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THE MOBILE CENTURY

LIFE AND WORK IN THE DIGITAL ERA

FEBRUARY 2018

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THE MOBILE CENTURY 2018

Welcome to the 2018 Edition of The Mobile Century

The Mobile Century (www.themobilecentury.com) is a publication of the Global Telecom Women's Network (GTWN). The GTWN began as a small network of senior women in the telecommunications industry more than twenty-five years ago and has grown and changed as the industry it represents has also evolved. It now represents the interests and thoughts of women, and their male colleagues, in all of the ''t'' industries – including telecommunications, information technology and TMT.

In this edition, published to coincide with our annual Welcome Reception during Mobile World Congress 2018 in Barcelona, we seek and explore many "solutions for a complex world". Each essay examines a different aspect of the challenges that face mankind – be they environmental, economic, social or even existential, and how we can use digital and mobile technologies to address them. While there are some notes of caution, especially about the potential threats to personal privacy and individual expression represented by the rising use of big data analytics, artificial intelligence and machine learning, we also discuss the many opportunities that will arise from these new technologies. The consensus is that we in the industry have a special role in advocating for education of the consumer about these services, as well as transparency in our use of big data and AI based systems, so that consumers continue to trust and see the benefits in these services.

We acknowledge the generous sponsorship for this edition of the magazine, by Vicky Sleight, Chief Perfect Officer, Perfect Ltd and Dr Terri Simpkin, Founder, Mischief Business Engineering, who together are putting into practice the principles of female leadership, diversity and inclusion upon which the GTWN was founded. And finally, thank you to our enthusiastic authors - experts in their field who have given so generously of their time and expertise to create this unique insight into our industry and its future.

VICKI MACLEOD
TMC Editor
GTWN Secretary General

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HOW CUSTOMER EXPERIENCE AND CULTURE IS CRITICAL TO DELIVERING DIGITAL TRANSFORMATION

Keri Gilder, EMEA VP&GM, Ciena

When I attend a conference, or read an article about digital transformation, the conversations are dominated by topics such as intelligent network automation, autonomous networks, big data analytics, software defined networking, virtualisation, faster service time to market, self-service portals, on-demand capabilities, and the myriad of other technologies that can either help me save money, or make money via new or differentiated services.

These are all very valid and useful technology based solutions that help my digital transformation efforts, but the one area they don't address is people – my customers and my employees.

I also recently attended a senior executive conference, and the consistent message from a number of CEOs was around protecting/improving their brand and their customer experience (CX). They all felt brand and CX are fundamental to their business success – the foundation of their house, on which they can launch, promote and sell their products to a customer base who believes in what they stand for and is loyal to them.

These two seemingly separate topics got me thinking about how to best to leverage customer experience and my employees on the road to digital transformation, and how, in fact, they are intrinsically linked. If my employees don't buy in to the digital transformation journey, aren't willing to retrain to have

the necessary new skills, or it is not delivering what will meet and delight my customers, then it is doomed to failure.

So where to start? The obvious point is with my customers, without them there is no business. But what if I could really get my employees to be customer centric, and get them aligned with my customer needs that I can satisfy through digital transformation? Then I would have a plan that can really succeed.

Implementing a well-defined customer experience program across the organisation can be the vehicle for this employee cultural shift, to help each employee understand not only what will keep their customer happy and make us easy to do business with (table stakes), but also what will really add value and delight the customer. They can then bring these insights, knowledge and prioritisation to both their own area and in end-to-end process definition during the digital transformation journey.

But can I simply ask my customers? I recently heard a service provider at a conference say that there is no point asking customers what services or products they want, since they don't know. And while that is often valid, it is probably because it was the wrong question. Our customers have a deep understanding of their own business, not ours, so let's ask what their business challenges are, what are they trying to achieve, what their personal goals are, and then bring this deeper understanding back into the organisation as we undergo our digital transformation - and design new products and processes for them. For example, let's not just automate today's processes to reduce costs and errors, but focus on automating a better process that is better aligned to the customer's needs.

A company with a of deep understanding and commitment to customer experience can leverage it as a cultural foundation to enable a better, faster and more committed digital transformation journey.

WOMEN@CIENA

Women@Ciena is proud to be the platinum sponsor the GTWN's Welcome Reception at Mobile World Congress 2018 in Barcelona and to support the role and contribution of women in the mobile industry and beyond. Like the Global Telecom Women's Network (GTWN), we celebrated our 25Th anniversary in 2017. We were founded at the height of the communications revolution which

began in the 1990s, and which led to the digital revolution of today.

