. How do you work with the engineering team if you are not an engineer?" For Shih, it is important to have an open mind to work with other people.

"This is important because people need good communication skills. They may be good technical people but a lot of them don't have good communication skills," she says.

"Groups like Python Ladies, Open Source Ladies and Wiki Wiki women often have discussions on how to improve their technical knowledge. But they hardly talk about how to work with others in different fields and become team leaders and have much influence."

How do men and women differ in their ways of working with others?

Men have the capacity to move on, says Shih. They make a decision and that's it. When they decide, they will not dwell too long on the matter. "Women care too much about people's feelings. If I argue with you too much, I feel like I'm not a nice person. And this presents a problem when you have to let others know how you feel."

For example, some women may wonder how they could tell their bosses that they deserved a raise. But they may have the nagging thought that they're not good enough. "I may consider myself ready to be a manager, but since my boss has not taken the initiative to promote me, maybe I'm really not ready for it."

"Or she may want to move to another department where she fulfills 80 percent of the requirements, but the job may ask for 10 years' experience

"We need more flexibility in the workplace", says Shih, "especially when we have children. Flexibility means I don't have to worry about reaching the office before 8 o'clock. "

managing people. Well I only have two years' experience so I can't do it. Men would immediately go for it. They say I only meet 50 percent of the conditions, but I can make it happen."

Is this due to a deeper sensitivity in women?

"Yes, I think women worry too much. Women feel like we have to be perfect before we can ask for something. I think women don't just look at the big picture, but they also break them down into the details and think of how to make it happen."

What can the private sector and governments do to support women in STEM?

"We need more flexibility in the workplace," she says, "especially when we have children. Flexibility means I don't have to worry about reaching the office before 8 o'clock; we could opt to get there earlier and then leave earlier, or we could arrive late – getting things done is what's important."

This freedom will encourage women to stay on the job longer because they can take care of their families. This will then enable them to move up the corporate ladder.

Many women fail to move up because the job becomes more demanding on top. But technology has broken down the walls of the workplace. Women can now work from home and manage to attend meetings online.

"This means I can keep up with the demands of my job and still find time to take care of my kid."

Break gender bias by being who you really are

Anne Yang

Principal Program Manager Lead, Microsoft Taiwan

In Anne Yang's eyes, scientific formulas are just as beautiful as art, and in the field of computer programming, women are just as competent as men.

Yang, Deputy Director of Research and Development at Microsoft Taiwan, encourages employees to find out what they are good at and devote their time and energy to grow in that field, regardless of prevalent social expectations or gender stereotypes.

Yang has always stood up against gender stereotypes. She went to an all-female high school where students scored higher in humanities, history and literature rather than science subjects. Her high school principal once made an announcement that "women are not made for science studies." To prove the principal wrong, Yang changed her mind from studying law to science. "I wanted to show that women could make it," she says.

As a high school student, she defied social convention and found her talent in science. She graduated from the Institute of Nuclear Engineering and Science at National Tsing Hua University, worked for Acer and Texas Instruments, before joining Microsoft more than 10 years ago. Yang is now in charge of the company's research and development, taking a lead position in the tech department.

Defying gender stereotypes

From university to the workplace, Yang was always surrounded by males, and she always got along well with them. Yang believes the opportunity to participate in the STEM field should not be based on gender. "There are men who are just as sensitive as women, and women who are just as career-driven as men. There is no place for gender bias in the workplace," she says.

For her, institutionalized practices that seek to remove or diminish gender stereotypes would allow employees to work at tasks that best fit their expertise. Microsoft is an example. To increase diversity, the company has a number of policies in place to grow the number of female employees and overturn any gender bias and stereotypes that have been there for a long time.

Policy implementation includes online courses, sitcom showings and a committee for diversity. Yang says the internal training remind employees of their behavior and open them up to balanced views. "Our hope is to build a tolerant and fair workplace," she says.

For example, there have always been fewer women who attend job training. Some women don't feel at ease when there are more males present. Also, untidy workshops discourage women from attending.

To encourage more female participation, Yang believes that there must be other ways to create an environment or

Anne encourages employees to find out what they are good at and devote their time and energy to grow in that field.

activities that are women-friendly. Online courses and female-only Hackathon events are part of the solution.

Mandatory internal training on inclusiveness

In 2016, the gender ratio among Microsoft employees globally was 25.8% female versus 73.7% male, as documented on the company website. In terms of hiring, women represented 27.7 % of all new employees, and 21.7 % of all new employees in technical jobs.

Gwen Houston, Microsoft's Chief Diversity & Inclusion Officer, cited a few initiatives to enhance employee diversity. Among them, she mentioned continued mandatory internal trainings on inclusive hiring and awareness of unconscious and unintended bias, and continued investments in STEM programs to help fill the pipeline with the potential and talents of diverse people.

More specifically for women and minorities, the company creates and delivers compelling career development offerings.

A recent study released by Microsoft UK found that while a more gender-balanced workforce delivered better quality work, generated more value and in turn reaped better rewards, one of the actual challenges besides the lack of gender diversity, was the lack of appetite to

Anne says the internal training remind employees of their behavior and open them up to balanced views.

address this issue.

The study suggested more investments in diversity among those studying Computer Science. For instance, Microsoft UK's DigiGirlz program, a one-day event each November at its headquarters has participants connecting with Microsoft employees as a way to gain personal insights in their field of study.

"The day is designed to equip the girls with a better understanding of careers within this sector through thought-provoking exercises and innovative product displays," the study said.

Meanwhile, Microsoft entered into a partnership with Modern Muse, a website that collects stories of successful women from a variety of backgrounds. Young women may explore subject choices and where those choices may lead, build connections, and gain advice from the successful women or from the companies they work for.

Work-family balance

According to Yang's experience, achievements at work sometimes mean sacrifices in home life. In 2006, she took her 7-year-old daughter with her to accept a position at Microsoft's headquarters in Seattle, while her husband, who was pursuing his PhD took care of their 3-year old in their home here.

She recalls that she felt guilty for not giving a hundred percent to her work and family. One day her daughter got a fever, and she had to leave meetings just to be with her. Fortunately, her supervisor at the time gave her a lot of flexibility.

Schools in the U.S. often held various activities for students. On one occasion, Yang struggled over the fact that the mother of her daughter's classmate knew all the names of her daughter's classmates.

