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Women in Tech

INSPIRATION, NO FAIRYTALES.

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PREFACE

WOMEN IN TECH: INSPIRATION, NO FAIRYTALES.

The digital revolution is fully underway, and the tech industry is reshaping our world. While it looks quite innovative and revolutionary from the outside, if you take a closer look, you'll see that a very important segment of society is underrepresented in shaping this tremendous social transformation: women. Women hold just 24% of all jobs in the digital economy. The IT universe is still dominated by men – in the developing world as in Germany.

If you ask six-year-old Malia from Ghana what she would like to be when she grows up, you'll get the same answer as from seven-year-old Lena from Munich: "Princess!" Princesses are beautiful and hang about passively waiting to be saved. If you ask a boy the same question, he is more likely to answer "astronaut!" An astronaut actively seeks to discover and explore new galaxies. Why are there still relatively few girls excited about working in scientific fields like the tech industry? The answer is simple: there are too few role models, and it can be hard to see the few there are. So the desire to become a princess gets passed down from one generation of girls to the next.

Why are women and girls still so seriously underrepresented in the tech world? Part of the reason is that 250 million more men than women currently click their way through the internet. It will remain a male-dominated sphere as long as not enough female content is developed, as long as technical innovations do not address the needs of women, as long as women remain the more frequent targets of digital violence, cyberbullying and hate speech, as long as codes and algorithms are written only by men, who sometimes automatically discriminate against women and female input *ex ante*, and as long as some societies forbid women from accessing a computer or enrolling in a computer science course.

This is a dangerous state of affairs. We are all well aware that access to information translates into advantages and power. More education leads to better career options and allows a person to earn an income and ultimately lead a life of self-determination and greater freedom. Assuming that more and more business will take place online as we move into the future, and that women are structurally and disproportionately excluded from this development, then the divide between the opportunities available to men and to women, to boys and to girls, will widen with each passing year.

Few global problems are as widespread, as international and present in so many different cultures as discrimination against women and girls. The Sustainable Development Goals (SDGs, for more see www.sdg.com) target all the world's countries and call upon the Global North to fulfil its responsibilities too. Clichés about the roles open to women limit their self-confidence and cloud other perspectives. These have to change in the Global North and Global South alike, which is why this book portrays women from all corners of the world.

The BMZ is strengthening the rights of women in the digital world and advancing their increased participation and ownership. We have made teaching digital skills in particular a key part of our mission and work to promote #eskills4girls (to join in, please see www.eskills4girls.org).

In the Global South and North alike, there are still too few (well-known) role models for girls and young women who show that women can succeed in the tech industry. We all know the Bill Gates, Steve Jobs and Elon Musks of this world, but how many of us know the Martha Chumos and Dr Mmaki Jantijes? We need to hold up these

shining examples of women succeeding in the digital world so young girls in both Nairobi and Frankfurt can see them clearly. After all, people tend to prefer the familiar path to the less travelled road.

The role models in this collection have overcome huge challenges at times to establish their place in the tech industry. They can inspire young women and girls and encourage them to explore possible career paths in tech. This book tells exciting stories of real women, not a fairy-tale princess among them. We would like to inspire girls everywhere to follow the examples set by these amazing women, these female inventors, scientists, web designers, managers and net activists.

Successful women in the tech industry can be a guiding light, illuminating the way and giving others the courage to forge their own paths into the digital world. The wonderful, exemplary women in this book call out to girls in Ghana and Munich alike: "See, I made it. Now it's your turn!"

Yours



Dr. Maria Flachsbarth

State Secretary

Federal Ministry for Economic Cooperation and
Development (BMZ) Germany



Federal Ministry
for Economic Cooperation
and Development



THE GENDER DIGITAL DIVIDE

The massive spread of digital technologies is generating new opportunities for economic development worldwide – but not everybody is reaping the benefits. Digital divides not only separate the Global North and South, but also men and women – the so-called gender digital divide. Only one in three people who report profiting from new technologies is a woman. Women hold just 24 percent of all jobs in the ICT industry around the world. Over 250 million fewer women than men are online today, denying them crucial access to information, education and participation. Today, it is more important than ever that women are empowered with the skills and make use of the immense opportunities that come with access to digital technology.

Germany's G20 presidency #eSkills4Girls initiative

As part of Germany's 2017 G20 presidency, the Federal Ministry for Economic Cooperation and Development (BMZ) successfully launched the #eSkills4Girls initiative to tackle the gender digital divide and promote the participation of women and girls in the digital economy. At the July 2017 Summit in Hamburg, G20 leaders endorsed the #eSkills4Girls mission statement, agreeing to work together to close the gender digital divide by eliminating barriers to women's access to and use of ICT by promoting education, employment and entrepreneurship opportunities for women and girls, particularly in developing and emerging countries.



This book grew out of one of the numerous activities the BMZ has launched as part of the #eSkills4Girls initiative. The ministry worked with other advocates to create the eSkills4Girls.org online platform, a space for information exchange and ongoing dialogues amongst all stakeholders and a showcase for best practices and success stories. Germany demonstrated its long-term commitment to the cause by joining the EQUALS (Global Partnership for Gender Equality in the Digital Age) multi-stakeholder initiative. As co-leader of the skills coalition, Germany recently launched the new Grassroots Digital Skills Training Fund, which allocates crucial funding to local initiatives advocating for digital skills for girls in developing countries. You can nominate an initiative or contribute to the fund under the following link: <https://webfoundation.org/digitalskills-fund/>. In cooperation with SAP, the BMZ is narrowing the gender digital divide on a regional level by supporting 21 workshops to teach girls the basics of coding in 16 African countries. Moreover, as part of German development cooperation at the national level, the first projects under the #eSkills4Girls umbrella are being implemented in Cameroon, Ghana, Mozambique, South Africa and Rwanda.

Only collective action can help close the gender digital divide. So let's get started!

GRAZIA VITTADINI

CHIEF TECHNOLOGY OFFICER AT AIRBUS, FRANCE/ITALY

When you work in aeronautics, the sky is not the limit. As a young girl kicking footballs and skidding across muddy fields with her friends, Grazia Vittadini had no idea she would one day be a leading figure at a company that grosses 67 billion euros annually and dominates the aerospace industry.

Growing up in Milan, Grazia didn't take much stock in what was considered socially acceptable for young women her age. She built airplane models out of bits of wood and raced motorbikes, fine-tuning and taking them apart, and putting them back together again. While she did end up taking up ballet and studying music at a conservatory, she never forgot her mother's sage advice: "If you want it, if you're passionate about it, you can achieve pretty much anything."

"THE ONLY LIMITS ARE THE ONES WE
IMPOSE ON OURSELVES."

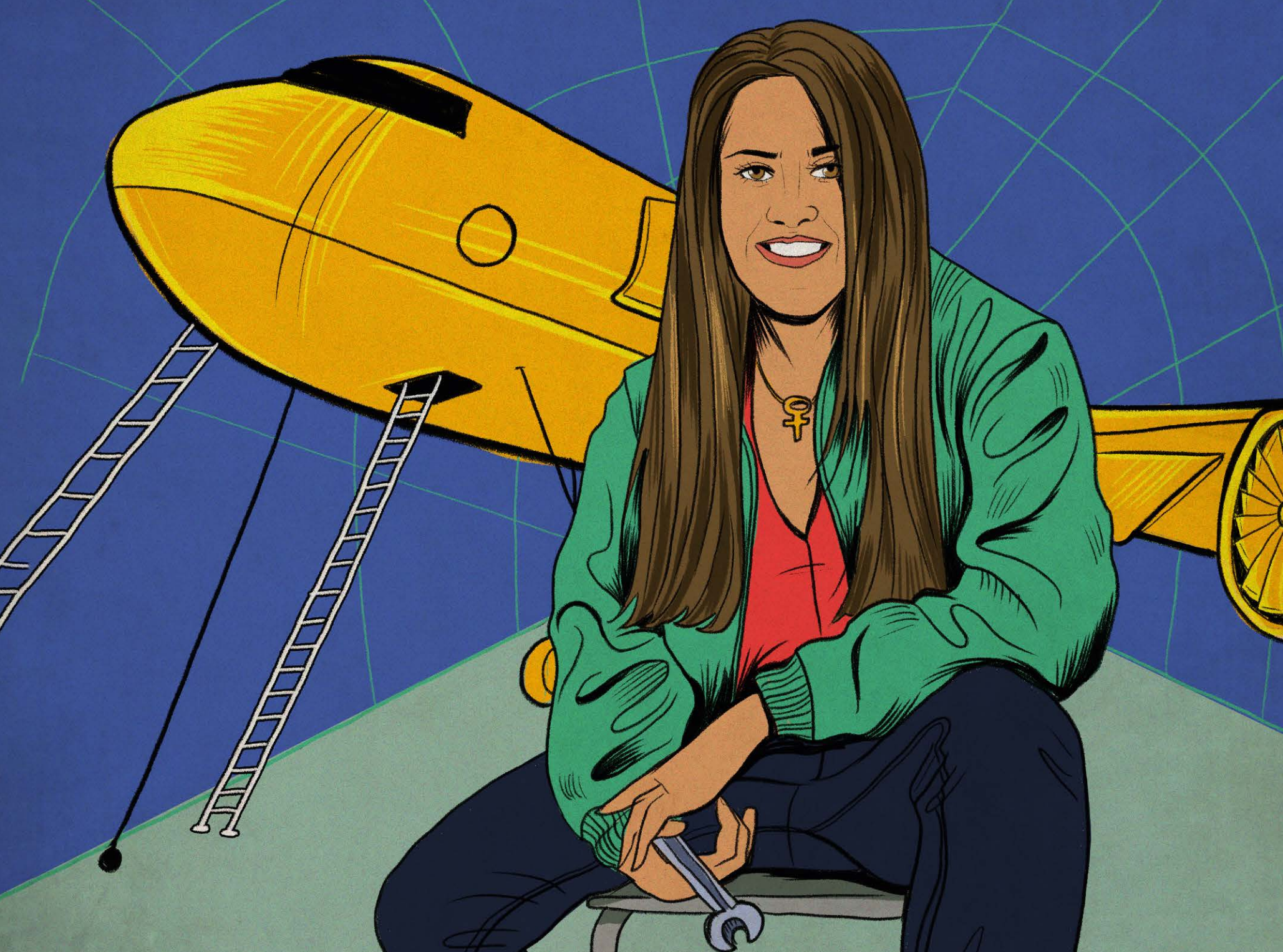
So Grazia went for her dreams and reached for the stars, quite literally. After graduating from the Polytechnic University of Milan and working as a design engineer, she embarked on a path to turn seemingly impossible dreams into reality. She rose steadily through the ranks at Airbus to become its first female board member and Chief Technology Officer in an industry whose engineering workforce is made up of just 17 per cent women worldwide. In a boardroom with 16 suits, "there are plenty of different reactions to you as the only female executive in certain discussions or contexts ...

these range from thinking you are an assistant to one of the other executives, to not knowing quite how to deal with you."

Strong, intelligent women everywhere are criticised for having ambition. Assertive women are called emotional, domineering and bossy, and admonished for being too feminine or not feminine enough. "I have had ladies, engineers, come to me and say that coaches or colleagues had criticised them for acting 'too friendly' or told them they were too feminine, that they should wear less pink, less flowery clothes. I've heard it too. You know what though, who cares!"

Grazia sees emotional connectedness as a strength and advises women to take such feedback with a grain of salt. In life, and in any line of work, "there will always be self-doubt and fear. There will always be people trying to tell you what you can and cannot do, and how you should change. Yes, feedback can be a gift, but you can also reject gifts, or set them aside without taking them all to heart."

The fact that aerospace is still a boys' club is not what makes it challenging. The real challenge lies in being different "when you don't adhere to the 'pale, male, Yale' stereotype." But that should never deter young women from pursuing a career in technology. "Success lies in knowing oneself better than anyone else."



JAPLEEN PASRICHA

FOUNDER AND EDITOR-IN-CHIEF OF FEMINISM IN INDIA ONLINE MAGAZINE, INDIA

In a country where rape and discrimination against women are daily evils, activist Japleen Pasricha has made it her mission to ensure women's voices are heard. She employs digital tools like her Feminism in India online magazine and online campaigns, and raises awareness of cyber harassment.

"We have to fight. Nothing is ever served up to you on a platter!" Japleen is a fighter who has thrown herself into the heart of the fray, standing up against patriarchy and discrimination. She numbers among the most famous feminist activists in her homeland India.

This wasn't the case just ten years ago though. In 2009, the German studies student was content to walk the streets of Berlin, a happy-go-lucky girl in love with books and travel. A few years and several trips later, she discovered her calling on the streets of her hometown Delhi. As the capital city, and the rest of India, took to the streets in collective anger over the rape and murder of a young paramedic in December 2012, something shifted inside Japleen as well. Still writing her dissertation, her interest in gender, women, sexuality and intersectionality had begun to blossom. "I was a feminist even before I knew the meaning of the word." Today she "smashes the patriarchy for a living", as she puts it.

In the aftermath of the Delhi rape case, she devoted herself to the study of gender and feminism, and discovered "that the internet (and public domain) did not have enough material on Indian feminism or feminist content rooted in the country." She decided to fill the gap.

Japleen is editor-in-chief of Feminism in India (FII), a first-of-its-kind, feminist media start-up that she founded in 2014. Begun as a Facebook page, the website is a trove of feminist writings and uses new media and technology to increase women's representation on the internet. It gives voice to issues concerning women and other mar-

ginalised communities, such as gender minorities and people from the oppressed lower castes. Over 2,500 stories by more than 300 writers have already been published. The site hosts a section that invites women to write, publish and share stories of their personal struggles. FII is more than just an online magazine, and has recently emerged as a resource centre for anything related to feminism and discrimination. It organises campaigns on feminist issues and workshops for journalists on how and how not to write about crimes against women. The Digital Empowerment Foundation honoured FII's #DigitalHifazat (digital security) campaign on online violence against women with

"SPEAK UP. TAKE CARE OF YOURSELF BEFORE OTHERS. AND ALWAYS, ALWAYS SPEAK UP!"

its 2017 Social Media for Empowerment Award. FII has also won the prestigious Laadli Award for Gender Sensitivity twice and has been showcased at several international conferences, such as the Internet Governance Forum in Mexico and the UN Women's 61st Commission on the Status of Women.