Women@Ciena is part of Ciena's commitment to Corporate Social Responsibility. We want to foster an inclusive environment that values and respects all individual's strengths, perspectives, ideas, and ability to meet the needs of our customers globally. Women@Ciena is the overarching initiative that encourages gender diversity. It does this by encouraging women to take the steps necessary to make the most of their careers; from onboarding new talent, coaching and mentoring to career planning, development and progression, as well as helping women reach the executive level.

Our mission is to establish a Ciena culture that cultivates, inspires, and rewards the contribution of every individual no matter what sex, race, religion or otherwise. Through active awareness, we are creating an environment that attracts, develops, and retains more women in our workforce. Ultimately, our goal is to create an understanding about the value of each individual, to break down barriers that exist, and empower the voice and talents of women in our workforce.

As part of Women@Ciena we have a Global Women's Council which is comprised of women and men from across the organization – all levels, regions and disciplines – to ensure a genuine cross-section of talent and insights. The council's aim is to grow the company's diversity program globally, with local action in each of the regions in which we operate. It involves the creation of smaller, regional groups to meet once a quarter as a 'diversity team' to share activities and develop new best practices as a grassroots program. The Global Women's Council leaders initiate a local projects or initiatives every quarter as well as connect, communicate and participate with the other regional councils as a wider, global team.

KERI GILDER

Keri Gilder is Ciena's Vice President and General Manager EMEA, responsible for guiding Ciena's EMEA service provider and enterprise customers, as well as partners, as they adapt to accommodate high-capacity applications and services, such as those needed for cloud-based services and video. She is also helping to drive adoption of Ciena's OPn network approach, advocating Ciena's advanced software and networking platforms, including its converged packet optical, packet networking and Blue Planet software solutions, to facilitate the transformation to open, software-driven networks.

Keri has held several significant sales leadership roles at Ciena, including Vice President, Major Account (CenturyLink) in North America, and most recently as Vice President of Global Account Sales, EMEA, where she developed and delivered a unified global account strategy that enabled top line revenue growth for Ciena's most strategic service provider customers.

Having built a reputation as a leader and respected consultant throughout her career as an engineer and network architect, Keri is actively encouraging mentoring and coaching - passing on her expertise in both personal and professional capacities. Most recently she helped found Women @ Ciena, a global internal networking initiative that aims to encourage diversity within the company through motivating and inspiring women at all levels and in all disciplines to attract, develop and engage talented people.

Prior to Ciena, Keri worked in multiple roles for Lucent Technologies as an Account Executive, Senior Systems Engineer and Senior Consultant. She maintained an S.S.B.I. (Single Scope Background Investigation) security clearance while working for Hughes Aircraft as a Network Engineer responsible for the evaluation, implementation and maintenance of data infrastructure for the global military theater.

Keri received a Bachelor of Business Administration degree with an emphasis in Management Information Systems (MIS) from New Mexico State University. Her certifications include, Cisco Certified Network Associate (CCNA), Six Sigma Green Belt and Dale Carnegie.

She lives in London with her husband and two children and is based at Ciena's offices in Worship Street.

5G: WHY WE NEED A SHARED INFRASTRUCTURE MODEL

Kate McKenzie, CEO Chorus, New Zealand

The key to driving investment in 5G mobile networks is a shared infrastructure approach, enabling operators to spread the considerable cost of these networks amongst the industry as a whole. This is all the more necessary in smaller economies such as New Zealand, which simply doesn't have the population or the geography of larger countries, which would sustain a market-driven infrastructure approach to 5G.

A shared and regulated infrastructure model is what the New Zealand Government (and others around the world, including Australia) have used to promote the rollout of Ultra-Fast Broadband. In a 5G world, the amount of capital that will need to be spent – with small cells every couple of hundred metres – means that it would be both uneconomic and unsustainable for each of the three mobile operators (Spark, Vodafone and Two Degrees) to do this separately.

Mobile 5G technology will involve placing thousands of new, closely spaced cell sites around the country to help transmit data from the millions of internet-connected sensors that are already starting to control machines, automated systems and gather data as the so-called Internet of Things (IoT) revolutionises efficiency and knowledge-gathering in a host of areas from urban planning to agriculture.