Yang believes that the life one mother could give her children is different from other moms. She says that she is far from being an exemplary mom, because she is not very good in the kitchen and all. Her daughter wouldn't have any memory of mom's cooking.

But that's life, she says. Seen from another perspective, she has trained her

For women and minorities, Microsoft creates and delivers compelling career development offerings.

daughter to be independent and to voice out her own ideas. During the two years they spent in the U.S., her daughter was exposed to a different culture and acquired life experiences that may be useful to her one day.

When she has time, Yang attends her daughters' school activities. She also enjoys taking her to the movies, and attending music festivals all over the island. She has tried to be her daughters' best friend. Her eldest daughter is preparing to study science abroad, while the younger one (interested in fashion and design) often makes her go shopping and help her choose clothes.

Yang says her daughters have different characters. One gets well along with male friends, and the other has a sensitive heart. She therefore expects her daughters and all females in general not to live for others but to follow their own heart.

Equal gender roles

Yang cites a frequently asked question: "should I marry the person I love, or the person who loves me?" Her response is that women should choose those who respect and appreciate their talent. She cites herself as an example. When the opportunity to work at Microsoft's headquarters in Seattle came up, her husband encouraged her to take it immediately. She has always been grateful for that, and she wouldn't have made her achievements without her husband's support.

She says that while the dual-earner family is very common in her hometown, both husband and wife should care for each other, appreciate each other and acknowledge that no one is obligated to take on all the responsibilities.

Looking back at her younger days when she chose her major and defied gender stereotypes, Yang has reached a stage in life where what others say no longer matters. She believes that as long as a woman has passion, motivation comes naturally, and achievements are not long in coming.

Women imbue technology with a human heart

Supapan Seraphin

Senior Advisor
King Mongkut's University of Technology Thonburi

Senior Specialist
National Metal & Materials Technology Center
National Science & Technology Development Agency
Thailand Science Park

Senior Specialist
National Nanotechnology Center
National Science & Technology Development Agency
Thailand Science Park

Emeritus Professor
Department of Materials Science & Engineering
University of Arizona, Tucson

Materials Science, commonly called Materials Science & Engineering (MSE), is an academic discipline that incorporates elements of physics, chemistry and engineering in the discovery and design of new materials with an emphasis on solids.

"Materials science produces hybrids such as metals that are used as conductors and polymers that are used as insulators," says Professor Supapan Seraphin, Emeritus Professor Department of Materials Science & Engineering at the University of Arizona (UA). Tucson.

Materials Science plays an important role in in the engineering sciences and in more recent developments in the field of Artificial Intelligence (AI). MSE has a synergetic relationship with artificial intelligence. "AI creates the need to develop material hybrids and in turn, material hybrids or multi-functioning materials are fundamental to the advancement of all technology including the extremely powerful computers that are the brains of artificial intelligence," she says.

Developing hybrids involves complex calculations

and data crunching that rely on artificial intelligence. Such material hybrids enable the shrinking of a cellphone to a size that fits in a pocket.

Very few women entered MSE when Prof. Seraphin did her doctorate from 1987 to 1990. And when she was hired as director of UA's Electron Microscope Facilities for Materials Research, just 10 percent of students were women. "Now, 25 percent are female."

Trained as a chemist at Bangkok's Mahidol University and at King Mongkut's Institute of Technology, Seraphin gradually transitioned to engineering. Her master's thesis dealt with how thermal collectors transformed heat from the sun into solar energy.

Problem-solving ability is crucial

Did you run into some obstacles while doing your doctorate? How did you overcome them?

"I was one of a few women in a room full of men, so I strove to get good grades and this enabled me to overcome any feeling of intimidation. I developed good study habits and never felt pushed to the sidelines."

But I think many women feel overwhelmed when they meet arrogant men. I just studied hard and worked hard."

"My chemistry background and love of problem-solving enabled me to tackle the demanding field of MSE," she says, "and I finished my doctorate at UA Tucson in less than three years; the average then was 5 years."

After working for 27 years

With graduate students at King Mongkut's University of Technology Thonburi, Bangkok, Thailand.

Seraphin retired last year and returned to Thailand. Looking back at her very fulfilling career, she hopes that more women would follow her footsteps and find fulfillment in Materials Science & Engineering.

"I was surprised at how women can't seem to enter this field in America where everyone breathes in the healthy air of freedom."

"I think upbringing and culture is an important reason. We are not encouraged to take things apart, to tinker with engines," she says.

But women with engineers among their family members will more likely decide to become engineers. What do women engineers bring to the profession that sets them apart from men? "Solving problems that ultimately benefit people," she says.

Alice von Hildebrand, a 94 year old Belgian philosopher and author of the book "The Privilege of Being a Woman," once said during a talk in New York that men have a certain fascination with tools, with machines … but women are fascinated with the living.

"That is very profound and clever observation," said Seraphin. "Technology and machines certainly make our lives better, but they are good only when they serve humans."

"And in making machines serve humans, a woman's perspective is essential; women are focused on people, on society."

Is this what women bring to the world that men could never hope to match? "Yes. In solving engineering problems, women bring in a different perspective that actually strengthens teamwork and solve human problems; this is what makes us succeed."

Physics and mathematics are vital

Like their male counterparts, today's young women are distracted by digital devices. What skills and attitudes should they develop to succeed in STEM?

"They should be good in mathematics and physics," she says. "These are the fields that usually discourage them from studying engineering. The problem partly lies in how these subjects are taught in high school."

"Less women study engineering because you need a mathematical mind in these fields. Women seem to thrive in the medical field or in bio-technology, or in anything related to biology."

In most U.S. universities, subjects such as Physics 101 or 204 weed out those who don't fit in engineering.

"Students need to thoroughly understand fundamental physical principles such as density and buoyancy – these are just the starting points to more complex subject matters in engineering," says Seraphin.

ASEAN STI Forum is aimed to be a platform for future shapers from ASEAN member states and dialogue partners to discuss critical issues and challenges facing the ASEAN region and to foster collaboration for innovation.

But how can women students develop their aptitude for Physics and Chemistry?

"It has to start in middle school. I recommend a reform in the way Science and Mathematics are taught in middle school," she says.

"U.S. universities are outstanding in research, but their kindergarten to 12th grade education (or K-12) is terrible. It's a good thing they're trying to improve it by having more interactive learning instead of just lectures."