Standing up for feminism in a deeply patriarchal society is not without its challenges. Japleen and her team are often harassed, abused and viciously attacked online by mostly right-wing trolls who accuse them of being "against Indian culture". But giving up has never been an option.



YES!

MY CHOICE

WOMEN

Future is female!

KEEP YOUR HAND OFF

SMASH THE Patriarchy!

#IWillGoOut

FOR ALL EN

F//
♀
✊

ZAHRA SHAH

PROGRAMME MANAGER AT RE:CODED, IRAQ/PAKISTAN

Zahra Shah is passionate about helping tech sectors in countries affected by conflict to grow. This passion first took her to Gaza, and now to Iraq, a challenging place to develop an infrastructure for tech entrepreneurship.

Zahra got hooked on the tech start-up world while working at Groupon, the world's fastest growing start-up at the time. Born in London, she had just finished her bachelor's degree at Goldsmiths College, University of London. "I fell in love with the fast pace and innovation that I would see on a daily basis," she recalls. So even when she quit her job to pursue a masters in The Netherlands, she simultaneously joined a start-up in Amsterdam. "I'm addicted to the work environment that start-ups provide."

**"TECHNOLOGY PROVIDES WOMEN
WITH A LOT OF FLEXIBILITY, NO MATTER
WHAT LIFESTYLE THEY CHOOSE."**

Today, Zahra works as a programme manager for Re:Coded in Iraq, an NGO teaching digital technology skills to young people affected by conflict. She runs the coding and entrepreneurship programmes and is involved in plans to expand the programme to other cities across the country. Iraq is a very different environment from the places she has lived in and visited before – London, Amsterdam and even Gaza, where she spent some time working at its first ever tech hub, Gaza Sky Geeks. The lack of infrastructure is a huge hindrance to the development of the tech and entrepreneurship ecosystems, she explains. Access to capital is almost non-existent and there are no proper

legal frameworks that reflect state-of-the-art technological development. "Aside from all this, the biggest challenge is the way people approach problems and think about their futures. There is a huge reliance on the government to provide jobs rather than looking at other non-conventional employment options, such as freelancing."

Online freelancing and tech entrepreneurship offer great flexibility. "If a woman decides to start a family, for example, that shouldn't stop her from also thinking about a career. The choice doesn't have to be one or the other anymore." For women living in the Kurdish-Iraqi town of Erbil, Zahra's role as a female programme manager is a special one. "I only recently realised how much of a unique position I am in to relate to local women and girls. As a British Pakistani that also wears a hijab, and often gets mistaken for a Kurdish or Iraqi woman, I've been able to show them that it is possible for women to be in managerial roles – something that is not so common here."

Zahra sees encouraging women as essential. "I'm constantly inspired by stories I hear of women launching their own businesses and supporting other women across the world." Most of all, women need to be convinced that they don't need to be developers to become key players in the tech branch. "There is a large misconception that you need technical skills to play a role in the tech sector. There are hundreds of jobs that derive from technology and require the same agile approach of a developer, especially inside a start-up." That's why Re:Coded held North Iraq's first Women in Tech and Entrepreneurship Summit, highlighting successful, local female role models to encourage other women to get engaged in the tech sector.



DOROTHY GORDON

TECHNOLOGY ACTIVIST AND DEVELOPMENT SPECIALIST, GHANA

As a senior manager for the United Nations Development Programme (UNDP), Dorothy has seen how technology can drive development in many parts of the world. For over two decades now, she has advocated using tech to drive positive change in Africa.

Dorothy discovered her fascination with internet technology while travelling through rural Ghana in the 1990s. The development economist was taking a break from her work with the UN to support a number of NGOs working to launch the first community information centres. The mobile internet hadn't been invented yet, so cyber cafés were the only access points and crucial for spreading information about health and educational opportunities.

At the time, using technology to support development efforts was more widespread in India, where Dorothy served as a UNDP senior manager. She still remembers the day the terrible Gujarat earthquake destroyed hundreds of thousands of homes and took thousands of lives. She observed how village women with very little education successfully taught other village women how to construct earthquake-resistant houses, spreading the information using the very limited bandwidth available, just enough to transmit one-way videos and two-way audio. "I realised that giving people internet access could have a huge developmental impact," she recalls. From that day on, this conviction has shaped her entire life.

Dorothy believes that technology is strategic to Africa's development needs, and she has made it her mission to boost the tech and innovation ecosystems in Africa and globally. In 2003, she was appointed the first Director-General of the Ghana-India Kofi Annan Centre of Excellence in ICT, a tech training centre for young people, where she has set up strong partnerships between governments and tech companies. She has

also served as a board member and advisor for institutions such as the Global Commission for Internet Governance (GCIG) and the World Summit Awards.

"WE NEED MORE TARGETED OUTREACH
TO YOUNG WOMEN TO SHOW WHAT IS
POSSIBLE AND CHANGE THE FUTURE."

Dorothy is well aware of how much still needs to be done, especially in education. "You might be surprised to find out that most schools in Ghana teach computer programming on paper instead of on computers. Many schools don't even have electricity. We also need to translate digital training content into our local languages."

Women in particular still face a lot of prejudice, she notes: "I have found that people assume you don't know anything about technology just because you are a woman. It is quite frustrating to know that cultural messaging, discouragement from their families and all sorts of unfortunate reasons are stopping women from getting into technology." Dorothy wants to see women not just consuming tech, but shaping it as well: "It is always dangerous to let someone else tell your story. We need more women in tech to change the narrative."



SHINTA WITOYO DHANUWARDYO

CEO AND FOUNDER OF BUBU.COM, INDONESIA

Shinta Witoyo Dhanuwardoyo is a compulsive serial entrepreneur. Bubbling with new ideas and the enthusiasm to match, she has created at least ten tech companies – including one of Indonesia’s first, Bubu.com – and mentored several others over the span of 20 years.

After studying architecture in the US, Shinta discovered the internet some time in 1995 while pursuing a master’s degree in business management. As a graduate assistant, she supervised a computer lab and instantly fell madly in love with the web. This not only changed her course in life; it also created a digital revolution of sorts in Indonesia that has touched millions of lives to date.

“If you believe in your idea, don’t waste too much time just thinking about it,” Shinta was convinced, and over the next few years she wasted no time at all: back in Indonesia in 1996, she launched Bubu.com, one of the country’s earliest tech companies. It began as a web design agency with Manchester United Football Club as its first international client. By 2006, it had transformed into a full-fledged digital agency providing services such as digital integrated campaigns, web and mobile design services, and digital and social media strategies. Since then, Shinta has worked relentlessly to promote technology in the country. In 2017, Indonesian business magazine Globe Asia named her one of the 99 Most Powerful Women and Forbes Indonesia Magazine featured her on its Inspiring Women Honour Roll.

Shinta revolutionised Indonesia’s online shopping business with Plasa.com, an e-commerce platform owned by Telkom Indonesia, which was later taken over by US tech giant eBay. In 2010, she created one of Indonesia’s earliest venture capital firms. Nusantara Ventures helps to build and nurture young entrepreneurs, especially by mentoring start-ups as an angel investor. She also founded the Silicon Valley Asia Technol-

ogy Alliance, a non-profit to facilitate the exchange of ideas and foster collaboration between the Indonesian tech industry and the Silicon Valley. Every two years, she brings together global tech leaders in Indonesia at the IDBYTE technology conference organised by her Alliance.

“IF YOU BELIEVE IN YOUR IDEA, DON’T WASTE
TOO MUCH TIME JUST THINKING ABOUT IT.”

When Shinta was starting out, her biggest challenge was explaining what her company offered to her clients. “The internet was so new then, few understood it,” she says. Now, after more than 22 years, she believes Indonesia is poised to become an e-commerce hub and a global digital player. As the head of the Committee for Digital Business, e-Commerce and Start-ups Development at the Indonesian Chamber of Commerce and Industry, she is committed to promoting the country’s tech industry.

Shinta is among the top female leaders in Indonesia’s information and technology scene. She has had her share of failures too, though she’s not the kind to let that slow her down. One of her mantras for success is ‘do not be afraid to fail’. Describing every failure as “an asset,” she says, “that’s how you learn.”



MMAKI JANTJIES

SENIOR LECTURER IN COMPUTER SCIENCE AT UNIVERSITY OF THE WESTERN CAPE, SOUTH AFRICA

If South African students use VR glasses to learn about chemistry in future, then Mmaki Jantjies' latest project has been a success. The computer science lecturer studies and develops tools to provide children from rural areas with a better education.

Mmakis' parents were in complete agreement: their four children were destined to become engineers. So they did everything in their power to make it happen, wanting to give their kids opportunities that they had never had. Under Apartheid, black students were locked out of STEM – science, technology, engineering and maths – fields. Occasionally her mother and father would even invite white engineer friends over to spark their offspring's interest in the discipline. Their efforts were successful: Mmaki and her brothers went into civil engineering, biochemistry and computer science.

"My parents sensed that these fields would open a world of opportunity for us. You could still be the first in something," Mmaki recalls. She is probably South Africa's first black, female computer scientist to hold a Ph.D. "I suppose I have yet to meet another black female South African computer science Ph.D. holder at any rate." This is probably more down to money though, as after graduation most computer scientists choose well-paid jobs in the private sector over the academic track. Not Mmaki: "I was really passionate about research. I wanted to use my skills to impact society."

Mmaki researches and teaches at the University of the Western Cape today with a focus on technology in the classroom. Technology, she says, makes it much easier to give poor and underserved children access to a better education, and to make the subject matter available in all of the eleven different languages spoken in South Africa. "It's easy to create an app with textbooks and learning games, and even to capture teachers' notes." At the moment she is immersed in a virtual reality project developing VR animations that will allow students to run chemistry experiments even if their school has no lab.

As a woman in a male-dominated field, Mmaki sometimes feels like a stranger in a strange land. "Many computer science men liked games when growing up. I really didn't. But games were what they wanted to chat about." Mmaki did not have many role models in the computer science field as there were not many women around, especially as a mother trying to balance a family and a career. Over the years, she has really come to appreciate how important it is to network with other women and support each other.

"TECH HAS PUT THE POWER IN THE
HANDS OF THE PEOPLE WHO DID
NOT HAVE IT BEFORE."

A few years ago, Mmaki founded a tech club for girls in impoverished areas as part of a project by UN Women and the Mozilla Foundation. The teachers in the clubs were all young, female information systems graduates from similar backgrounds, living proof for the girls that they too could successfully walk the same path. Today there are also tech clubs for boys. She insists that all kids should grow up tech savvy. "Today, innovations can come from anywhere. Even in the most isolate villages, kids can program apps and earn money with them."



JANINA KUGEL

CHIEF HUMAN RESOURCES OFFICER AND MEMBER OF THE MANAGING BOARD AT SIEMENS AG, GERMANY

“We simply cannot accept discrimination,” Janina Kugel says. As Chief Human Resources Officer for tech giant Siemens, she is in the ideal position to effect positive change.

It is 6 p.m. and Janina slips her laptop into its case. When not on the road, she leaves work in time to have dinner with her family. A few years ago, this would have been unthinkable on the upper floors of a global corporation. Janina is responsible for around 379,000 employees all around the world. Yet she still makes sure to prioritise her family every evening, and waits until late in the evening to switch her laptop back on.

“I have been enthusiastic about technology for quite a while,” Janina recalls. As an economics student, she dreamt of working for the United Nations. Then she landed a job in corporate consulting, where getting to know the different branches of industry formed the basis for joining Siemens. “I find it fascinating to see how a company like Siemens can lastingly improve an entire country by building large plants and infrastructures.”

As a board member in a tech corporation, Janina is a welcome anomaly for two reasons: technology companies around the world tend to be male dominated – as in most companies in the industry, female engineers make up around 20 percent of the Siemens workforce – and the number of women falls the higher you go up the corporate ladder in all sectors. “We would love to have more girls in STEM – science, technology, engineering and mathematics – at Siemens,” Janina says, but this won’t happen until the number of female trainees and university graduates in STEM increases. Janina would also like to see our clichés and role models change along with the education system. “If we ensure successful women are more visible, girls will see that they can go into any field they want to.”

In her professional life, Janina has often been the only woman at the table. “It was odd at first and I had to recognise that some of the rules and dynamics were different,” she recalls. She learned to stand up for herself, including insisting on time to spend with her family. “If that had not been possible, my career would probably have turned out differently. Flexible working hours are important for lots of people these days, not just women. This is something firms have to accommodate, since no company can afford to pass up talent for that reason in today’s market.”

“ADVOCATE FOR YOUR VALUES AND GOALS AND LOOK FOR A SUPPORTIVE ENVIRONMENT – AT WORK AND AT HOME.”

She has also been on the receiving end of the occasional disparaging remark, sometimes about her gender, sometimes about her skin colour. “These often turn out to be power games insecure people feel the need to play, or just plain ‘stupidity’.” Ultimately though, it all comes down to how you respond: “I think it is important to stand up and fight. It takes courage, but it’s worth it. We simply cannot accept discrimination of any kind.” As head of HR, Janina pushes for equal opportunity. She wants to enable every employee to live up to their full potential, regardless of gender, skin colour, or potential disabilities. “In the end, different experiences and points of view are what really enrich a team and a company.”



IVY BARLEY

CO-FOUNDER OF DEVELOPERS IN VOGUE, GHANA

Programmer and social entrepreneur Ivy Barley had long dreamt of a sisterhood of amazing women in tech. Now she is making her dream come true with Developers in Vogue, a community of female developers who are passionate about using technology to revolutionise Africa.

“The future of technology is female and African,” Ivy is fond of saying – and she is part of that future. As a young girl, technology fascinated and amazed her. She realised she could potentially impact the world from her own little corner by creating software using nothing more than a computer, some electricity, an internet connection, and her own skills. She began teaching herself to code in pursuit of her ultimate goal: to be a female developer.