Leaving 5G infrastructure to the market would risk smaller countries like New Zealand being left behind because no one mobile network operators would be able to make the investment needed.

I am certain where we could end up if a shared approach to 5G infrastructure is not taken. While there is no immediate urgency for policy on this issue, we believe it is more likely to become pressing in the early part of the 2020s. However, in preparation for this, there needs to be a public policy debate and a readiness before you would do anything in that direction and you could get agreement between the mobile operators. It is not the case, as some have suggested, that a shared infrastructure model would slow down the rollout of 5G. On the contrary, such an approach will both lower the cost of the new technology, while also speeding up the build out of the new infrastructure, with resultant savings both to the economy as well as to mobile customers.

There is a growing level of understanding for the need for a shared approach to 5G infrastructure. Wireless and networking executives gathered at the 2017 Wireless Infrastructure Show in Orlando, Florida, for example, debated this issue and agreed that the spectrum needs of 5G, will require innovative approaches to both techology and policy. The Federal Communications Commission in the US has been working for several years on freeing up access to spectrum to enable 5G rollout, and has been examining the benefits of a spectrum sharing approach.

New techniques such as 'network slicing', which is the ability to deliver multiple network occurrences over one shared infrastructure, will enable network operators to orchestrate specific capabilities across their networks for the varying use cases 5G will bring. This means that network operators will be able to deploy different network slices: quickly and customize them depending on a system's needs, providing much greater flexibility and elasticity to their operational response. So within a shared network infrastructure, a slice can be used for one industry,

for a specific need, or even at a specific time. The best analogy is in computer networking, where we no longer have dedicated file servers, because servers are now virtualised. 5G network slicing will take this idea and extend it throughout the network architecture all the way to the radios in the cell sites.

There is no doubt that there will nonetheless be some challenges in getting agreement on the principles of infrastructure sharing for 5G. It will be a challenge that will test industry cooperation. However, I firmly believe this is a wonderful opportunity to show that as an industry we can actually come together and make this happen, and demonstrate that sharing is a really valuable technique to technology challenges going forward.

KATE MCKENZIE

Kate was appointed in February 2017 as CEO of New Zealand infrastructure provider Chrous. Before joining Chorus, Kate was most recently Chief Operating Officer of Telstra, Australia's largest telecommunications company. She joined Telstra in 2004 holding a range of senior executive roles in strategy, marketing, products, regulatory and wholesale. Prior to joining Telstra, Kate was a CEO in the NSW Government of the Departments of Commerce, Industrial Relations and the Workcover Authority. Kate also has significant corporate governance experience and is currently on the board of Allianz, having previously been on the boards of Foxtel, Sydney Water, Reach, CSL and Workcover. Kate is a qualified lawyer with a strong track record in understanding government and regulatory environments. Kate also has a passion for innovation and technology and for customer centricity. She is also is a member of Chief Executive Women, a member of the Board of the GTWN, and has served on the Telstra Foundation, Telstra's philanthropic arm and has had a long history of involvement in promoting the interests of indigenous communities.

SHOOTING FOR THE MOON

Jennifer L. Schenker, Editor-in-Chief, The Innovator

Naveen Jain's first company, Infospace – which started out by focusing on content and services for websites –was created during the Internet dotcom boom.

While that company had big ambitions, Jain is now literally shooting for the moon.

Moon Express, the third company he has co-founded, is attempting to build machine-operated spacecraft that can mine materials like gold, cobalt, platinum and Helium-3 (nuclear energy fuel) on the moon. It won a contract from NASA and is participating in the Google Lunar X-Prize.

Without even waiting for Moon Express to launch its first spacecraft, Jain is already busy working on his next moon shot, a startup called Viome, that seeks to prevent chronic diseases by examining the microorganisms in users' guts and counseling them on how to keep healthy.

Jain is one of a number of tech entrepreneurs who are embracing moon shots, ambitious projects that address big problems and propose radical solutions using breakthrough technology.

While the Internet revolutionized communications, today a whole host of powerful technologies are converging, bringing about exponential change and opening up the possibility for tech entrepreneurs to tackle challenges that in the past only governments could handle: space exploration, the eradication of diseases and ensuring an abundance of food, energy and water, says Jain.

"None of these things are impossible any longer," says Jain, "and the cost is coming down so that it can be privately funded."