Governments should offer incentives

Seraphin was the director of UA's Electron Microscope Facilities for Materials Research. They used big electron microscopes to look at nano structures. Such learning through visualization attracted many students.

"This was how I got students more involved in learning science. I had met students who told me they were encouraged to study engineering because when

they were in high school, they did a field trip to visit my laboratory. This was highly gratifying to me."

What about teaching today's highly connected generation? How do you capture their attention?

"Young people nowadays consider their phones a part of their bodies," she says. "It's really hard to keep them engaged through a 50-minute or 1.5-hour of lecture."

"So teachers usually resort to the flipped classroom. Students watch online lectures, engage in online discussions, or carry out research at home and discuss concepts in the classroom with the guidance of a mentor."

With Prof. Geraldine Richmond (middle) and participants at a career development workshop on January 24, 2017.

In a flipped classroom, the students are more involved instead of struggling to focus their attention on a teacher.

Seraphin never used the flip classroom but for 20 years, she had always encouraged teamwork and graded her students based on three yardsticks: individual performance, team work, and peer evaluation. "As future engineers, they have to learn how to work in teams."

"Women work better in teams because we prefer to compromise and are good at negotiating," says Seraphin. "We hate to go to war and dislike quarrelling."

This emphasis on teamwork could partly explain the increase in women students at the UA.

In 2009, Seraphin received an Inclusive Faculty Award for her dedication to increasing diversity. Is diversity threatened by a digitized world where everyone

tends to lose their individuality in the mass of social media?

"I don't think so," she says. "Women will be needed in giving engineering design a human touch. Car companies, for example, need to have women on their design teams."

If women have such an indispensable role in technology, how can the private sector encourage more women to enter STEM? "For this to happen, the government should offer incentives and loans for women to engage in start-ups."

In Southeast Asian economies like Thailand, women are less aware of options related to loan and grant opportunities. This is due to several factors that include limited access to networks which provide important business information, and lack of sufficient knowledge to manage financial paperwork required by banks.

In March 2015, UNESCO Bangkok launched its new report – A Complex Formula: Girls and Women in Science, Technology, Engineering and Mathematics in Asia. The report said that women in STEM are impassioned and inspired, but there are too few of them in these fields. And within STEM, the higher you go, the less women there are. Whether in education or the workplace, the proportion of women in STEM decreases dramatically at the highest levels.

In a 2015 interview with Business Insider, Padmasree Warrior, the chief strategy office of Cisco, a global IT and networking company, said: "The data says that many women start their careers in the tech industry. They leave after a few years because they don't find the environment is fostering or inclusive."

This seems to confirm Seraphin's last remark: "I think women have to work twice as hard as men to succeed."

Be not afraid of science

Leading feminist challenges young women to enter STEM

Chia-Li Wu

Emeritus Professor of Department of Chemistry at Tamkang University, has been pushing for more females to join STEM field.

Chinese Taipei is one of the leading economies in the world to witness the rise of feminism over the past decades. Though relatively late in comparison with their counterparts in the US and Europe, the feminist movement in the island has gained public awareness and support as early as the 1980s.

Since then, women's status on this island has enjoyed a significant rise over the past three decades. One example is the record-high 50.74 percent rise in women's labor participation rate in 2015. In early 1978, only 38 percent of women over 15 were in the labor force.

However, more need to be done to promote gender equality here, especially in the field of science and technology that is largely dominated by gender stereotypes.

Wu Chia-Li, a feminism leader says here, the men-women ratio in higher education institutes is almost one to one.

"We can only find one-third of females in the mostly male dominated world of science," she says. The numbers of female postgraduates and professors in science and technology are even smaller, according to Wu.

This causes a vicious cycle as girls and young women, lacking female role models, are disinclined to enter STEM.

Wu, an emeritus professor of chemistry at Tamkang University says she has been pushing for more females to join academia. In 2011, she founded the Society of Taiwan Women in Science and Technology to raise the visibility of women scientists and to encourage more women like her to pursue science as a career.

Women have the same capacity as men to make life-changing discoveries and to transmit their findings to others through teaching. Moreover, scientific research usually involves working in a team, and women not only have this great capacity to build teamwork, but also often offer different views in order to accomplish an objective.

Reminiscing the days when she first began to get involved in social movements, Wu admits that she had little knowledge or interest in social issues when she studied chemistry at National Taiwan University (NTU). There was martial law and any kind of social activism was considered taboo.

When she did her Master and Doctorate in the US, Wu witnessed demonstrations against the economy's involvement in the Viet Nam War, protests on Diaoyutai Islands event, as well as Chinese Taipei's withdrawal from the United Nations in the 70's. She began to be more aware of the many social issues that happened in the place where she grew up. She returned to this island right after her graduate

Group photo with TWiST members in 2015. Prof. Wu sits on the second row, 4th from left.

study and taught at Tamkang University where she met other feminists, including Professor Lee Yuan-jen. They established the Awakening Magazine in 1982.

With the lifting of martial law in 1987, the magazine became a strong voice for gender equality in Chinese Taipei. The magazine transformed into a foundation that gained fame as the champion of gender equality here.

Reforms needed to raise women's status

From 2002 to 2008, Wu sat as a member of the Examination Yuan, tasked with validating the qualifications of civil servants.

During her tenure, Wu initiated a series of reforms notably that of lifting the maximum quota for females taking the national civil service examinations, thus ensuring that women on this island have the same opportunity as men as civil servants. Government agencies, such as the Coast Guard Administration, Bureau of Investigation and National Police Agency, gradually removed the quota restrictions on recruitment of officers to meet the Act of Gender Equality in Employment which was enacted in 2002.

Despite the steady increase in women's employment, the female labor force participation rate is not unusually high among East Asian economies. At 51 percent today, the rate is roughly comparable with Japan (49 percent) and Korea (50 percent in 2013), while lower than the rates of Singapore (60.4 percent in 2016) and China (64 percent) in the same year.

"I believe a government agency should

"I believe a government agency should choose staff based on ability and professional skill instead of gender," says Wu. "The US and most of Europe as well as many Asia economies do not consider gender in selecting people for civil service."

choose staff based on ability and professional skill instead of gender," says Wu. "The US and most of Europe as well as many Asia economies do not consider gender in selecting people for civil service since long time ago."