In 2017, Ivy became a teaching assistant in maths, statistics, physics and computer programming at the African Science Academy (ASA), an all-girl advanced magnet school for science and mathematics. Before she started teaching, Ivy had heard many people claim that women could not excel at technology. Now though, she was experiencing the exact opposite: “The girls were very enthusiastic about coding and had a lot of great ideas. They made a great impression on me, and inspired me to start a sustainable initiative to create the ideal environment where females could code, connect and collaborate.”

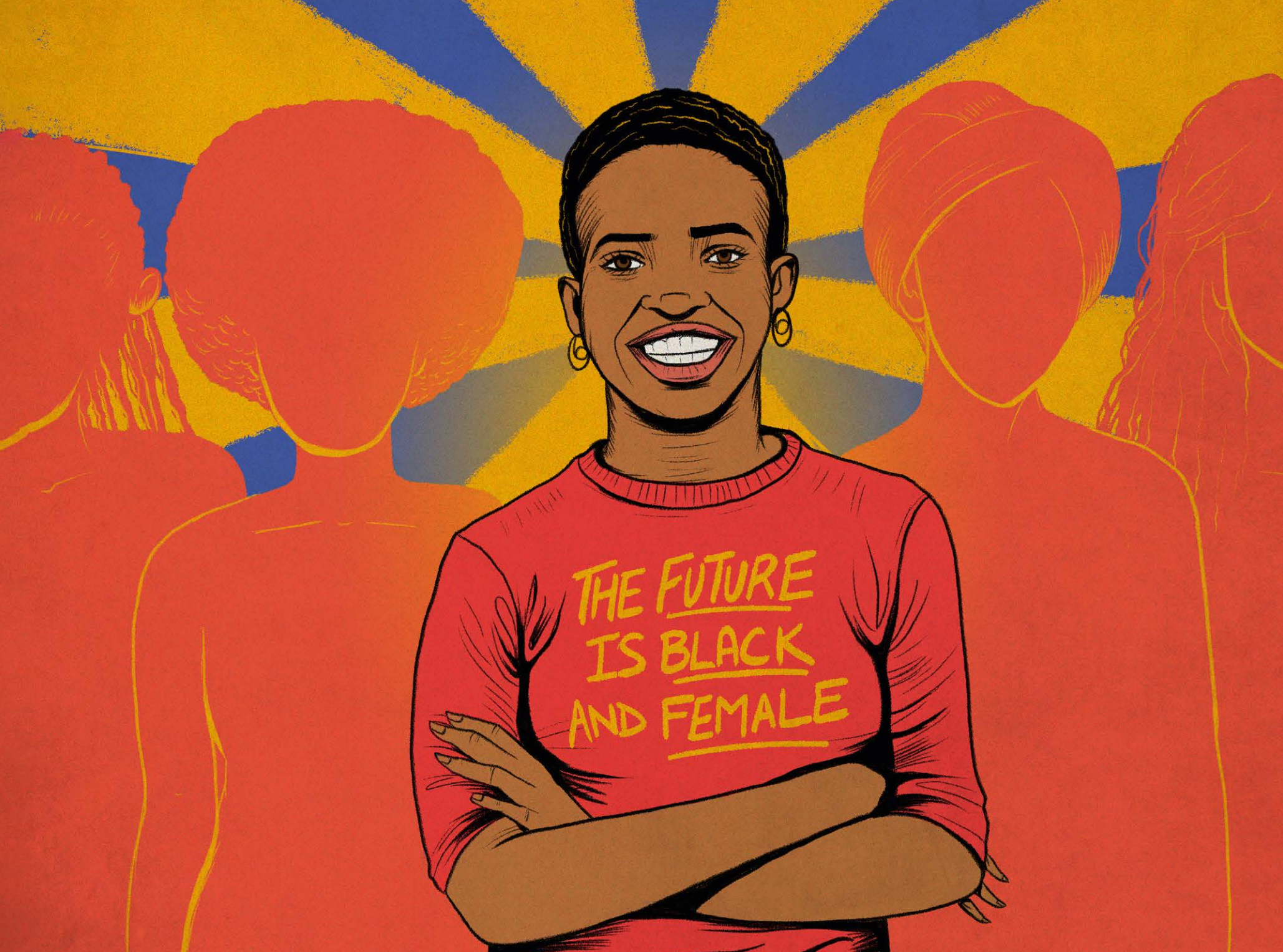
Ivy’s Developers in Vogue initiative was born in 2017. In addition to creating a sisterhood of amazing women in tech who encourage and support each other, Ivy and her team train women in the latest technologies using a practical and project-oriented curriculum. They also connect them to real-time projects and jobs, enabling them to apply their skills and earn an income. “Being a Ghanaian woman in tech feels empowering as I keep getting so many life-changing opportunities in the tech space,” Ivy says. There are still plenty of challenges though. “People tend to underestimate my

abilities, but that is not a problem for me. I generally have to prove that I am capable of delivering the expected results.”

According to Ivy, there has never been a better time to invest in women, especially African women. She strongly believes that most challenges facing the African continent can be significantly reduced by advocating technology and innovation. “When women are equipped with the right skills, they are in a better position to be at the forefront of the digital revolution.”

“WHATEVER YOUR PASSION IS, YOU
DEFINITELY NEED A LOT OF DILIGENCE
AND DETERMINATION.”

Undeterred by people underestimating her abilities, Ivy continues to shatter the glass ceiling. In 2017, she made headlines in Ghana after taking first place in the prestigious #eSkills4Girls competition in Berlin, Germany, a prize that came with €15,000, mentoring from Google and support from Impact Hub Accra. Ivy has trained the more than 100 women currently involved in the Developers in Vogue community, and exposed them to opportunities in the tech ecosystem. She is also a member of the Global Shapers community initiated by the World Economic Forum, a prestigious network of young people making a difference in their countries.



THE FUTURE
IS BLACK
AND FEMALE

MAARJA-LEENA SAAR

PROCESS MANAGER IN THE ESTONIAN COOPERATION ASSEMBLY, ESTONIA

As a young business student in Tallinn, Maarja-Leena Saar taught herself basic IT skills. Today she heads the country's official e-petition platform and works on implementing digital tools for citizen participation.

Sooner or later, anyone working for social change in Estonia will land on the Rahvaalgatus.ee website led by Maarja-Leena. The platform allows citizens to submit suggestions to the government: If you want more parks in the city, less rubbish on the streets, or better care for the ageing, this is the place to get the ball rolling. If more than 1,000 users sign your petition, it is sent to the Estonian parliament for consideration.

Maarja-Leena works at the Estonian Cooperation Assembly, an NGO founded by the President of Estonia to encourage citizen participation. She was responsible for implementing the e-government tool. "Elections are only one of the many ways Estonians can exercise their citizenship," she says. The platform went online in 2016, and in the intervening two years, the parliament has processed 16 initiatives, two of which have become law.

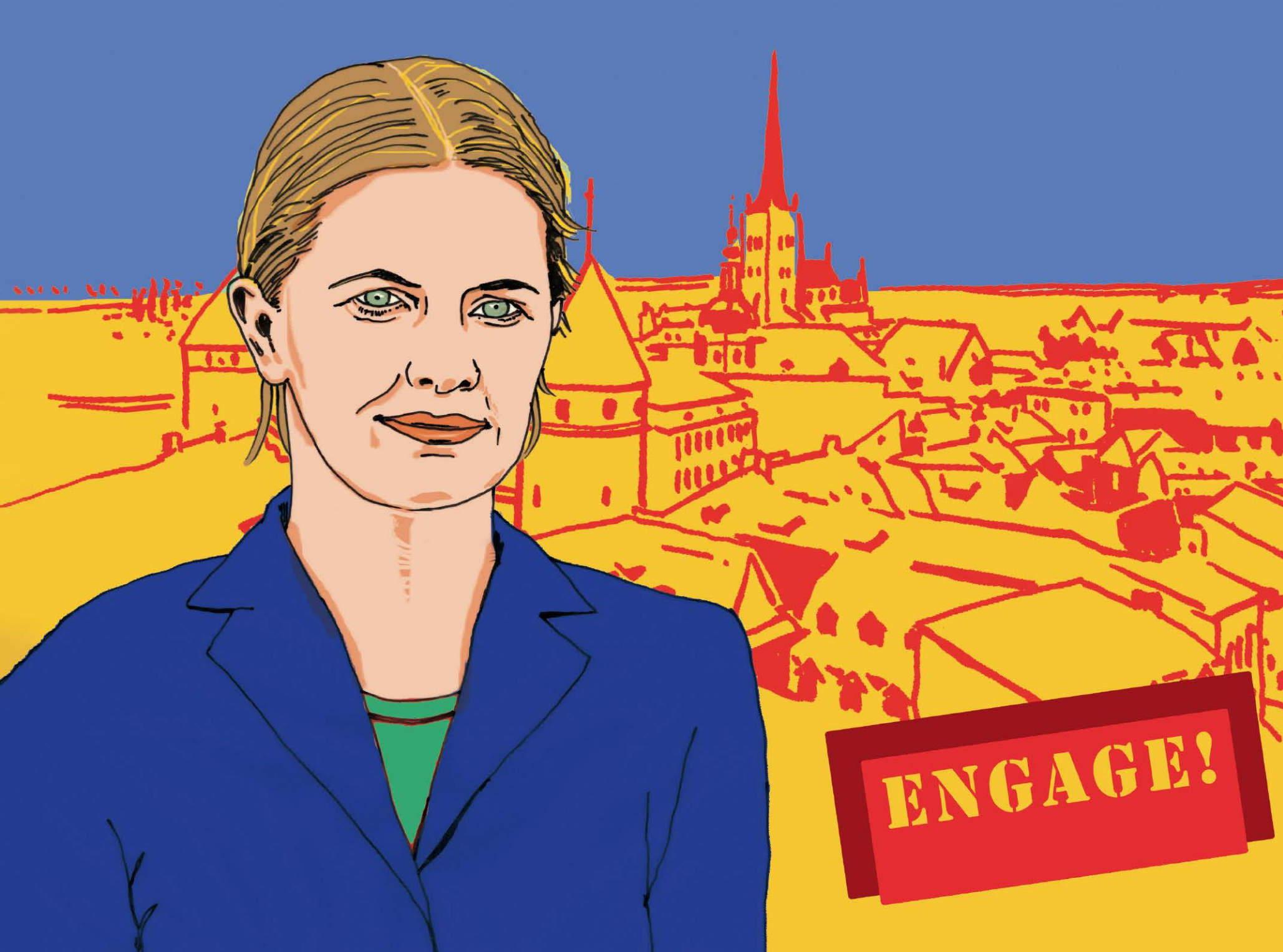
Maarja-Leena is a self-made tech woman. She taught herself basic IT skills while completing a degree in business administration and marketing management at TalTech University in Tallinn. Technology wasn't her initial focus; she was more passionate about communication. But with digital tools becoming so essential to how we communicate, she realised, "I had to take technology seriously". Maarja-Leena was soon considered the "IT person" on campus, always ready to help her fellow students with their tech projects.

At the Estonian Cooperation Assembly, she is trying out new ways of improving democratic participation through technology: "There's a lot of experimenting and stepping

into the unknown. There are moments in which the challenge is to try processes that don't really exist yet." A big enthusiast of open data, she wants to make data accessible and understandable in hopes of "avoiding the spread of inaccurate or even false information". Maarja-Leena's work has been recognised by New Europe 100, an organisation that honours outstanding challengers bringing change to Eastern and Central Europe.

"WOMEN NEED TO DARE TO INSPIRE
AND BE ROLE MODELS."

Being a woman in technology has been more of an inspiration than a challenge, "even if it's odd to be the only woman in a room sometimes." However, Maarja-Leena has noticed that women are still mostly invisible: "They are great experts, but often lack the self-confidence to present their work." Rather than calling for more participation by women in future, she says, we need to recognise that women are already pushing the boundaries by experimenting and collaborating in technology development. Their visibility needs to be raised; women need to dare to be role models and take centre stage. The impact of women on the future of technology is not an abstraction, she states – it is a reality here and now.



ENGAGE!

ASMA ENNAIFER

CHIEF EXTERNAL RELATIONS, INNOVATION AND CSR OFFICER AT ORANGE TELEKOM, TUNISIA

"I would like to thank everyone who threw banana skins under my feet, for it made me stronger," Asma Ennaifer says. Called "The Orange Lady" by admirers and opponents alike, she's one of the spearheads driving Tunisia's digital transformation forward.

"At the beginning of my career, I was the right arm of the president of Tunisair, Tunisia's flagship airline. Some people, especially men, did not like that and asked, 'who is this child who's got all the power?' I turned a deaf ear and kept on. I surpassed them and that's when I succeeded." Many have tried to block Asma's path to success along the way, but she has never given up. This is what earned her the title "The Orange Lady", which not only refers to the Orange Telecom company she joined soon after it was established in Tunisia in 2010, but is also a play on the "The Iron Lady", the nickname given to Margaret Thatcher, Britain's first female prime minister. "I have always had a strong character," Asma says.

At Orange Telecom, she is fighting to ensure women have a place in the job market and the world of tomorrow. "While we do not know exactly what sorts of jobs there will be in 2030, we are sure they will revolve around the digital realm," she explains. "If we do not push women into the digital world and toward technology, they will not find jobs in future. Women, especially women engineers, do not believe in themselves and in their capabilities."