Jain, who grew up poor in India and became a billionaire after moving to the United States, says he believes the next set of superpowers will be entrepreneurs, not nation states.

"For the first time in human history a small group of people can do things that only nation states could do before," says Jain. "We no longer have to rely on the government to impact society, whether it is going to space or solving the problem of healthcare or the clean energy talked about in the Paris Treaty – these things will be solved by entrepreneurs."

Technology is at a point where it could potentially solve the world's biggest problems, but for that to happen more entrepreneurs will need to make moon shots.

Al Gore, a politician and environmentalist who served as the 45th Vice-President of the United States, gave speeches at several European tech conferences in 2017 about the need for entrepreneurs to help solve climate change.

Executives at Bayer Foundations, a branch of Germany's global drug and agriculture company that focuses on frontier science, social pioneers and startups with impactful tech innovation, is searching for startups with technologies that will impact hundreds of thousands, if not millions of people across the globe.

The German entrepreneur Harald Neidhardt, who co-created one of a select few health-related projects funded by the Bayer Foundations, is promoting a HeroX competition that aims to encourage one million people in the developing world to become entrepreneurs over the next 30 years.

Bill Liao, a general partner at SOSV, a global fund that accelerates over 150 startups a year in verticals that include synthetic food and health, believes it is important to talk to entrepreneurs about the importance of purpose. SOSV's core purpose is "making the impossible inevitable," says Liao.

"It is not a slogan. It is what we do. Produce things that the world needs and set the stage for a massive shift in what biology is going to do to solve global grand challenges."

There is good reason for this flurry of activity: global issues that urgently need to be solved.

The United Nations 2030 Agenda for Sustainable Development and the Paris Agreement require an unprecedented mobilization of both public and private finance – some $90 trillion over the next 13 years. Only a fraction of that funding has been spent, says Marc Buckley, Al Gore's Climate Reality Project Country Manager for Germany and Austria and a jury member and open innovation advisor to the Bayer Foundations.

"Between 2015 and 2016 we did not even spend $1 trillion," says Buckley. He adds that Bayer Foundations, which invests $15 million per year through all of its various programs, has trouble giving out its grants. "There is plenty of money but there are just not enough good, impactful innovations," he says.

"This is not about a 3-, 5- or 10-minute pitch. It is not about a TED talk about how to save the world. Impactful global solutions are complex systems and dynamic models. What we want is business models that address all aspects of complete systems and the global challenges we are trying to solve in our world – whether it involves agriculture, food, water, or power," says Buckley. "Most companies are only doing one aspect and those will not have sustainable resilient long-term impact."

A systems approach is necessary because problems are so complex. Take the example of two of the world's biggest problems: a lack of food and of clean drinking water.

Technology pioneers such as Indigo Agriculture are using plant microbiomes to strengthen crops against disease and drought, to help farmers sustainably feed the planet and reduce water use in agriculture.

That is helpful, but it only solves part of the problem because the majority of agriculture is used to fuel cars and feed animals.

When it came to introducing electric vehicles, which remove the need for fossil fuels and bio-fuel production, big car manufacturers initially dragged their heels. Then the entrepreneur Elon Musk came along and launched Tesla, which earlier this year reached a market capitalization that surpassed that of Ford Motor Company and General Motors. Tesla's progress has spurred the big auto companies to up their game.

On the same day in November that Tesla introduced a new all-electric truck and an electric sports car that goes from 0 to 60 miles per hour in 1.9 seconds and has a 620-mile range, the Volkswagen group announced it had approved a €34 billion spending plan to accelerate its efforts to become a global leader in electric cars.

Memphis Meats – one of SOSV's investments – is among a number of startups helping ease the other part of the issue: It creates beef from self-reproducing cells, producing an animal-based product but avoiding the need to breed, raise, and slaughter huge numbers of animals.

Electric cars and lab-produced meats result in more food for people and lead to huge reductions in water and land use.

If you eliminate cattle farming then you also eliminate the massive amounts of methane that cows produce and which harm the environment.

That is why the Bayer Foundations' new focus is finding entrepreneurs aimed at disrupting agricultural, food and beverage industries. "Globally these industries are responsible for the majority of climate change," says Buckley.

THE OPPORTUNITY

These industries and others are in for a big shakeup.

The $90 billion global meat industry – which includes cattle farms, butchers, slaughterhouses – is being transformed, as is real estate, since land use is set to

change radically.