The retired chemistry professor and several women NGOs can be credited for breaking through the ceiling of limitations for women diplomats. Since 1996, more females serve as diplomats stationed overseas. That year, Ministry of Foreign Affairs accepted 653 applicants for the foreign service, 319, or 49 percent, were women. Currently, of the 1,500-plus foreign ministry personnel, 41 percent are women.

Wu says that the whole society has also changed. It is no longer rare to see fathers holding their babies and men doing the shopping. "The whole society has become more gender equal."

Overstatement of the issue needed

She believes that promoting gender equality here needs a certain level of overdoing because of the gender imbalance in public office, in academia, and in senior management posts for centuries. "Overcorrection is a necessary evil so that this society can go from imbalanced to balanced," she says.

In her own field, there are notably few women, so in 2008, Wu started an e-Newsletter for women in science and technology. The Society of Taiwan Women in Science and Technology (TWiST) was born three years later from the e-letter. The society sought to raise the visibility of the nation's women scientists and encourage them to pursue scientific careers. "Women are a minority in science and technology and we need to unite in exchanging the latest developments in our special fields and also to discuss gender issues." TWiST also offers awards for young women scientists to attend international conferences and workshops. They published picture books and story book on women scientists to encourage young girls to join STEM fields.

Those who aspire to work in STEM fields should focus on studying high school subjects related to science and technology, she says. "Many of them are terrified by mathematics and natural sciences, because they are threatened by traditional stereotypes as well as the tough exams. We think that good teachers, role models, and strong encouragement definitely will help young girls overcome the fear and fall in love with the beauty of science."

Inflexible work hours imposed by male-ruled society

Amy Hu

Chief Technical Officer of THI Consultants Inc.

Faced with the rapidly ageing society, the role of women in bringing children into the world and in caring for them can no longer be neglected. Flexible working hours will help firms retain their best women employees. The care of a young family is usually a psychological burden for such employees and when they confront a demanding work schedule, they might just consider resigning.

Amy Hu, chief technical officer of THI Consultants Inc. knows this well. "I consider myself fortunate for having found a way to achieve work-life balance," she says. "I didn't choose civil engineering as a profession; it chose me. And I think women qualify for this profession."

From primary to secondary school, Hu excelled in her studies. She originally wanted to take up medicine but she couldn't stand the smell of Formalin. She passed the exam for the Department of Civil Engineering at National Taiwan University where out of a hundred C.E. students, only ten were female, including herself. "But we were top of the heap," she says "and always got the highest grades." In her first two years, she found the subject matters completely boring. "I thought of switching to another major."

In her third year, she started studying Structural Design, Water Conservation,

and other courses that captured her interest. She finally chose Transportation Engineering as her career.

Hu, a forty-year veteran in the engineering consulting business, is the company's first female senior executive. Her experience includes the network planning of the Taipei and Kaohsiung MRTs and consulting work on the recently built Taoyuan Airport MRT. Once, in the peak of her career and having gained prestige in her field, she decided to return to being a full-time mother.

She believes that the status of women in this island has improved greatly compared to most Asian economies. This is something that should be recognized and shared with others, she says.

Being a mother: The best years of her life

Her international experience convinced her that women need flexibility in the workplace. "Their working hours could be adjusted to fit in with the needs of their families," she says.

"Highly competent women will stay with you if you don't impose work burdens that take their attention away from their families." For women, especially mothers, leaving their homes for work is an emotional burden. They are weighed down by concern for the children they leave behind. She experienced this herself, so she advises mothers to work part-time while taking care of their babies instead of going on a maternity leave.

With fellow engineers.

"This way, they're not

away from their work too long," she says, "they can stay in their workplaces without sacrificing the care their families need." There's no need for mothers to follow a fast-paced work life while their children are still young. They could return to such a life when their children have grown up, or take up another interest. The important thing is to enjoy every stage of a woman's life.

Speaking of women, Hu believes that they would do well as civil engineers. The reason lies within the very definition of this profession. "It simply means works that impact daily life such as building houses, roads, bridges and urban construction. This is a 'people-oriented' field and women's solicitous nature would make them good civil engineers."

Women are more considerate and pay better attention to detail. Engineering is full of males so when a client deals with a female engineer, they seem to be less defensive and more open to dialogue. THI has more female employees than men, including those in senior management positions this has enhanced the company's people-centered corporate culture.

"THI is a small and beautiful company," she says. A group of engineers pooled their resources together and set up the company."

That time, foreign companies won most construction contracts on this island. "But here, companies are just as good," she says. THI's management team worked hard to show that in building projects, domestic engineers were highly qualified. Their efforts finally bore fruit and THI started winning government engineering contracts. But this ushered in a period of talent drain as the government offered their best engineers ministerial level positions.

About the years she stayed home for her children, Hu says, "They were the best years of my life; I made the right decision."

Former Taipei City mayors Chen Sui-bian, Ma Ying-jeou down to incumbent Ko Wen-je draw from the pool of THI talent to fill top positions at the Ministry of Transportation and Communications.

Being a mother: The best years of her life

Hu found herself pushed up the THI corporate ladder. From vice president, she made the leap to chairman. She had to steel her nerves to take on such a big challenge. Five years later, she found out that her elder son could not adjust to the school system and that her younger son had atopic dermatitis. She resigned and flew back to the U.S. with her sons. She lived as a stay-home mom for two years.

About the years when she stayed home for her children, she says, "They were the best years of my life; I made the right decision." She believes that women need flexibility in their work life. Some are totally immersed in their work, others focus on their families. There is no right and wrong. Each one should decide freely, but having the support of one's spouse is essential. "If husband and wife could look beyond each one's personal goals and reach a consensus on how to manage their family, they arrive at a win-win situation."

During the ceremony for the National Awards of Outstanding SMEs.

Injecting new life into ailing bodies and companies

Sherry Ku

Chairman and CEO of Savior Lifetec Corporation

Savior Lifetec Chairman and CEO Sherry Ku is an experienced pharmaceutical chemist. Her forty years of experience in working for famous American pharmaceutical firms include the development of over 170 new drugs, 8 of which are commercialized and are publicly listed brands. Tazocin, an antibiotic is one of them. Since it its commercialization in 1993, it remains a popular medicine in the world.

In 2009, Dr Ku joined TWi Pharma as the President and Chief Scientific Officer. In 18 months, Twi filed 6 high barrier abbreviated new drug applications (ANDAs) and established a pipeline of 6 new drugs which included 3 biological drugs. An ANDA contains data which is submitted to the U.S. Food & Drug Administration (FDA) for the review and potential approval of a generic drug product. Once approved, an applicant may manufacture and market the generic drug product to provide a safe, effective, lower cost alternative to the brand-name drug it references.