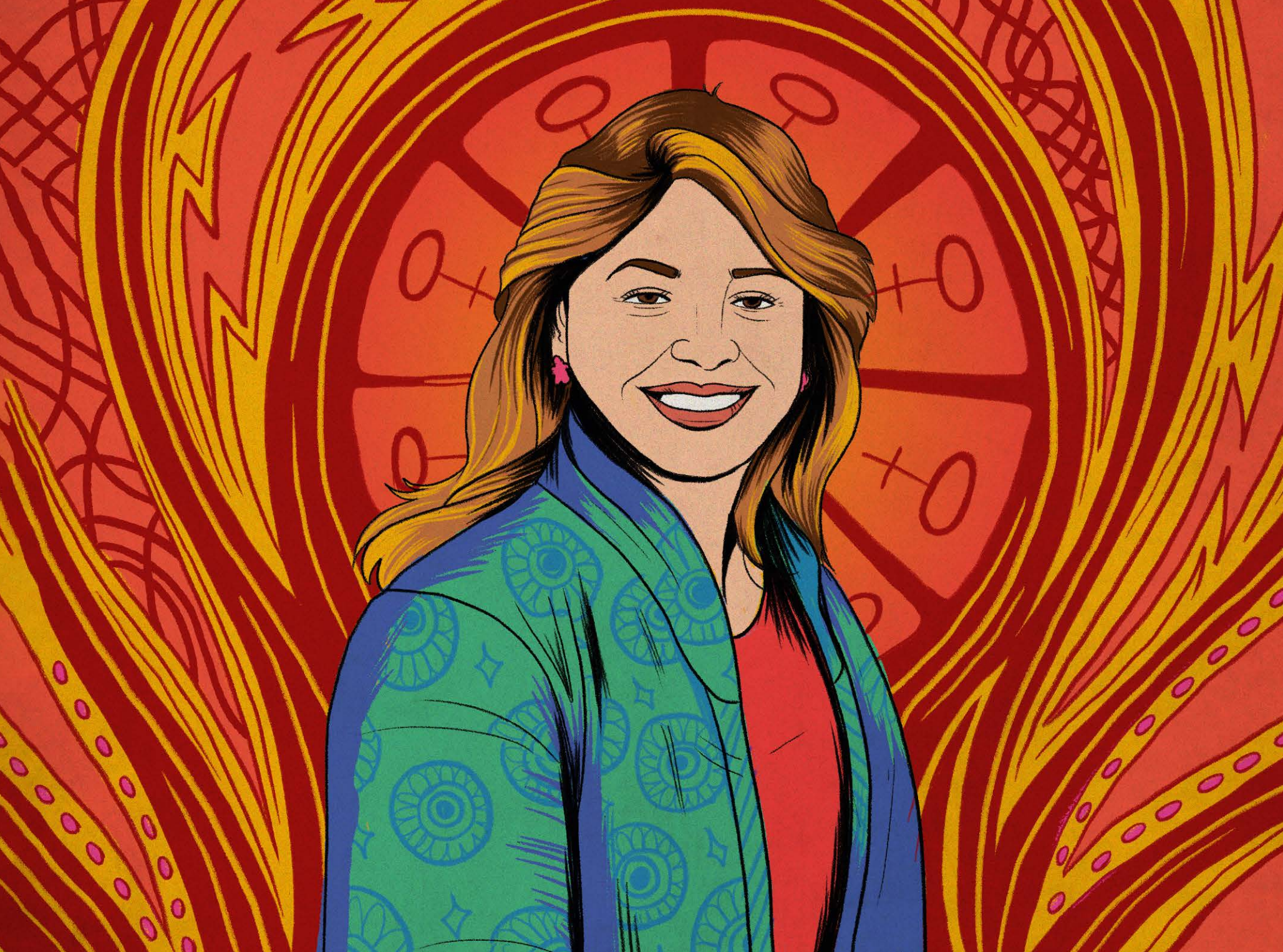
Asma and her team established North Africa's first coding and programming school, the "Orange Developer Center," in 2010. Back then, coding and mobile application development was not yet on the curriculums of universities and engineering schools. That has changed thanks in no small part to Asma's dedication. Over the years, her Orange Innovation Program has grown and become much more than a coding school. Orange tech clubs have been established at almost every university to train young Tunisian engineers and IT experts and help them create their own digital start-ups.

"Young Tunisians are technophiles and excellent in their studies, but there is a deep divide between higher education graduates and the job market," Asma notes. 25 percent of male engineering graduates in Tunisia are unemployed. For women the situation is even worse: they make up 50 percent of engineering students, yet 40

"THE MORE WE GIVE WOMEN FINANCIAL
AUTONOMY, THE LESS LIKELY WE ARE
TO HAVE WARS."

percent cannot find a job after graduation. That's why Asma is adamant when it comes to achieving parity in any project initiated by the Orange Innovation Program. "We require gender parity. Women should make up 50 percent of the total number of participants," she insists. However, Asma notes that women need to show more solidarity and support each other more. "Women do not help each other; they prefer to work for men. But we can only make it through female solidarity."

The Orange Innovation Program has achieved such large-scale success in Tunisia that management has asked Asma to replicate it in other North African and Middle Eastern countries. "I am very lucky to be doing this job. Making other people's lives better and easier is my passion and what keeps me strong."



REGINA MBODJ BROWN

DIRECTOR OF THE CTIC START-UP INCUBATOR, SENEGAL

Regina has high hopes of tech start-ups and their ability to drive the economy, improve health care, and combat poverty. For years she worked as a programmer all over Africa, and today heads the CTIC IT incubator and accelerator in Senegal.

Senegal was on school holiday when Regina sat down in front of a CRT monitor for the very first time. The secondary school student had registered for a programming course at a small computer school during the break. The year was 1995 and Senegal's IT sector was still in its infancy. Microsoft Windows was completely unknown. Small, white numbers flickered over the otherwise black screen. Regina had a lot to learn before the bulky machine would respond to her commands. Still, in that moment she knew she no longer wanted to be a veterinarian.

Regina attended university and majored in software engineering. She was one of the few female students in the programme, and also one of the best. She never felt at a disadvantage. If anything, being a woman raised her profile. "I never felt like I was doing a man's job."

She is sympathetic to the many young women who shy away from a career in tech, but sees no reason for hesitation: "In some roles you only see men, which could seem discouraging. But I am doing it too, and I'm no smarter than anyone else!"

After completing her degree, Regina travelled extensively in Africa, the USA and Europe working as an IT manager for an oil company. Today she heads up CTIC, a Senegalese IT incubator and accelerator, and has helped many other African incubators get off the ground as well. She finds her work inspiring: "I am always impressed by how

often entrepreneurs fail and still refuse to give up. Sometimes even I have lost faith in their project, but they keep going until they have made it work. And I feel a great sense of pride when I see a start-up become a big player a few years down the road, with dozens of employees and millions in turnover."

"A WOMAN CAN DO ANY JOB
A MAN CAN DO."

For Regina, digitalisation represents progress and opportunity. Entrepreneurs have to solve problems, she insists, and not just keep writing new software for the same old purpose. "A digital entrepreneur has to create change – in agriculture, in fishing, in tourism. We have to ask how IT can help drive the economy, improve health care, and combat poverty."

These days just under 40 percent of the entrepreneurs at the CTIC are female, in part because the incubator addresses women directly. "We need more women in leading roles. If you want to achieve something as a woman, you have to go out and grab it with both hands. We have got to get out there and show you what we can do."



MARTHA WURM

DEVELOPER AND FOUNDER OF THE NAIROBI DEV SCHOOL, KENYA

Martha Wurm fell in love with technology as a teenager. It took her only a few years to teach herself to code, and at the age of nineteen she was already a tech entrepreneur who had founded a coding school.

When Martha received her acceptance letter from the Hacker School in New York City (NYC), it felt like the best day of her life. The eighteen-year-old was determined to attend the three-month immersive training course for programmers and nothing could stop her, not even the high cost. Through online crowdfunding, she raised 5,000 US dollars to fund her trip. But then she hit an insurmountable obstacle: she was denied a visa.

All of Martha's coding skills were self-taught, so expanding her knowledge in the USA would have been a great opportunity. As a teen, she got hooked on technology during an internship at leadership incubator Akili Dada. She then 'googled' everything she could about programming and began practicing coding. After a short stint as a junior developer, she did a three-month internship with an open source software development programme for women.

Though disappointed, the visa troubles did not deter her. Since she could not attend a coding school, she decided to use the money she'd raised for her trip to NYC to start one of her own in Kenya: the Nairobi Dev School. Martha dedicated everything to the school. She was featured on CNN and BBC and travelled all over the world telling her story. "From April 2013 to August 2015, this was my life: I was the founder of a coding school. It was not the typical story of a young woman in Kenya."

While running the coding school, she ran up against two main challenges: funding and finding partners. It still frustrates her when she reads that a huge part of fintech funding in East Africa goes to American and European founders who have started

businesses in Africa. Partnerships are as important as funding, and Martha found that they were equally difficult to secure. Even though she was the talk of the town and presented as a rising star in the tech firmament all over the world, this did not translate into more than white noise. In 2015, Martha decided to close the Nairobi Dev School to learn more about how to run a tech business. She is now in her fourth year as a business major at the Minerva Schools in San Francisco, USA, which has given her an opportunity to work with large tech organisations in different countries.

"TECH IS SOMETHING YOU CAN
QUICKLY BUILD YOUR SKILLS IN."

For Martha, investing in and empowering women in tech is a no-brainer. "Tech is not just about coding and sitting at a computer; it is such a diverse field, there is not just one path." She has observed many young, energetic women who have already developed great project portfolios. "If you think starting a coding school at nineteen was impressive, then just wait and see what these women do."

After her studies, Martha wants to head back to Kenya to chase her dreams as an entrepreneur, providing software as a service. Though she has become a global citizen with a wide network, she has not forgotten about the latent talents of people in Kenya. "I will hire coders from Africa. I know a lot of skilled people who just need an opportunity."



JOANA BREIDENBACH

FOUNDER OF BETTERPLACE.ORG AND BETTERPLACE.LAB, GERMANY

Cultural anthropologist Joana Breidenbach is passionate about globalisation and international understanding. Once just an internet user, she has become one of the best known social entrepreneurs of Germany's digital sphere today. She sees this as a logical progression rather than a leap.

In 2006 Joana, her husband and their two kids packed their bags for a five-month time out to travel the world. Along the way, Joana encountered many small initiatives dedicated to changing local conditions. The trip intended to expand her horizons also signalled the start of a whole new life.

**"FOLLOW UP ON YOUR IDEAS,
EVEN IF THEY ARE NOT PERFECT."**

Joana began to think about how she could mobilise support for these initiatives and about ways small projects could draw attention to themselves without spending a lot on advertising. She imagined an online platform where social projects could present their ideas, a space for direct communication between donors and recipients. Once back home, she brought computer scientist Till Behnke on board and Betterplace.org was born, the first and today the largest online donation platform in Germany.

Since then the pace and rhythm of her workdays has changed. The capacity to implement and adapt ideas quickly is what sets the digital apart from the analogue, the entrepreneurial from the academic world. The team jumped straight in, both feet

first, learning as they went along, experimenting, readjusting their expectations, and in the end it was not as complicated as it had seemed at the outset. Now it is easy for anyone in Germany to donate money directly to any of the small initiatives Joana met along her travels.

Joana's experience with Betterplace.org inspired her, and she began to wonder if global technology could be the antidote to the egocentricity and ethnophobia that seemed to be overtaking the world. At Betterplace.lab, a think-and-do tank, she looks for ways to use technology for the public good. "I want us to see the full depth and breadth of digitalisation. In Germany alone there are so many platforms dedicated to making the world a better place. We can't just focus on 'evil' giants like Facebook and the like when we talk about digitalisation; we have to explore all the other options too."

Joana has never felt restricted by gender discrimination, but she knows that's not the case for lots of other women. Working on Betterplace.org filled her with euphoria, with joy in her way of life, in starting a business with all the risks and challenges but also the freedoms that went along with it. This joy is clearly contagious: "My daughter is 25 and just founded a digital start-up in Berlin. She knows it won't always be smooth going, but she is willing to take the risk and really doing well so far."



GLORIA MUHORO

GENDER, TECHNOLOGY AND INNOVATION LEAD AT AFRICAN DEVELOPMENT BANK, CÔTE D'IVOIRE

According to Gloria Muhoro, engaging more women in the technology sector is not only a moral imperative; it is smart economics. Specialised in gender, technology and innovation, the international development professional is working on women's and girls' socio-economic empowerment across Africa.

As a young girl, Gloria wasn't particularly interested in technology. Her interest in tech developed through her desire to change lives: "I am fascinated by the power of technology to elevate standards of living. From fintech, drones delivering aid, to life saving and productivity enhancing apps, technology has changed the way we live. It is the future."

"TECHNOLOGY IS ABOUT HELPING
PEOPLE TO SOLVE PROBLEMS AND
MAXIMISE THEIR POTENTIAL."

From the beginning of her professional life, Gloria knew she wanted to pursue career opportunities that merged technology and development. In her current role as the focal point on Gender, Technology and Innovation at the African Development Bank, she assists in the mainstreaming of gender in ICT projects, and advises on the design and implementation of projects that aim to bring African women to access, create and use technology.

While the benefits of technology in economic and social transformation are being recognised across Africa, its benefits have been unevenly distributed based on gender differences, she points out: "Barriers such as cost, social norms, network coverage,

security and harassment, trust and technical literacy all contribute to the fact that women in developing countries are less likely to have access to mobile phones and be online than men." This is a huge loss in times where a country's competitiveness depends on its human capital and talent: the skills, education and productivity of its workforce.

One of the biggest challenges Gloria has faced as a woman in the world of technology is the lack of mentors and role models. Another deterrent was the fact that coding is often considered a core skill set for working in technology. But Gloria discovered other career options in the technology sector which she found as the perfect fit for herself. "I do not code. Nevertheless, I work to create ways for women to participate in the technology sector – in access, leadership, creation, entrepreneurship, usage and labour force participation. There is nothing wrong with coding. The point is that the potential for women in tech transcends coding. We need to shine the spotlight on these non-traditional career options in tech that girls are not learning of in school, most of which do not require an ability to code."

Gloria believes that engaging more women in the technology sector is not only a moral imperative; it is smart economics. "If women, who account for half of world's population, do not achieve their full economic potential, then our economies will not attain sustainable and inclusive development." According to her, a country's competitiveness, overall and specifically in the technology sector, depends critically on the empowerment and employment of its women.