"There are 71 markets out there that are ripe for disruption and it promises to be a lot worse than what happened to Kodak." says Buckley. "This exponential disruption will not only occur because of the quantum leaps start-ups are taking in the digital age but also due to the globally unknown effects of climate change and deteriorating infrastructures."

In the case of food, "there are 10 big companies out there that control all of the brands – Nestle, Kraft, Unilver, Coke, Pepsi, etc – and in agriculture when it comes to seeds it is DuPont and Montsano. This has to change if we are going to feed all of the people we need to feed," says Buckley.

Agriculture is also facing radical change. "The world is losing 23 global hectares a minute to soil contamination and drought; five years ago it was 12 global hectares," says Buckley. "If you think a new country the size of Brazil is going to come along or a new place where we can grow crops outdoors I will tell you that you are wrong," he says. "We are going to have to get vertical and go multilevel and build closed greenhouse systems and use land more efficiently and use solar power and ambient water harvesting."

Today 30% of everything the agriculture, food and beverage industry produces "is thrown away, which is a 10x waste and then comes back to bite us as methane which is 70% more effective at trapping heat than CO2," says Buckley.

What's more, "we do not know what kind of climate calamities will come upon us but if we do not have a resilient sustainable infrastructure in place we will experience food security issues and other problems," he says.

Puerto Rico is a case in point. Its agriculture sector was decimated by Hurricane Maria, resulting in a 90% loss of local and regional food sources. This type of devastation is due to climate change and if there is no resilient sustainable infrastructure in place, the recovery takes years, says Buckley. "This can prove to be devastating for humanity that needs to eat daily. After all food is our energy source. This is one big reason why we can hear talk about the Anthropocene and that humanity may be facing the sixth mass extinction."

Buckley is frustrated by what he sees to be limited efforts by the food and beverage companies to change their business models and do less damage to the environment.

"If you are driving down the road in the wrong direction and you slow down by 60% you are still going in the wrong direction, just slower," he says. "We need to stop and start going in the right direction. If you tell me you are doing some minor changes or good pilot (test) projects, or reductions in your green house emissions you are still damaging our environment and killing people, you are just doing it slower."

Waste from the food and beverage industry includes mountains of single-use plastic containers. The UN has estimated that yearly damage from plastic pollution in the ocean is $13 billion, due to impact on marine life, tourism and fishing. That is not all. Globally, 30% to 40% of food produced for consumption is wasted. If food waste were a nation, it would rank third in the world for harmful emissions, according to OpenIDEO.

An American startup called Full Cycle Bioplastics is aiming to solve both of those issues by converting food waste into a fully compostable bioplastic.

As for the plastic that is already there, Boyan Slat, a 23-year-old Dutch entrepreneur, has raised $30 million for The Ocean Cleanup, an initiative that aims to eradicate the Great Pacific Garbage Patch, one of the most polluted areas of the ocean, using a boom to capture plastic and keep it in areas where a boat can pick it up.

These are just some of the many examples of the rise of the non-expert, people from outside industries who come up with novel approaches because they see things from a completely different

angle and just go out and do it.

A UK start-up called E-leather is another example. Its late founder, Chris Bevan, was told that what he set out to do was impossible.

Up to 50% of natural leather hide is wasted and often destined for the landfill. E-leather is using that waste by recycling it into a more durable, light-weight leather, saving over 5,000 tons of traditional leather waste from landfill – the equivalent of the weight of over 100 narrow-body aircraft.

Not only is E-Leather selling its leather to airlines who use it for seat upholstery to save weight, fuel and money, in September the company signed a partnership agreement with Nike, which is producing a sport shoe made out of the material.

A French startup called Pili is also doing its part, by changing the environmentally toxic process used to make dyes. It makes biosynthetic dyes as a cleaner alternative to petrochemical syntheses or heavy-metal-containing pigments.

THE HUMAN FACTOR

Technology could also help solve some of the developing world's biggest problems, including the recording of births and deaths, financial exclusion and inaccuracies and fraud in property registration. More than a billion people do not have a recognized means of identifying themselves, leaving them without access to healthcare, education, government assistance and financial services.

The Swiss technology firm WISeKey's digital identity dual factor authentication sits on top of the blockchain, an immutable ledger that allows third parties to validate that an original digital identity or attribute certifications have not been changed or misrepresented. This and other similar new technologies could help the United Nations achieve its goal of helping everyone in the world have a secure digital identity by 2020, paving the way for a better life both for citizens of the developing world and for refugees.