In 2012 she co-founded Ruen Huei Biopharmaceutical Company and served as the company's President. In 2014, Ku was elected Chairman of the Board of Savior Lifetec Corporation and also serves as the Chief Executive Officer.

After her return from the U.S., she became an expert in rescuing ailing

drug companies. She led the transformation of Savior Lifetec into the leading manufacturer of US-marketed injectable drugs.

You only start learning after school

While studying in high school and preparing for the Joint Entrance Examinations, she was motivated by a teacher to study biological Sciences. "It was an extraordinary discovery for me," she says. "I thought it was a relevant field of study. I also realized that the real learning started after graduation." This thought has remained with her until today. She is a life-long learner.

She received her B.S. in Pharmaceutical Chemistry from National Taiwan University (NTU) and then earned a Ph.D. in Pharmaceutical Chemistry and Pharmaceutics with a minor in pharmacoloy at the Ohio State University. Since then, she has filed 70 patent inventions and written 62 academic papers. She belonged to the committee of experts in United States Pharmacopeia (USP) and was elected became the Chair of the Physical Pharmacy and Biopharmaceutics Commission of the American Association of the Pharmaceutical Scientists (AAPS). She was the head of Early Pharmaceutical Development at Wyeth/Lederle (now Pfizer), overseeing discovery interface through clinical proof of concept.

2016 Inauguration of SLC's 2nd Zhunan factory.

"Developing new drugs is a complex process," she says. "It is time-consuming and labor-intensive. An R&D team could be between 30 to 300 scientists engaged in biological processes, drug testing, statistical analysis, and physical and chemical procedures, before actual manufacturing could start." In the U.S., Tazocin is called Zosyn, a third generation antibiotic. It is not used to treat the common cold or aches. Doctors prescribe it when the first and second generations prove to be ineffective treatments. It can be considered the drug of last resort and is also used as a life-saving cure for patients in intensive care units. It remains as one of the three lifesaving injectable antibiotics in the hospital worldwide.

"I may be helping drug companies rake in money," she laughs, "but drug development is not just about profits; the satisfaction of having produced a cure for those who need one is the biggest return."

Ku grew up in a family of scholars. Her grandfather was a lawyer and a local government official. Her older siblings graduated from Taipei Municipal Jianguo High School and Taipei First Girls High School. She has a high self-expectation and is always in the top five of her class. Finding herself in the company of equally talented peers made her work harder.

An R&D testing team could be between 30 to 300 scientists engaged in drug testing_ and physical and chemical procedures.

She excelled in speech and debate and wanted to be a lawyer until she read an issue of Scientific American that

gradually made her have a change of heart. A biology teacher at Taipei First Girls High School inspired an interest in Biochemical Genetics and so she chose what is called the Third Stream (Sciences) in the domestic high school system. Her first choice for university studies was the NTU Medical School.

"That school usually took in over twenty students annually from my high school," she says. She was always among the top students in the entire school and she thought that her admission was certain. She was heart-broken when she read the list of students admitted to NTU's Medical School. She had to walk the different road of Pharmaceutical Chemistry.

Time is short, use it well

The Sciences is still a field where men dominate. When she worked at Wyeth/Lederle, there was one woman every seven employees. But her audacious nature never made her feel inferior even though she rarely spoke about sports, nor did she have a drink with male colleagues. She once went on

The ability to communicate is vital in R&D team work.

a business trip to Japan and she was the only woman in a meeting with Japanese counterparts. “Not to worry; we will consider you a man,” they said.

Calm and composed in manner, Ku is elegant in her ways. This surely has its advantages, but she is quick to reply that “for scientists, a pleasing disposition is certainly not an advantage; it could draw contempt and prejudice. While studying in the U.S., someone told me ‘you’re too pretty to be doing a doctorate; you should get married and have children.’”

“The ability to communicate is at least 50 percent of success,” says Ku, “this is vital in R&D team work.

Time is limited, she says. Immersing yourself in work will affect the time you spend with your family. Fortunately, she has a very supportive husband who believes that her career is as important as his. They met in the university in the U.S. He holds a Ph.D. in Mathematics and works for Citibank and IBM. She advises young people to consider the practical issues in a marriage, how each spouse will arrive at a work-life balance.

Love and communication the keys to success

“I love my work,” she says when looking back at her 30 years plus of professional achievements. This has driven her to keep on learning and improving. "Young women must discover their true interest and must leave a job they don’t enjoy doing," she says. They shouldn’t limit themselves just because they’re women. They need the resilience to show that they’re as good as anyone.

A willingness to learn is just as important. Young women need to update themselves on the latest developments in their fields. They have to acquire communication skills. "The ability to communicate is at least 50 percent of success," she says, "this is vital in R&D team work. You need to exert an effort to communicate, to consider the other person's viewpoint. Only then can you serve others and cooperate to reach an objective."

The ability to speak a foreign language is also crucial. We have a small market and relies on exports. The effort to master a foreign language is like power you can use to break through the barriers built around the lives of those who work on this small island.

Australian industrial scientist maintains professional work and helps fight cancer

Leonie Walsh

Chair of the Fight Cancer Foundation Group

The youngest daughter in a working-class family in rural Australia and the first child who attended university, Dr Leonie Walsh is also a cancer survivor. She now chairs the Fight Cancer Foundation Group.

Walsh says she has always been a "curious" person who thrives more with the hands-on approach than with theoretical musings. She took a cooperative study stream which placed her in the industry environment for a year and inspired her to work for companies like Dow Chemical after finishing her degree. The experience showed her the real world and set her on track to large multi-national corporations. For the next three decades, she learned technological applications in diverse markets and locations.

Diversity dilutes prejudices

At Dow Chemical, she worked in a multicultural environment with colleagues of various nationalities. In the mid-1990s, female professionals were not uncommon in her team.

"I have never felt discriminated against in that company," Walsh says, adding that from her experience, diversity in the workplace reduces prejudice. When an organization is set up to leverage diversity in a "team-oriented" fashion,

people get used to work with other people of different ages, cultures, and gender. Differences become normal and biases against each other tend to wane. She thinks that globalization has made the world more open and multicultural, and this will spill-over and impact the entire globe.