ANKE DOMSCHEIT-BERG

PUBLICIST AND NET POLICY SPEAKER FOR THE DIE LINKE PARLIAMENTARY GROUP, GERMANY

As a child growing up in the German Democratic Republic (GDR), Anke Domscheit-Berg never saw a distinction between men and women in the workplace. The politician has set her sights on shaping our digital future and would like to see more women involved.

“When I was at school, if someone had said that the natural sciences were just for boys, we would have died laughing,” Anke says. “And toys were not targeted for different genders in the GDR, they were made for different age groups.” If the East German government had had its way, Anke would have gone on to study computer science after completing her leaving certificate in 1986. But she studied art instead, a skill she found hard to market after the Berlin Wall fell. So in a jobs office in the West, she asked, “What should I study to make sure I’m never out of work?”

“THE MOMENT A DOOR OPENS EVEN A SLIVER,
STICK YOUR FOOT IN. WALLFLOWERS HAVE
NEVER CHANGED THE WORLD.”

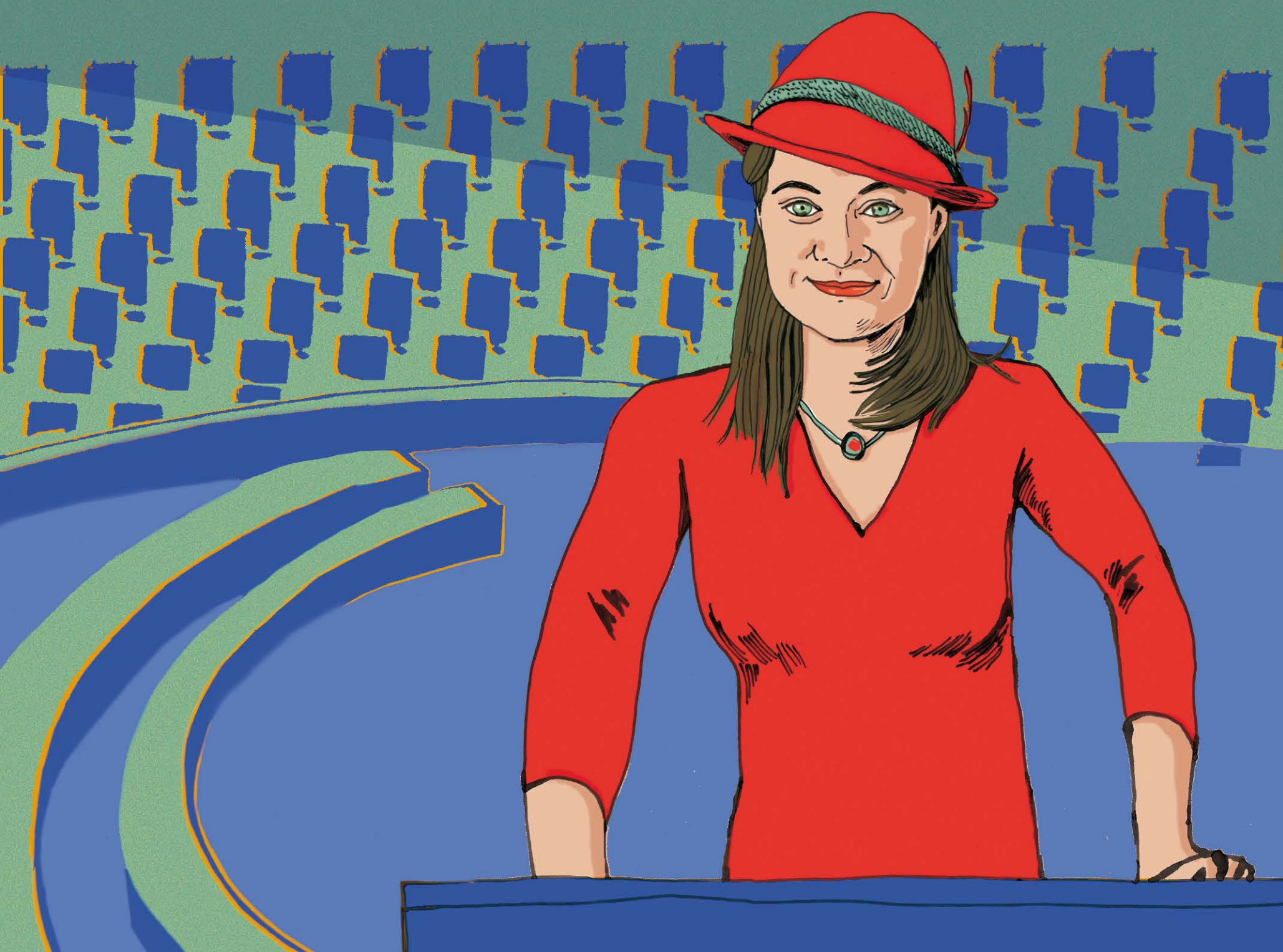
She ultimately completed a bachelor’s degree in international business administration and followed it up with a master’s in England, where she worked at a university computer lab. Few people owned a home computer back then, and Anke’s job gave her plenty of time to explore the emerging internet. “It was like the Berlin Wall fell all over again,” she remembers, “and the internet has fascinated me ever since.”

Anke enjoyed working as a corporate consultant for eleven years, then went freelance as a publicist before switching to politics. She feels politics has to keep up with developments and take appropriate action, though this hardly ever happens. “It infuriates

me that we know what is coming in 20 years and no one seems to care.” About one million people will lose their jobs to self-driving cars, for example, from lorry drivers to driving instructors. “Women need to have an equal share in shaping digital society, since they make up half of the population and have been socialised to think more about social repercussions and long-term effects.”

Unfortunately, reality on the ground looks quite different in Germany. “I am almost completely surrounded by men at every event on artificial intelligence. But how can you effectively shape the future if women aren’t involved in the process?” Anke lives in a state of constant culture shock surrounded by the gender divides so prevalent in the West that weren’t part of the culture of the East. “Children are told from birth where their supposed strengths and talents lie.” And gendered marketing only makes it worse, with t-shirts for girls that say things like ‘In math I’m only decoration.’ “Why would anyone even make something like that?” She initiated the Goldener Zaunpfahl Award to name and shame the most absurd examples of this type of gender stereotyping.

“I have felt a lot of discrimination on the job, especially once I became a mother.” Germany has just two boxes for women: the “ruthless career woman” and the “wallflower”. She soon discovered she was not alone and that female managers everywhere were facing similar issues. “It helps if women systematically recognise these stereotypes.” So Anke would like to see more women networking, exchanging ideas and experience, and becoming more visible – taking part in debates, being proactive. “I have learned to take advantage of every opportunity that even remotely presents itself. It is the only way to get ahead.”



LORENA JAUME-PALASÍ

FOUNDER OF ALGORITHMWATCH AND THE ETHICAL TECH SOCIETY, GERMANY/SPAIN

Digital philosopher Lorena Jaume-Palasi analyses the relationship between humans and technology. She was appointed to the Council of the Wise on Artificial Intelligence and Data Policy by the Spanish government and was a member of the EU High-Level Expert Group on Artificial Intelligence. Yet she still has to battle for control of the microphone.

The home, the marketplace, the forest: as a philosophy student exploring the law and the constitution, Lorena realised that concepts of the private and the public were grounded in geography. As digitalisation continues to dissolve these boundaries, the Spanish-born and German-based philosopher and political scientist has made it her mission to analyse this digital shift, challenging assumptions rather than pushing the tech hype. “We are making a huge mistake by focusing too much on the technology in this debate. It obscures the actual issue at hand: how human beings deal with technology.”

“IF IT FEELS UNFAIR, IT PROBABLY IS
UNFAIR – SO MAKE SURE YOU STAND UP
FOR YOURSELF.”

Lorena co-founded AlgorithmWatch at the end of 2015 and The Ethical Tech Society non-governmental organisation in 2018. The think tank analyses how our interests and prejudices impact the development of algorithms. Algorithms influence whether someone is granted a loan, a discount, or even whether a prisoner is let out on probation. They run in the background though, so it can be hard to determine exactly how they work. In the run-up to the 2017 German elections, AlgorithmWatch developed

a browser add-on to increase the transparency of these processes. It allows the user to track their Google search results and pass them on to AlgorithmWatch, who then study how personalised content plays out. In addition to exploring the ethical implications and gaps in technology, The Ethical Tech Society also plans to develop algorithms for the common good.

“We have to let go of the idea that every member of society has to understand code. After all, not everyone has to know the chemical formula for yogurt or how a motor works.” But citizens do need to be aware of the impact the algorithms collecting and evaluating their data can have. And automation has to be subject to ethical and legal regulations – a framework Lorena wants to help design.

In 2017, the Spanish government appointed Lorena Jaume-Palasi to the Council of the Wise on Artificial Intelligence and Data Policy and she advises governments and institutions. Yet she still finds herself fighting to be heard at German and international conferences. “When a woman explains something, people don’t register it until a man has said the exact same thing.” So she employs strategies like the 20-minute rule, letting all the alpha males speak until they are ready to listen. She finds it very frustrating that so many of the women doing excellent work in the tech industry are not moving up. “Women remain ghost writers.” At podium discussions, male speakers will often rip the microphone right out of her hand. These days she counters with an acerbic comment before taking the moderator’s mic.



AMEL SAIDANE

PRESIDENT OF TUNISIANSTARTUPS, TUNISIA

One of engineer Amel Saidane's first clients once asked her, "Why do you bother to sell CRM licenses; why don't you just sell makeup?" The tech entrepreneur and co-founder of TunisiaStartups knows the challenges women face in the start-up world – and is advocating for change.

Amel always gravitated to the tech orbit, first as an electrotechnical engineering student in Germany, then in senior positions with Siemens, Nokia and later Microsoft in her homeland Tunisia. "When I left my job at Microsoft, I didn't even really want to look for another," she recalls. She decided to become an entrepreneur instead, and started her first business in 2015. At the end of 2016, she co-founded the Tunisia-Startups association, whose membership has grown to around 100 start-ups today.

The shift towards entrepreneurship has presented plenty of challenges, and even failures at times. "We were not aware of how start-ups should be run. But I learnt the importance and power of lobbying, advocacy, influencing, government relations and the media." One of Amel's projects didn't attract enough clients, and the promised funding never materialised for another. But Amel never doubted her own capabilities or herself as a person for even a second. "The positive part of transforming the frustration of my failures into determination is that I have met lots of amazing people who were also facing many challenges."

Being a woman adds another layer of difficulty. "The patterns seem to be the same in most Arab countries." In Tunisia, the percentage of girls in technical programmes is from 50 to 60, but only 5 percent of key level positions in tech companies are held by women. This also translates to the start-up ecosystem. "In today's world, 90 percent of the funds are invested by men in start-ups run by men. I only know one lady in Tunisia who is leading a private equity investment capital fund." But according to Amel, statistics show that start-ups led by women stand a better chance of remaining active

and surviving longer. Despite what most people think, women are equal to men when it comes to taking risks and handling stress.

"WE SHOULD NOT WAIT FOR ANYBODY TO
TELL US WHAT WE SHOULD BE DOING."

Armed with these figures, Amel has become an avid fighter for women's visibility in the start-up world. She co-organises start-up weekends for women, teaches courses on electronic engineering to motivate school girls to pursue tech professions, and gives talks at conferences about women in tech. "We need to raise awareness; it is simply not true that men are superior when it comes to risk-taking. And start-ups are not a man's world either. Investing in ventures with women co-founders has proven profitable, so I hope investors will dare to place their trust in women more often."

Amel is not a woman who shies away from problems. Maybe this is why she was unanimously chosen by a majority of men as the Startup Association President. "The guys are proud to say we have a female president," she says with a smile. To young women interested in tech she says: "The tech world is so much easier than other disciplines as it is so logical and predictable. So go for it girls!"



REBECCA STROMEYER

MANAGING DIRECTOR OF ICWE GMBH AND FOUNDER OF ELEARNING AFRICA, GERMANY

While Rebecca Stromeier has never had a hand in developing technology, the founder of the eLearning Africa Conference knows everything there is to know about how digital technologies can improve education. And she provides educators all over the world with a platform for exchange.

Rebecca is on her way out the door, headed to Rwanda's capital Kigali for the annual eLearning Africa Conference. Her company, Integrated Communications Worldwide Events (ICWE), has organised the conference in countries all across Africa since 2006. "I am not a typical woman in tech; I don't develop technology," she says. Her focus is on education and her speciality the effective deployment of digital technology in education, training and skills development. "I was always interested in how we can use technology to redesign learning."

The daughter of a German businessman who set up language schools and adult education centres in the Middle East, Rebecca was born in Kuwait and spent her childhood primarily in Iran and Lebanon, before coming to Germany via England. She was always expected to attend local schools and study in the local language. "Education is the only thing that allows us to really interact with the world," she says.