Walsh spent 21 years with Dow Chemical, where she had countless opportunities to realize her full potential. "The company had a 'nurturing culture,' in addition to its transparency on performance management and compensation process; this helped to prevent a salary gap between male and female staff of the same position."

That's not always the case for other companies. Walsh had experience with another organization where she found out that she was being underpaid compared to her male peers.

At Mildura High School on a visit to the region last year to talk to some Year 11 students and help with the Mildura Innovation Awards.

"It's blokey culture," she describes, adding that in choosing which company to work for, you should always get information about its team culture and level of transparency of its salary scheme and promotion policy. She encourages those who unfortunately find themselves in unjust situations to reach out to people who have broken through the glass ceiling, or have found alternative paths to go around it.

Networking and interpersonal skills vital

Speaking from experience, she recommends growing a support network that works like a "sounding board." Walsh recalls that in the past, there were many

occasions when she didn't dare apply for a higher position, while some of her colleagues told her that she was more than capable. "Having people who give you that nudge, who help you build confidence and reinforce strength is extremely important for women throughout the different stages in life."

At a Forum of Australian Chief Scientists Meeting in Hobart. Walsh represented Victoria and the meetings are held quarterly in different states.

Secondly, she suggests acquiring a breadth of skills, particularly interpersonal skills, as a solid foundation. "The ability to work and communicate with different people will give you the confidence to raise questions and know how to deal with sensitive issues."

Ceaselessly increasing one's knowledge and experience is also vital, especially in communicating with other people about promotions or going to job interviews. "Coming across as someone knowledgeable and informed on current affairs can help engage with a broad range of people and open up lines of discussion," she says.

Failure as a learning opportunity

For younger women in a science field, she advises trying different jobs, and not to fear failure. In her first job as a team leader, she was frustrated by her performance review that said she focused more on her personal development than on her team members' performance. "I took it extremely hard, because that's just not who I am."

She took a step back and focused more on the team, to better connect and support them. As a result, the team performance improved. "I found that

so incredibly rewarding," she says, "and I was commended for the team's performance. In retrospect, I think it was all about turning the apparent failure around and seeing it as an opportunity to grow."

Since then, during performance reviews, Walsh is not satisfied if the only comment she got was "you are doing a good job." Instead, she constantly strives to do better. "I have developed a level of comfort when faced with setback or failure; I think it has something to do with the influence of American culture from the company I worked for."

She sees failure as a type of change, and a learning opportunity to improve. So she advocates experimenting and encourages young people to try different jobs to find those that fit their working style, or the company culture they're happy with. "The only way to find out if a job is for you is to try it," she says.

Early STEM entry is key

Having participated in various initiatives on bringing more women to the STEM fields, Walsh believes they should start early. She cites a recent school program where STEM subjects were included in the curriculum for Year 10 secondary school students.

Photo courtesy of Veski
At a Veski Inspiring Women's networking event. Dr Walsh was the Master of Ceremonies.

The principal embraced renewable energy. With government funding, they installed solar panels on the roof and sensors around classrooms so that students could collect data and take measurements.

The school's Year 10 girls were as much engaged as the boys in learning about renewable energy. Programs like this also allow teachers and

parents to see the child's aptitude and interest, so they could provide further guidance and inform the students career options while they're still young. "Really, the earlier you can engage them the better," she says.

On the other hand, she believes involving parents, career guidance professionals and teachers is equally important. It is very standard to encourage children to go into more traditional courses like law, medicine or commerce, because "there is a lack of understanding of science careers, let alone those where girls fit," she says. Therefore, when school programs have a way to make learning interactive and with the involvement of parents, they stand a better chance of promoting STEM among girls.

In Australia, over the past 5 years the awareness has increased, and a range of efforts and initiatives are in place to increase the number of women in STEM. Walsh is involved in a number of them, including mentorship at Industry Mentoring Network in STEM, a one-year program for PhD students to get to know more about the industry sector. She is also the Inaugural Ambassador for Women in STEMM Australia, whose over-arching goal is to connect women in science, technology, engineering, mathematics and medicine regardless of their discipline and profession.

Photo courtesy of Veski
With 4 inaugural Inspiring Women Scholarship winners (in the back) and the Victorian Government Minister for Innovation in the front next to the Governor of Victoria and the Chair of Veski beside Walsh. As Lead Scientist reporting to the Minister for Innovation and Veski, Dr Walsh was a partner in rolling out the Inspiring Women's Program.

"There were hundreds of programs and the number grows

weekly," she says, citing a report by the Office of the Australian Chief Scientist. The variety of programs available has led to a platform called "STARPortal" for education outreach program providers to register, and those who look for such services could search for what suits their needs.

Precious family support

Throughout the years Walsh has reached a clear understanding of where she could best deliver her value. She calls it a "sweet spot," which means having a "broader portfolio." She spends part of her time supporting and volunteering at various charitable organizations, and another part on contract work. She finds the combination "nice, satisfying and stimulating."

Many of her charitable activities are related to blood cancer or blood and marrow transplants, for a personal reason. At 28 years old, she was diagnosed with leukemia. Doctors gave her three years to live, unless she could get a bone marrow transplant.

"I was very fortunate that my sister was a perfect match," she says. During her treatment and later in the recovery process, the company she worked for at the time was most supportive. They gave her enough time and flexibility to get back to work. She has remained very grateful for this.

At home, Walsh is also grateful to her husband, who, in her words had been prepared to give up his job and career for her sake. He moved with her to the U.S. for Walsh's position with Dow.

"These days, very demanding professional roles are almost 24/7, with a lot of travel. Having a partner who's incredibly supportive of your career advancement is priceless," she says. "Your home is the most important support system.

Women-founded firm puts competence over gender

Karen Wen

President of the Leading Biotech Company Mycenax

Karen Wen, president of the leading biotech company Mycenax. She is an outstanding female manager. Since the foundation of Mycenax in 2001, Wen has been intensely engaged in the development of this island's biotechnology industry.

Ten years of testing have finally led to the Taiwan Food and Drug Administration finally approving the company's rheumatoid arthritis drug TuNEX in July. Effective in alleviating the inflammation caused by rheumatoid arthritis (RA), TuNEX is the first locally-developed drug.

This is a major breakthrough for Mycenax in a market with an estimated worth of over NT$4 billion annually. Mycenax has become the first biopharma company to manufacture a ground-breaking biologic in Chinese Taipei. Wen attributes her company's success to the hard work of all her employees over the past 10-plus years.

"It took us 12 years to come up with this biosimilar," she says. "The process is extremely time and cost consuming. Unlike the IT industry, biotechnology products have their own nature."

The development time for drugs is long and complicated; different drugs have different manufacturing processes. The entry barrier for drug manufacturing is high but this also means that clearing the barrier gives rise to drugs with longer life cycles.

"The domestic biotechnology industry as a whole is still in its early stage of development," says Wen, "the 12 years spent to develop TuNEX serves as a reference point for other companies." Bringing locally developed drugs into the local market could also bring down the prices of imported drugs.

Characterization.

Women are focused on details

Wen notes that the female workforce is a major contributor to her company and to the biotechnology industry. In fact, three of the five top level managers in her company, herself included, are women.

It is quite common to find successful women in the biotechnology and biopharmacy industries, she says. "Women are more patient, more careful and attentive in conducting experiments. Most men are not and after working on repetitive processes for over a decade usually falter in attention to detail."

A study published in the British Journal of Psychology in 2009 confirms this observation. According to the study, men are better at seeing things in the long range, while women focus on things at close range.

However, Wen sees no reason to give special treatment to women in the workforce. Men and women are equal and her company places high importance on upholding gender equality.

"We are not giving preferential treatment to women simply because of

their gender," she says. "They will be given the proper respect as long as they do their job with professional competence."

The company offers the same salary and benefits to both men and women in the same post. It is also provides flexible working hours, from 7 a.m. to 4 p.m. and 10 a.m. to 7 p.m. Employees can choose based on their family needs.

2000L bioreactor disposable.

Still, men and women have different needs. Female employees enjoy period leaves and there are breastfeeding rooms for mothers.

Mycenax male employees make up 48.9 percent and female, 51.1 percent. The women can apply for maternal leave, but just 15 percent of men have applied for paternal leave. And if there is a pressing need, employees may take their children to work.

Wen believes offering such benefits could give employees a sense of stability and security. They will likely work harder for the company after returning from parental leave.

Support of family & friends decisive

Wen returned to this island in 1993 after receiving her PhD in Biological Sciences in the United States. She first worked as a researcher at the Development Center for Biotechnology (DCB). DCB was founded in 1984 as a non-profit organization that relied on governmental funds and private donations.

Its mission was to facilitate the development of the domestic biotechnology industry by building infrastructure, developing key biotechnologies, and training and recruiting professionals, in coordination with industrial, governmental, academic, and research institutions.

But Wen had always dreamed of setting up her own business venture. "I didn't want to spend my whole life in the ivory tower of academia, unless I could come

up with some great discovery."

The bio-pharmaceutical industry was growing in the nineties so she teamed up with three friends and founded Mycenax in 2001.

They spent the first three years raising funds by convincing local investors that the disposable employee model was workable. In mid-2003, Lin Rong-jin, the former chairman of pharmaceutical company TTY Biopharm Company invested in the company and introduced them to other investors. Lin understood the growth potential of pharmaceuticals and believed that biological products will play a substantial role in the pharmaceutical market. The National Development Fund and other important investors enabled the company to develop its first product, TuNEX.

Since the foundation of Mycenax in 2001, Wen has been actively engaged in the development of this island' s biotechnology industry.

Such investors' vision finally enabled a start-up company to find its pathway to growth and supported the dreams of the company's founders.

What advice can she give to young women who aspire to succeed in STEM? "It's important to have family and friends to support you," she says. Wen and a group of women in the biotechnology industry has formed the "Bio Lady" group that regularly holds activities and even sing together in a chorus.

"Women in this field need to work together," she says, "and help the domestic biotech industry to keep growing."

Intel seeks to attract more women to science

Deborah Yen

Director for Taiwan Corporate Affairs and Regional CSR/Marketing Programs for Intel Greater Asia Region

Employees at Intel Taiwan female or male, are entitled to 6 months parental leaves. But so far there have been no male applicants, according to Deborah Yen, Director for Taiwan Corporate Affairs and Regional CSR/Marketing Programs for Intel Greater Asia Region.

Intel, the world's leading company in technology, makes efforts to recognize the role of women in technology. In this interview, Yen discloses a number of company policies Intel has implemented to reduce the gender gap, and to further empower women.

"Diversity" and"fairness" are among the long-term goals Intel pursues, Yen says. The multinational corporation invests in the enhancement of equal employment opportunity. It does this by leveraging its influence to bring changes to the supply chain. Through education, Intel works to overturn long-established gender stereotypes in society.

Female perspective neglected

In 2015, Intel CEO Brian Krzanich pledged US$300 million to increase workforce diversity by establishing a hiring channel for women and minorities, and building a friendlier working environment. The objective is to become the

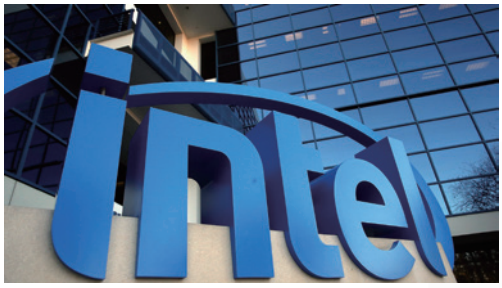
first tech company to achieve equal employment by the year 2020.

This doesn't mean the ratio would become 50 percent men and 50 percent women, but that the ratio would reflect the available talent marketplace for the groups and businesses in which you hire, as Kimberly Weisul quotes Intel's chief diversity officer in her story on Inc.com.

"For technical women, the market availability is at about 27 or 28 percent of the workforce," Weisul writes.

Two and half years have passed since Krzanich's announcement. A recent news story on Fortune.com reports that the company has improved 65% since then, quoting Krzanich to say that Intel will reach its workforce representation goals in 2018 — two years earlier than previously expected. According to Intel's mid-year diversity report released in August 2017, the company still needs to bridge a gap of about 800 employees.

The pledge seeks to exercise corporate social responsibility and realistically address the need for equal employment opportunities, Yen says. "The gender ratio among the users of our products is 50-50. In most families, women are responsible for shopping, so the majority of our products are designed for men. The female perspective has apparently been neglected," she says.



Through education, Intel works to overturn long-established gender stereotypes in society.