She studied literature, media and Slavonic studies in Germany and business administration in England. At university, she realised just how effective new technologies could be in education and skills development. "Even before the smartphone, you could sense that we were in for huge changes in this area." In 1995, she and her father co-founded Online Educa Berlin, a conference on technology-enhanced learning and digital training. Rebecca has organised similar conferences worldwide ever since. She brings all the key stakeholders shaping the globalisation of education together – universities, colleges and schools, politicians and public officials, and the private sec-

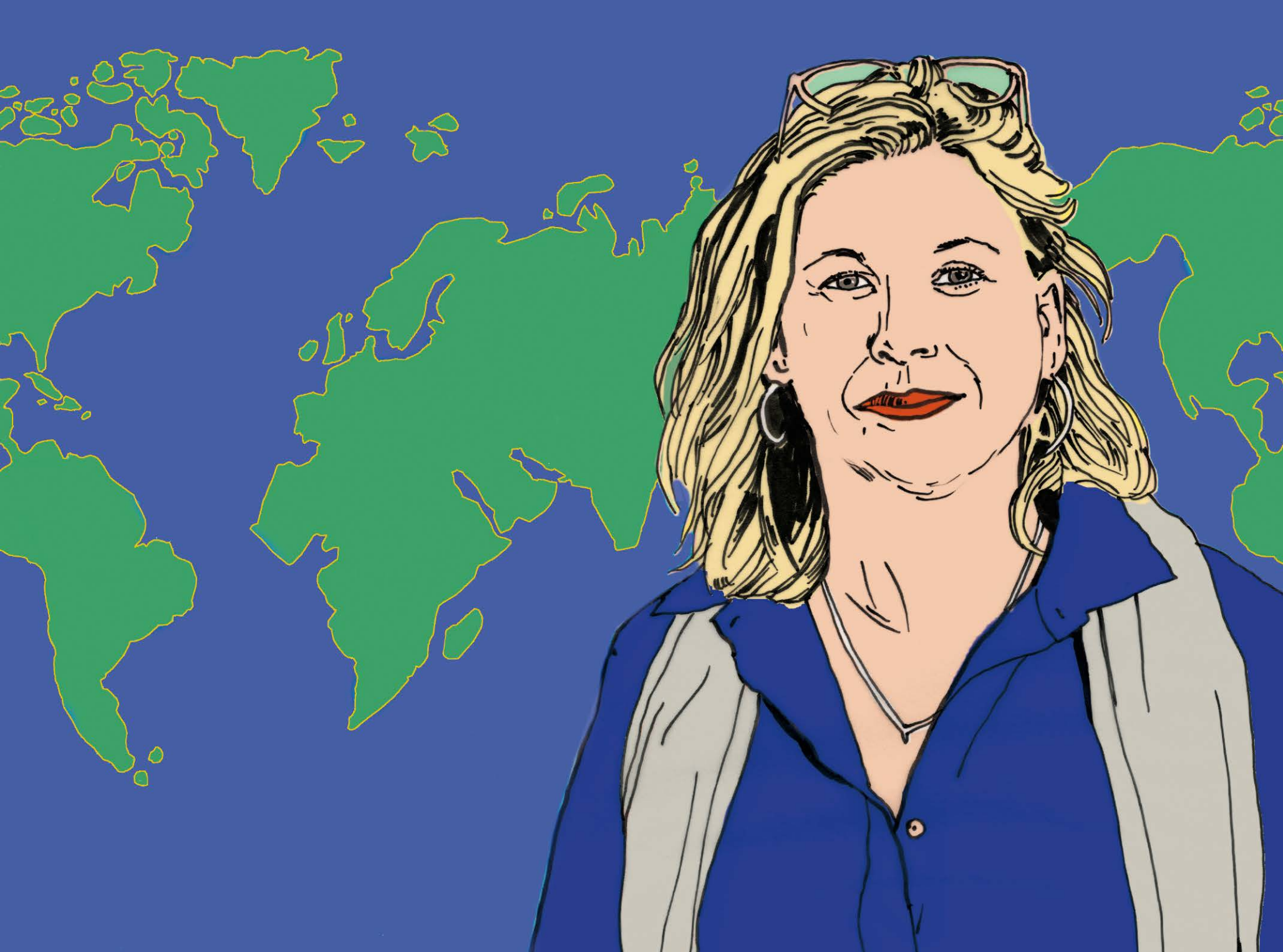
"BEHIND MANY
STRONG,
INDEPENDENT
WOMEN IS A
SUPPORTIVE
FATHER."

tor. And although her focus is primarily on Africa, she strongly feels that "we have to rethink education everywhere."

The driving force behind eLearning Africa was Rebecca's conviction that "technology could make a real difference in places where knowledge is hard to access." The first conference was held in Ethiopia in 2006, and was an overwhelming success: an anticipated 300 attendees turned out to be 800 in the end. The community has come together every year since then and continues to grow. "It is exciting because there are always new developments for us to discuss." Balance is important too: "Our policy is no session without a woman."

In her early thirties – a successful entrepreneur and young mother – Rebecca was often asked where her boss was. "It is hard to get taken seriously as a woman in Germany, no matter where you go." She is confident things will get easier for women in the tech industry, though she adds, "then we'll be faced with other hurdles." Women have to work harder for recognition, something she knows all too well. She has found that success is the best way to win over the doubters.

Asked if she would encourage women to go into tech, her answer is clear: absolutely. Rebecca feels we should all follow our passion. "But you have to be given the opportunity, especially as a woman – and in many countries you also need permission." Another trend she has observed: "Behind many strong, independent women is a supportive father."



REGINA HONU

FOUNDER OF SORONKO SOLUTIONS AND THE SORONKO FOUNDATION, GHANA

Regina Honu is determined that women and girls will not be left behind by the digital revolution. The software developer and social entrepreneur founded the Soronko Academy, one of the first coding schools for children and young adults in West Africa. To date, her Tech Needs Girls mentorship programme has trained over 4,500 girls to code.

When she was 12 years old, Regina fell in love with Pac-Man. She wanted to add a bit more colour to the arcade game, but discovered this would require knowing how to code. That was when her fascination with technology began.

In 2005, Regina graduated top of her class as a software developer from Ashesi University, one of Ghana's finest institutions of higher education. She landed a well-paid job at a major international bank in Ghana, where she was the only female IT specialist for six years before she left to found her own business. The Soronko Solutions software development company targets its services primarily for NGOs and small and medium sized enterprises in Ghana. Its profits go to fund the Soronko Foundation, which aims to increase young people's skills in science, technology, engineering and mathematics (STEM).

Regina feels very fortunate to have been able to live out her dream career and follow her passion: technology. The journey has not been entirely smooth, though. To this day, she still gets a "five-second shocked reaction" whenever she introduces herself as the CEO of a tech company. "People still underestimate me, and judge me on my appearance."

Despite the setbacks, discrimination and sexism she has faced, Regina has gone on to build a globally recognised brand and earned an excellent reputation as a social entrepreneur and software developer. She was listed as one of the BBC's 100 most inspirational and innovative women for 2017, won the 2017 Northwestern University

Buffett Institute for Emerging Global Leaders Award, and was also recently honoured with the Coca Cola Young Achievers Award as a leader in technology. CNN featured her internationally as "one of the 12 inspirational women who rock STEM" and she is a member of the World Economic Forum community of Global Shapers. Regina is also an Ashoka, an Aspen Institute New Voices, a Vital Voices VVLEAD, and a Young African Leadership Initiative fellow.

"STEP OUT OF YOUR COMFORT ZONE AND
DREAM BIG. IF YOUR DREAMS DON'T SCARE
YOU, THEN THEY ARE NOT BIG ENOUGH."

Regina strongly believes in the need for female perspectives in technology and digitalisation. "It is important that girls and women are not left behind by the digital revolution." Through its Tech Needs Girls mentorship programme and the classes held at Soronko Academy, the Soronoko Foundation has taught over 5,500 girls from Ghana and Burkina Faso to code. Regina also initiated the "Women in Digital Skills" project that trains women from the informal sector and disadvantaged communities to use digital skills while pursuing careers in technology. Some of these women have gone on to start their own online businesses and foundations, or have received full scholarships to study computer science at university.



IFFAT ROSE GILL

FOUNDER AND CEO OF CHUNRICHOUPAAL, PAKISTAN

As a high school girl, Iffat Rose Gill wanted to help Pakistan's rural women gain more autonomy. Today, the NGO activist and social entrepreneur is training women in digital technology and bringing skilled women together with businesses looking for IT workers.

Iffat never saw a career in technology as a viable option during her childhood. She was taught to aspire to "traditional jobs" like doctor or engineer. At school, computer science was an elective at best, but never something to base a career on. But things changed when she realised that choice was a privilege.

"THIS IS THE PERFECT TIME."

Born in Libya and raised in Malta, Iffat returned to her native Pakistan at 17. "I was shocked," she recalls. In rural Multan, Iffat's home district in Pakistan, most girls her age had no choice at all. Regardless of talent or intelligence, they stayed at home after completing elementary school. "They just waited to marry someone chosen by their parents." She bonded with the girls and tried to understand their problems. Even before completing a pharmacy degree, she had already made up her mind how to help empower women through digital literacy. Now the girls from Multan gave her a life goal.

She started with launching a skills-development centre in Multan where women could train in vocational fields like handicrafts. That was back in 2003. "Gradually, we moved beyond the traditional and started to teach women marketing and basic digital

skills." The courses were hugely popular with the women, but they angered the men. Amused by the memory, Iffat recalls: "They accused us of corrupting their women." Eventually, the centre had to be shut down.

In the meantime, Iffat finished a specialised course on internet governance. Her eye firmly on her mission to use information and communication technology for women's empowerment, she moved to the Netherlands, where in 2013 she launched ChunriChoupaal, an organisation whose flagship Code to Change programme offers a five-month mentoring programme on digital technology and entrepreneurship for women. She was determined there would be no more denying women jobs by citing their lack of technical expertise. "Our message is 'Are you looking to hire a woman? Here, we have so many skilled women for the job.' This is how we aim to bring about gender parity in IT and IT-enabled professions."

A successful NGO leader and activist, digital strategist, and social entrepreneur, Iffat has called for digital inclusion of women at the UN World Summit on the Information Society, the UN Internet Governance Forum and the European Parliament. Her company, Gill Non-Profit Consulting, offers consulting, training and coaching for entrepreneurs, non-profits and small and medium-sized enterprises in the use of digital media and social fundraising. She advises women wanting to follow in her footsteps to have a proper strategy and a good mentor – and not to wait for too long to take the plunge because, she says, "this is the perfect time."



NAYLA ZREIK FAHED

CO-FOUNDER AND CEO OF LEBANESE ALTERNATIVE LEARNING, LEBANON

Nayla Fahed gives hope to thousands of Syrian refugee children living in precarious conditions in Lebanon. Through its Tabshoura e-learning platform, LAL develops free educational resources to ensure that vulnerable children have access to an engaging and effective learning experience.

Today, as technology is growing increasingly pivotal in education from primary school all the way to university, Nayla's path might not seem so extraordinary. The former French literature professor always employed new technologies in her classes at Saint Joseph University. What is extraordinary though is how she has used technology to help children in precarious situations.

Nayla's home country Lebanon currently hosts about 1.5 million Syrian refugees, a third children, most of whom cannot attend school. As a committed teacher, Nayla decided to help, and together with a few colleagues she started thinking about alternative solutions that might fill this huge gap in education. "Having worked closely in the field, I saw the need to find alternative solutions that could help students falling behind keep up with school."

Together with ICT expert Nagi Ghorra, she founded the Lebanese Alternative Learning Association (LAL), an NGO offering educational resources to those who cannot go to school. "We began developing e-learning activities for children suffering from long-term illnesses," Nayla recalls. "We explored different solutions that finally led to the Tabshoura e-learning platform." Tabshoura, the Arabic word for chalk, offers free educational resources based on the official Lebanese curriculum. They are available in Arabic, French and English and can be accessed online and/or offline through a pocket-sized server, "Tabshoura in a box", that connects to smartphones, tablets and laptops. The system is designed to be used by children, educators, schools and NGOs in remote areas.

Through her work, Nayla has learned that "the right to education must be preserved even in the direst conditions. Refugee girls and boys appreciate and value the chance to get a proper education and are eager to learn." Nayla has also integrated offline activities into her e-learning programme so education isn't limited to the digital world. LAL has carried out other projects as well, such as a conflict resolution workshop in a refugee camp and an online campaign to reduce waste, and has brought in various artists to teach their skills to refugee kids.

"BRINGING TECHNOLOGY TO WOMEN IS
GIVING THEM NEW PERSPECTIVES,
AND WOMEN ARE ADDING NEW
PERSPECTIVES TO TECHNOLOGY."

Nayla says digital skills are a great asset, especially for women in traditional communities as they "can open many job opportunities which allow them to work from home." Nayla is optimistic when it comes to the role of women in tech. LAL is currently working on a project supported by the Malala Fund: "Girls can count" empowers girls by enhancing their STEAM (sciences, technology, engineering, arts and maths) skills, making sure that technology is no longer just for boys.



RENATA ÁVILA

EXECUTIVE DIRECTOR AT FUNDACIÓN CIUDADANÍA INTELIGENTE, GUATEMALA/CHILE

The Guatemalan lawyer Renata Ávila has devoted herself to human and digital rights. At the Fundación Ciudadanía Inteligente, she explores the intersect between technology, democracy and human rights.

Renata's story is about women empowering other women: it is the story of a mother in tech opening doors for her daughter. Renata's first encounter with technology was when her mother – a Guatemalan engineer – brought home a PC and encouraged her to play around with it when she was seven years old. For Renata, it was the dawning of a whole new world. Computers have been her closest companions ever since, and a reliable path to knowledge and innovation. Computer classes offered at her high school – still quite unusual at the time – fed her burgeoning curiosity and by the age of 15, Renata had taught herself to code and set up her first website.