Since 2015 female hires are required in all job vacancies, especially ones that involve technical skills. Yen cites a study that showed how male supervisors look for candidates through their own network in filling job vacancies. They would notify people they already know once a vacancy becomes available. This puts female candidates in a disadvantaged position as

they usually follow general hiring procedures.

In Intel Taiwan the current male to female employee ratio is four to one. This means that among every thousand employees, around 200 are female. In addition, 40 percent of newly hired employees are female. "We still have work to do," says Yen.

Apart from the efforts made to improve the hiring process, the retention of female employees is even more crucial. Society expects women to care for the family. "Reaching a good balance between work and family is therefore of key importance," she says.

WIN mentorship Program

This year, Intel Taiwan upgraded the benefits for maternity leaves, extending them from 8 to 14 weeks, during which the employee is entitled to receive her full salary, compared to just half a salary in the previous policy. Subsidies for childbirth have been increased 5 times while paternity leaves for male employees extended from 5 to 10 days.

Having anticipated that it would most likely take time for the employees to re-adjust to their work routine after taking a leave, Intel Taiwan offers its staff a one-month re-adjustment period. Flexible working hours and working from home have helped employees to take care of their work and family.

"We often hear baby cries in the background during video conferences," says Yen, who thinks these policies help both female and male employees. She herself had benefitted from it. A few years ago, she had to take care of her sick father.

"The company policy allowed me to take care for my family, to be there for

them," she says.

On employee retention, in 2016 Intel implemented WarmLine, a service that provides a support channel for U.S. employees to explore different options with a personal advisor before they consider leaving the company. In the aforementioned Fortune story, Barbara Whye, vice president of human resources and chief diversity officer shares that the program has since tracked over 6,000 cases so far, with about a 90% success rate and identified two main reasons employees begin to look for other options: manager capabilities and career progression.

Inspire them young

In its dedication to encourage millions of women worldwide to exhibit their capabilities, Intel works to decrease the gender gap in education by investing in projects that inspire more women to be creators or innovators in technology.

Intel has also tried to make an impact on women at a younger age by having Intel female managers visit campuses and give talks on careers in technology for women. They thus become role models for young female students to emulate. Moreover, workshops on coding and programming have enabled students to "learn by doing."

Deborah receiving a CSR award on behalf of Intel

There are also sponsorships for science fairs where awards for female entrepreneurs make science more relevant for women. Yen believes that if inspired young, more

women would pursue a career in science.

These initiatives show that Intel sincerely seeks to overturn the stereotype and mindset that humanities, literature, and business are studies for women to become teachers or public servants later. While for men, the stereotype is to be an engineer or a pilot.

Yen sees social expectation reflected in how students choose their major in university. "It is false to think that women are not fit for technology jobs," Yen says.

Deborah in Peru

Intel is also building a diverse tech ecosystem by committing US$1 billion in procurement from diverse suppliers, businesses owned by or whose shareholders are women or minorities, and where the gender ratio among their staff has reached a certain balance.

As of this year, spending in this initiative has reached more than US$500 million, exceeding initial projections. This is how Intel, an industry leader, tries to make an impact on the supply chain.

"A supply chain composed of members of diverse backgrounds would generate more possibilities of innovation," says Yen.

Intel is also working with public schools in Oakland, California, as Weisul cites in the abovementioned story about the company's diversity strategies. "Intel will invest $5 million over five years to build a computer science and engineering pathway within the school district, and to pair students with mentors at Intel."

The pathway includes scholarship, mentorship, and internship and actually

lands the participants a job at Intel when they graduate.

Support system needed

Yen believes that career women like herself must understand their own preferences, and always be ready and courageous in trying new things and taking on new challenges.

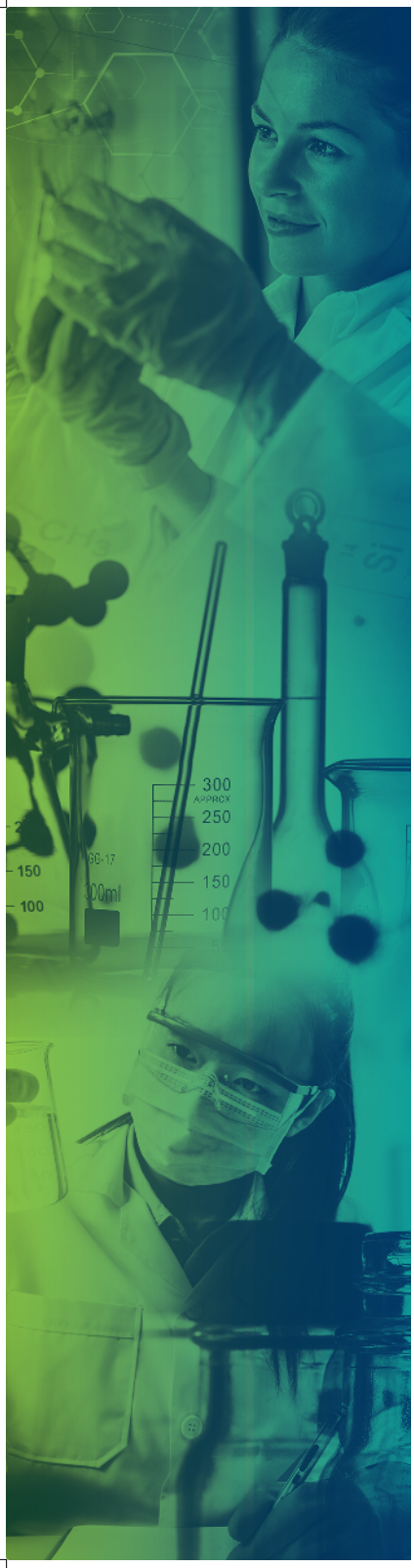
"The key to keep moving forward with passion is to face problems with resilience and well-maintained inner peace," she says. "For women to thrive in the workplace connecting with others is very important---someone who doesn't seem to matter today could be your life changer tomorrow."

Yen founded 'Women at Intel Network,' to provide work-related training and as a supporting network that help meet diverse needs such as caring for old family members and newborns. Intel offers the venue and gives subsidies on holding relevant events for the network.

Re-painting the walls of a Shelter for the homeless.

Yen also believes that a balanced mental state requires channels to relieve pressure and a support system in times of need. This system could include family, friends, or religious beliefs.

"You must first take good care of yourself and love yourself so you could love and care for others."



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