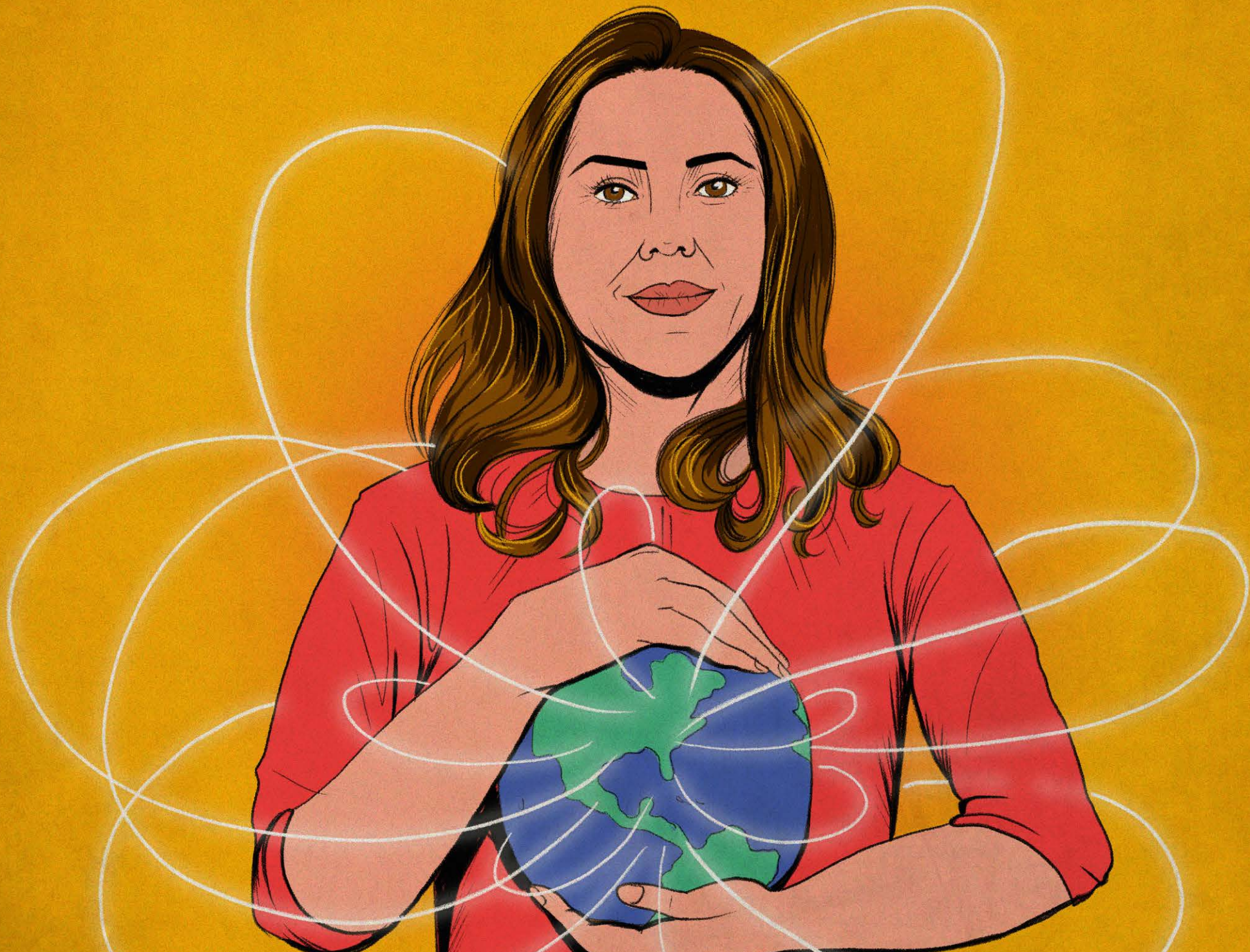
“WOMEN WILL DEFINE THE FUTURE
OF TECHNOLOGY, AND TECHNOLOGY
WILL DEFINE THE FUTURE OF WOMEN.”

Renata studied law and has devoted herself to human rights. As a lawyer, she has represented indigenous victims of genocide in Guatemala, including Nobel Peace Prize Laureate Rigoberta Menchu Tum, and she was on the international team of lawyers representing WikiLeaks founder Julian Assange and his staff. Renata has engaged in free software activism, founded Central America's first Creative Commons chapter, and worked as an independent researcher at Harvard University's Berkman Klein Center for Internet and Society.

As a senior advisor at the World Wide Web Foundation, she led a global campaign to uphold human rights in the digital age, the “Web We Want”, from 2013 to 2015, gathering support from over 125 organisations in 75 countries for a positive internet rights agenda. Her experience from this campaign gave rise to her current research focus: inequality in connectivity and its impact on democracy, including issues such as inclusive artificial intelligence for women. Today, Renata is the Executive Director of Fundación Ciudadanía Inteligente (International Smart Citizen Foundation), an international NGO that aims to protect citizens' digital rights in Latin America's democracies. It develops technology tools to empower citizens to exercise their rights, evaluates the impact technologies have in democracy, and ensures they don't create additional digital inequalities.

Renata is convinced that women will define the future of technology, and technology will define the future of women. But she also notes that tech is often still a foreign world for many women, who may shy away from asking technical questions and often have no access to the experts who could provide answers. “But I do believe in the power of mentorship and in the many ways in which women can bring more women into technological spaces.”

The time has come for women to step up more, Renata says, to make technology a room of their own, a space of safety and freedom. “Without the meaningful inclusion of women at all stages of the development and implementation of digital policies and technologies, we will fail to make digital equality a reality.”



MERONNE TEKLU

SOFTWARE DEVELOPER, USA/ETHIOPIA

An Ethiopian-American who grew up in the US, Meronne Teklu is excited about developing technology for social change. At the outset of her career, she looks forward to excelling as a woman in business.

When she enrolled in computer science at university, Meronne had never taken a programming class before. Computer science wasn't her first choice, and she was following her head more than her heart. But once she got started, she found she loved the complex and analytical thinking required. Today, she is reaching for the stars as an aspiring black woman in tech.

“HAVING WOMEN IN TECH WILL MEAN
HAVING MORE TECHNOLOGIES THAT
ARE EMPATHETIC, RELEVANT, AND THAT
BETTER OUR LIVES.”

Meronne's peers have always described her as tech savvy, even as a young girl. She regularly found herself doing the “tech jobs” at school, at home or while volunteering. And like many other children of immigrants, she was keen to get a degree in a STEM field (science, technology, engineering, maths). She decided against her first choice to major in biomedical engineering and business as this turned out to be a little too ambitious, and chose computer science with a minor in African studies. “I envisioned that I would be a programmer stuck behind a desk. But it didn't actually work out like that.”

Ever since, Meronne has been enthusiastic about leveraging technology for social change. One of her driving forces is the commitment she feels as part of the Ethiopi-

an diaspora. “It is our responsibility to improve the social and economic state of our home country. Whether by providing monetary resources or by connecting people to new markets – the easiest way to do so is through technology, and this is my ultimate goal.”

As a young black woman in tech, she faces two stumbling blocks: self-doubt and a lack of role models. “It is hard to envision yourself in a field where you do not see other people who look like you.” Though this can be discouraging, she has stayed on track in pursuing her goals and dreams. Knowing your own worth as a woman, she says, is key in the tech industry. “A lot of people will tell you it is quite easy to get funding as a woman of colour in tech. There is an assumption that because you are part of a minority, you are afforded opportunities others are not. If you listen to this message, you will not easily see your own worth.”

After finishing university in 2017, Meronne started at TechChange, a start-up that built an online learning platform it licenses out to international companies and NGOs to elevate the impact of online learning and skills training. “It combined my tech interest with my interest in social impact work.” Working at a start-up, Meronne was thrown into the deep end and found herself swimming. She has created interactive online training courses on blockchain, artificial intelligence, and data visualisation.

Now she is looking to the future. She has left TechChange to embark on a career as an entrepreneur, establishing Rybbyt, a mobile app for spontaneous, in-person meetups. Her goal is to create a business in which technology is not the end in itself, and instead “utilises technology as a tool for people to live more authentically.”



NNENNA NWAKANMA

POLICY DIRECTOR OF THE WORLD WIDE WEB FOUNDATION, NIGERIA/CÔTE D'IVOIRE

Nnenna Nwakanma who introduces herself as “Nnenna from the Internet”, is a global citizen with a huge international social media followership. She believes in the opportunities technology can provide not just for high-flying businesses, but, even more importantly, for rural families.

From a young age, Nnenna found herself on a level playing field despite her location. In her small home village in Eastern Nigeria, her father taught her that the world was truly her oyster and that she could do anything she set her mind to. Her parents gave her the freedom of choice and curiosity became her asset and drive.

Nnenna first touched a computer at university where she studied religion, history and English, and did a short course in computing. Along with the basics of word processing and spreadsheets, the course covered the essentials of the World Wide Web. Today it may seem absurd to learn about the internet, but it was the very cutting edge of technology in the late 1990s. Nnenna realised that the internet could serve as a window to the outside world for people in Nigeria's rural regions, and she fell in love with the opportunities it represented. After postgraduate studies in International Relations and Law, her curiosity led her to the African Development Bank as they were transitioning from electronic to digital. Since joining the AfDB, she has worked in, for and around non-profit organisations and led tech communities, tech foundations, and a tech consultancy. “But I still do not think I am a geek. I could make a living writing code if I had to. But mainly I learn the tools I need to effect change. Now I am training in artificial intelligence.”

Some opportunities have come more easily than others. The framework for the now African Internet Governance Forum was drawn up in her kitchen. Once she had completed the paperwork and sent it to the African Union, they invited her to speak about its aims and objectives, and the rest is history. Her career spans over thirty years and she has built a brand that is now sustaining her. For over a decade, she has worked

with the United Nations on information society and sustainable development. Her focus is open data, ethical technology, women's rights, affordable internet access and digital transformations.

“IT IS NOT ENOUGH TO BE GOOD IN CAPE TOWN, LAGOS, ACCRA OR CAIRO; YOU HAVE TO BE GOOD GLOBALLY.”

Not everything has always been rosy though. “As a girl, everyone wants to put you in a box from the get-go, tell you how to behave and what is good for you. And as you grow up, the statements become about money and power. People want women to be quiet, prim and proper, but also poor and rural.” Nnenna has broken that mould by making sure she has the skills and knowledge to back up her voice. Mediocrity is not in her vocabulary. “OK is not enough; you have to be exceptional.”

Twenty years ago, Nnenna hoped she would see more women in leadership positions in tech businesses by today. Understanding the challenge facing young girls, she acts as a mentor, offering her support and ensuring they get a quality education. She is shocked at how often people ask why girls should work in STEM (science, technology, engineering, maths) fields: “Why ever not! You need to know about technology for most jobs. So whatever career someone is pursuing, they should ensure they learn about the technology for it.”



ITIR AKDOĞAN

RESEARCH DIRECTOR AT TESEV, TURKEY

Itir Akdoğan considers herself part academic, part civil society activist. Her central aim is to foster democracy through technology – by increasing e-participation and improving access to information for vulnerable groups.

Sometimes the events that define our lives start out with a seemingly small step. Itir had completed a BA in journalism and communications at Galatasaray University in Istanbul and moved to Brussels to pursue an MA in international politics when a classmate approached her with an offer. This classmate ran a consultancy firm and was looking to develop an e-politics tool to provide easier access to information and facilitate interactions between EU parliamentarians and citizens. She invited Itir to collaborate on the project.

“At the time, the European Union website was user unfriendly to the point where European MPs preferred to browse Google to access certain documents than directly search the EU website,” Itir explains. She and her colleagues devised a platform designed to make MEPs’ lives easier by helping them access information easily and even plan and schedule meetings. “The tool we offered European MPs was similar to Facebook, though remember that Facebook did not yet exist at the beginning of the new millennium.” Itir was just 23 years old at the time.

The project represented a turning point in Itir’s career; it was her entrée into the tech universe. “I have always loved technology, but I had not considered it as a tool for democratisation before.” Itir, pursuing a PhD in Finland, became an e-democracy consultant who has worked for different international organisations on projects in Europe and Africa. For the United Nations Development Programme (UNDP), she taught hundreds of young volunteers in underdeveloped regions of Turkey like South-eastern Anatolia, who later trained thousands of women over 30 in Eastern Turkey’s

urban areas on internet literacy. Today she is back at university teaching innovation, entrepreneurship and communications – and working at TESEV, an independent think tank striving for democratisation in Turkey, including projects on e-participation and preparing local Turkish governors for Society 5.0.

“LEARN, BE OPEN, BE CURIOUS ABOUT
TECHNOLOGY.”

Itir claims she has never faced discrimination in the workplace, noting she has always been surrounded by female bosses or open-minded men. Indeed it was a woman who gave her the life-changing job in Brussels. “When working on the project with EU MPs, the tool itself was challenging, but not the fact that I was a woman.”

It bothers Itir that in spite of all the progress being made in technology, women still use technology less and have less access to it than men, which is reflected in the rate of internet penetration. Even in higher education, women who choose tech-related careers are still a minority. “There is less ownership, as tools for women are actually designed by men. But women should be involved in all stages of the process.” This is something Itir has tried to achieve through the various projects she has headed. “Empowering women in tech means empowering creativity.”



SASHA RUBEL

PROGRAMME SPECIALIST AT UNESCO'S SECTION FOR UNIVERSAL ACCESS AND PRESERVATION IN THE COMMUNICATION AND INFORMATION SECTOR, WEST AFRICA/FRANCE

Sasha is a professional dancer, video artist and anthropologist by training with a passion for West African cultures. This interest in cultural expressions led her to her current work: exploring the ties that exist between technology, culture, development and gender equality.

As the new millennium dawned, Sasha, a young PhD student and a dancer by training, embarked on a research project in West Africa. She wanted to work with local artists to explore the intersection of culture and technology. During her research, Sasha noticed that women had a particularly important role to play. She started to wonder about women's access to technology, about the possibility of producing local digital content, and about how tech could further support gender equality. "Back then, I could have never imagined myself working in technology," she recalls. Her affinity with West Africa had originally been fuelled by her interest in cultural expressions, but then she found herself more and more involved with information and communication technologies.

"THE ENCOURAGEMENT AND INSPIRATION
OF OTHER WOMEN COULD HELP
YOUNG WOMEN SEE THEMSELVES AS
NATURAL PARTICIPANTS IN THE WORLD
OF TECHNOLOGY."

Her research was not only the beginning of a deep attachment to the region; it also laid the foundation for the work she does today. At UNESCO, she seeks to render the ties between technology, culture, and gender equality visible – and to raise awareness

that women should not just be consumers, but also producers of technology, of local content and solutions that promote sustainable development. Based at UNESCO in the Sahel and in Ethiopia from 2013 to 2018, Sasha conceived and directed the development of the UNESCO e-learning platform "Women in African History". Through digital comic strips and MP3s produced by women digital artists from Africa and the diaspora, the website tells the stories of women's contribution to the continent's history. The series' mission is to dismantle the marginalisation of women in African development narratives as either invisible or relegated to a 'supporting' role.

Sasha is especially interested in backing the creation of mobile apps created by women. She emphasises how important it is for women to make technology to fit their needs, rather than having to adapt ready-made apps to suit their context – or worse yet, adapting themselves to suit the apps. Sasha establishes programmes for young women that promote skills development in digital entrepreneurship. She also works with governments to develop public policies that put digital skills development and digital entrepreneurship at the heart of national development plans, with a focus on empowering young girls.

Sasha wishes more young women would enter the tech sector. For this to happen, the chain of women supporting and engaging women needs to be strengthened: "You can't be what you can't see. We need more women role models in visible roles in the tech sector, and mentorship programmes to encourage young women to pursue careers in technology."



NANJIRA SAMBULI

ADVOCACY EXPERT AT THE WORLD WIDE WEB FOUNDATION, KENYA

Digitalisation mirrors social inequality: People with lower incomes or limited political rights are often systemically denied internet access, a reality for many more women than men. Nanjira Sambuli is helping design policies to change this dynamic.

When the Costa Rican government initiated a programme to promote internet access among poorer people, they discovered that they were primarily supporting women. The state provided a subsidy to all low-income households to allow them to pay for internet access and buy a computer. But around 95 percent of the households that qualified were headed by women, many of whom were single parents. This simple example illustrates that internet access is not just a technical issue; it is a social question as well and tends to reflect social inequalities. Nanjira is fascinated by such questions, which she studies at the World Wide Web Foundation.

**“YOU CAN TAKE ON ANYTHING YOU WANT.
TAKE ON THE WORLD!”**

Nanjira’s enthusiasm for social media blossomed with the very first social networks. She drafted social media strategies for companies and helped found the Bloggers Association of Kenya in 2011. Two years later, iHub Nairobi – a tech start-up incubator – asked her to design a research project to analyse the role of social media during the upcoming elections. Since then, she has been the driving force behind a number of other projects to address issues like hate speech in Kenya, Nigeria, Myanmar and South Sudan.

Nanjira grew up in Kenya’s capital Nairobi, a city with a vibrant tech scene. However, as a woman in tech, she too has met with resistance: “Men feel attacked the moment a woman raises her voice.” She is used to being heckled during her presentations, and has learned to ignore comments like “you don’t know what you’re talking about” or “you have no right to speak” and attempted jabs calling her “opinionated” or “aggressive”.

The tech world seemed more welcoming to men in other ways as well. There were very few women at iHub when she started there. “It was like a men’s club,” Nanjira recalls. Still, she enjoyed her time there, three years spent at the heart of all the innovation, technology and entrepreneurship emerging in Kenya.

Nanjira then moved to the Web Foundation where she explores equal internet access and possible policy changes to bring it about. Jobs like hers didn’t even exist just a few short years ago. “Lots of people think you have to be a programmer, but there are many different ways of getting into the tech industry. We need anthropologists and ethnologists to study the social effects of technology, for example.”

Nanjira organises a biannual summit for women in Africa’s tech industry, bringing entrepreneurs, programmers and academics together to exchange ideas and support each other. “This is so important, not just in the tech scene, but throughout society.”



JOANA VARON

FOUNDER AND DIRECTOR OF CODING RIGHTS, BRAZIL

United women in a man's world: Joana's indignation about gender imbalances in technology inspired her to found Coding Rights, an international woman-led network for human rights in the digital sphere.

She believes technology development has to be feminist, non-discriminatory, and globally fair.

A family computer and an Atari console were Joana's gateways into the world of technology. Like many kids in the 1980s and '90s, she was a huge video game enthusiast, though she quickly realised how different this experience was for boys and girls. She developed an ongoing interest in representation and gender in video games. As a researcher by profession, Joana found that the gender inequalities prevalent in society were replicated in the tech world. "The more I looked into it, the more I saw these gender asymmetries."

Far from discouraging her, this realisation ignited the fire that still burns within her today, turning a researcher into an activist. In 2015, Joana founded Coding Rights, an organisation that aims to redress the power imbalances built into technology. And though the council is about much more than just issues of gender, it maintains a strict 'female only' policy: Coding Rights is an international and interdisciplinary consortium of female coders, lawyers, social scientists, artists and journalists that spans the globe from India, Poland and the US to Guatemala and Brazil. Together they have launched many creative campaigns on digital human rights. "I feel energised and inspired by so many women, especially in Latin America, involved in the tech branch, working on software development, digital policies or data security," Joana says.

She has not lost her love of video games over the years either. The logo for her current project Chupadados (literally: the Datasucker) is reminiscent of the old Atari games, and the project's website uses comic-style graphics. They enliven a fairly dry topic: Chupadados gathers stories about the mass collection of data from across Latin Amer-

ica. For example, it explains how menstruation apps make money from their users' data, how children's apps spy on kids or how targeted advertising manipulates consumer behavior. Through these short articles, Joana wants people to become aware of how their devices are sucking in their data.

"WE GROW UP THINKING THAT TECHNOLOGY IS A COMPLICATED FIELD. THERE'S A LOT OF MANSPLAINING. DON'T BE AFRAID."

Today, Joana is affiliated with the Berkman Klein Center for Internet and Society and is a proud Mozilla Foundation fellow. Politics and the Internet have created an attachment that will not be broken any time soon, she is convinced. Her hope is to get as many women as possible participating in and mastering the evolution of technology, and to take away the fears that keep them from taking the lead. "Change can be brought about by women working together." Joana sees a new era of communication and information technology made by women on the horizon, an era in which feminism and transfeminism are present, and in which a chain of women energising and inspiring each other continues to move forward.



AYA JAFF

PROGRAMMER AND ENTREPRENEUR, GERMANY

Aya wanted to understand how technology worked and develop her own apps instead of just using them, so she taught herself to code in grammar school. Today the 22-year-old is one of Germany's most famous programmers and manages her own consulting firm.

While other girls were plastering their walls with boybands, Aya had posters of Bill Gates and Mark Zuckerberg up in her room. "Their stories inspired me," she says. Most of the stars of the Silicon Valley are men, and Aya didn't have a female role model until Marissa Mayer entered the scene. One of the most powerful women in the world, first as a Google vice president and later as head of Yahoo, the smart computer scientist was nothing like your typical geek. "She was everything I wanted to be. I don't identify with the nerdy, socially awkward programmer kid; I want to keep my femininity," Aya says.

She was two years old when her parents fled to Germany from Iraq. In Nuremberg her father supported the family as a taxi driver, but technology was his passion. He brought new gadgets home for his daughter and repaired friends' computers as Aya watched and learned.

When she was 16, Aya wanted to create an app that would let her sleep in a bit, an app that could go through class schedules and flag any cancellations. She taught herself to code with the help of online platforms like Code.org, TeamTreehouse and CodeAcademy and founded a coding club. A co-working space gave the young women a place to meet, and teachers and experts worked with them on the programming. "I realised that all I had to do was ask someone to get the help I needed." Together with a group of young people, she created her first big open-source project "Tradity", an online stock market game where students could practice trading stocks in real time to learn how the stock market really worked. Since its release, more than 13,000 young Germans have tried out their stock broker skills.

Despite all her experience, as a young woman Aya had to prove herself time and time again at hackathons and conferences. "At first I felt a bit uncomfortable because everyone just assumed I had no skills – until I told them about my projects," she says. "At some point I realised it was an advantage: I never had to queue for the WC and could apply on diversity tickets."

"START YOUR OWN PROJECT AND TRY
TO FIND OTHER WOMEN TO WORK WITH YOU.
TAKE ADVANTAGE OF EVERYTHING
OFFERED TO YOU."

Aya is convinced that women can achieve a lot in tech, and she would like to see quotas to raise women's visibility in the sector. "Women are often modest and don't really talk about what they can do." Now that she is such a public figure, she experiences less self-doubt, almost as if she has been given the 'male' stamp of approval.

She doesn't code as much since founding the CoDesign Factory, a consulting firm that sends teams of scientists, influencers, programmers and other experts out to help companies develop digital projects. She wants to continue to serve as a role model for young women though too, and mentors groups of girls working on tech projects: "They are the role models of tomorrow."



FAITH KEZA

CHIEF EXECUTIVE OFFICER OF IREMBO, RWANDA

After working for tech giants like Oracle and Google in Silicon Valley, Faith Keza returned to her home country to head Irembo, a local technology company that is revolutionising government service delivery in Rwanda. Their IremboGov online portal offers over 80 government services from birth certificates to health insurance.

When Faith entered university, she realised that she had quite a bit of catching up to do. She had always loved mathematics and performed so well that her teachers and family encouraged her to study it. But once she had signed up for a mathematics programme at the prestigious Massachusetts Institute of Technology (MIT) in Boston, USA, she realised that she'd rather study an applied science or engineering. "I had study mates making really cool software and others turning sugars into fuel. I knew then that I wanted to be a maker, and one of the fields I explored first was computer science." She loved it and decided to join the Electrical Engineering and Computer Science Program. "At MIT, all my classmates grew up programming games and tools. I had never programmed before my first computer science course at the university." But she had good advisors and friends who encouraged her to stick it out.

Faith graduated with a Bachelor of Science in electrical engineering and computer science – and set off to conquer Silicon Valley. In California, she worked as a software engineer for top tech companies including Oracle, Delpix and Google. "It was a great experience and great introduction to how software technology is made at scale. I learnt a lot about teamwork, product strategy and user-centric design."

But at the back of her mind, Faith always wanted to come back and make an impact in her home country, Rwanda. And when an opportunity opened up, she "knew it was the right fit." Upon her return, she joined Irembo as Chief Technology Officer.

Irembo is a digital government start-up that delivers the country's main government services online, saving users the trouble of applying for services in person. Citizens can sign on to public health insurance, register for a driving test, pay fines and apply for ID cards and birth and marriage certificates. Faith was later appointed Chief Executive Officer of Irembo. With her diverse background in the technology sphere, she was also appointed to the board of the National Bank of Rwanda (BNR).

"LEAN IN, DO IT
AND STICK WITH IT!"

According to Faith, women are still underrepresented in tech. "We have a representation problem in the field globally, but I feel it more now that I am back on the continent. In many companies, we have very few if any female engineers, and we need to do more to attract and keep women in the industry." The way we communicate with young girls and boys needs to change, she says, and more opportunities must be given to girls in high school and college to ensure that women are not considered anomalies in tech in the future. Only with more women in leadership positions can we change tech companies to be more inclusive and welcoming to women.



AUTHORS

LARISA AKROFIE

Ghana-based Larisa Akrofie is founder and Editor-in-Chief of Levers in Heels, a digital platform highlighting rising African women in science, technology, engineering and mathematics (STEM). Launched in 2013, Levers in Heels publishes interviews and articles to inspire and empower women in STEM. Larisa also supports the British Council in the delivery of its Social Enterprise programme in Ghana.

SARAH BERNING

Originally from California, Sarah Berning left the United States right after high school to see the world. She moved to Germany, where she worked as a journalist for Deutsche Welle, the country's international broadcaster. She speaks English, German, Chinese and Spanish and, after nearly 20 years, is now back in California working on projects to help secure the future of safe water sources, along with helping open doors to younger generations by teaching German.

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Sarah Klein is a German journalist and online communications consultant specialising in solution-based storytelling and social change. She is the co-founder and publisher of award-winning Tea after Twelve magazine, a trend-setting online outlet on social innovation, and co-founder of Bunny Island GmbH, a German communications agency that provides communications and ICT advisory services for German ministries, public institutions and media houses.

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Sonja Peteranderl is a German investigative journalist and co-founder of BuzzingCities Lab, a think tank focusing on the influence of digitalisation on crime and security. She covers foreign politics, tech trends, security, organised crime and cybercrime. She has worked as a senior editor at Wired Germany magazine and as a freelance foreign correspondent for media like Spiegel Online and Zeit Online, reporting from Latin America, the US and China.

THALIA RAHME

Originally from the Lebanon and now living in Marseille, France, Thalia Rahme is a communication consultant and humanitarian interpreter. She is also a Global Voices volunteer author and translator and always on the lookout for Arabic-friendly tech tools. Working for Translators without Borders showed Thalia the importance of language and access to information and how vital it can be for a population's survival.

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India-based Anuradha Sharma is an independent journalist. She writes on politics and culture.

ILLUSTRATORS

OLAMIDE UDOMA-EJORH

Olamide Udoma-Ejorh is an urban activist, researcher, writer and artist. She is currently involved in governance and social issues in the Lagos urban environment and is an advocate for sustainable transportation and social engagement in street spaces using both high and low tech. In the last six years, she has managed and coordinated projects in the UK, South Africa and Nigeria, working with a variety of clients to ensure relevant knowledge is shared with the right users.

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Eva-Maria Verfürth is a German journalist and online communications consultant specialising in solution-based storytelling for social change. She is the co-founder and publisher of award-winning Tea after Twelve magazine, a trend-setting online outlet on social innovation, and co-founder of Bunny Island GmbH, a German communications agency that provides communications and ICT advisory services for German ministries, public institutions and media houses.

LAURA VIDAL

Laura Vidal is a Venezuelan researcher in technology and learning guided by intercultural exchanges, social movements and gender studies. Her doctoral thesis closely explored the learning potential of online communities, in particular that of Global Voices, the global citizen media platform where she serves as regional editor for Latin American and Spanish-speaking communities. Her work looks at the different ways technologies can foster exchange between cultures.

ELEONORE VON BOTHMER

Eleonore von Bothmer is a freelance journalist and translator from Germany whose work has been featured in publications like Development and Cooperation magazine and Die Zeit newspaper. She specialises in health and development, and one of her favourite trips was to Malawi where she explored the causes and spread of diabetes.

SHEHZIL MALIK

Shehzil Malik is a Pakistan-based designer and illustrator whose primary interests are in societal issues like women's rights, feminism and identity constructs. After several years as a designer and art director for companies like Sony and Ogilvy & Mather, she now focuses on projects with a social impact. She leads an independent studio involved in work ranging from fashion and publication design to illustration and branding.

CATALINA SOMOLINOS

Catalina Somolinos is a Spanish illustrator and painter. She studied architecture in Barcelona and now lives and works in Germany. Her clients and projects cover a wide range: She has illustrated children books, worked as performance sketch artist, designed packaging illustrations, and painted commissioned artworks for design agencies in different European countries. She loves painting outside in nature.

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