Already the Finnish Immigration Service has begun providing unbanked refugees with prepaid Mastercards rather than cash. These prepaid cards, which were developed by the Helsinki startup MONI, also provide refugees with a unique digital identity stored on a blockchain and could be adopted by refugee camps throughout the world.

Entrepreneurs are also helping to improve the plight of the some-60 million displaced people in other ways. The German entrepreneur Neiderhardt co-developed with Cisco a refugee first response mobile medical center out of converted shipping containers and outfitted it with advanced technology tools that allow the translation of patient-doctor dialogue into 50 languages.

Technology is also finding unique approaches to solving healthcare issues for millions – if not billions – of people.

For example, Israel's Zebra Medical Vision teaches AI-powered computers to automatically read and diagnose medical imaging data, allowing healthcare institutions to identify patients at risk of conditions like emphysema and coronary artery diseases and offer preventative treatments. It recently introduced a new suite that offers all of its current and future algorithms to healthcare providers globally for $1 per scan. The company says its aim is to make it possible to deliver healthcare to the next billion people who will join the middle class by 2020.

Artificial intelligence is also enabling a breakthrough in the fight against malaria, which each year kills almost a half a million people. Malaria is one of the hardest diseases to identity on a microscope slide. So the Global Good Fund, a collaboration between Intellectual Ventures and the Microsoft co-founder Bill Gates to develop technologies for humanitarian impact, has just announced a collaboration with the advanced microscope designer and manufacturer Motic China Group to create a distribute the EasyScan GO, an AI-powered microscope to fight the spread of drug-resistant malaria and

assist in its case management. Using custom image recognition software, EasyScan GO is capable of identifying and counting malaria parasites in a blood smear in as little as 20 minutes.

Intellectual Ventures said it bases its work on "reverse innovation," the idea that to successfully tackle big problems like malaria, technology has to be invented explicitly for conditions in the developing world such as lack of consistent electricity and poor technician training, rather than being retrofitted to those settings. Often these technologies are disruptive enough to be re-deployed back to higher-income markets for profit, creating a market incentive for commercial partners. In the case of EasyScan GO, the microscope was built to tackle malaria, but Intellectual Ventures is now exploring going after some forms of cancer in partnership with Motic.

Other advanced technologies could do everything from help relieve the global shortage of organ donors to eliminating chronic disease.

Prellis Biologics prints human organs in a laboratory setting. The company aims to address organ donor shortage and provide human tissues to streamline the development of therapeutics. As its first product, the startup is developing insulin-secreting units of the pancreas to help people with Type 1 Diabetes.

Viome, Jain's venture, and a number of other startups, including Ubiome, are offering new services that sequence the microorganisms that live in the digestive tract. The companies say they can do things like make diet recommendations and predict risk for certain diseases based on a person's unique microbial makeup. If it lives up to its promise, Jain says analysis of microbiomes could prevent people from developing chronic diseases.

SHOOTING FOR THE MOON AND BEYOND

By why stop at solving earth's problems? Jain says he believes it is possible to make other planets livable for humans. "That's the ultimate goal," he says. "The moon is the first stepping stone. If we manage to make the moon the eighth continent then we can go and live anywhere else."

Jain dreams about bringing resources back to Earth, such as Helium-3, "which could power this planet for generations to come."

And he believes moon rocks may someday replace diamonds. DeBeers made a fortune out of associating diamonds with love. Jain envisions a marketing campaign that says "If you love her enough, give her the moon."

Moon Express is one of five companies competing for the Google Lunar X prize. If none of them manage to make a moon landing by March 2018 the total of $30 million in promised prize money may be rescinded. That doesn't faze Jain.

"I am confident that we will launch by the end of March," says Jain. "If not the prize may be extended or someone else could fund a prize. It doesn't really matter. We are building a business that can survive with or without a prize."

As Moon Express hopes to prove for entrepreneurs ready to make moon shots, the sky could literally no longer be the limit.

JENNIFER L. SCHENKER

A veteran technology journalist, is Editor-in-Chief of The Innovator, a global English-language publication owned by Groupe Les Echos, the publisher of the largest financial newspaper in France. The Innovator (www.innovator.news) explains technology shifts to top executives and connects them to the startups that should be on their radar. It publishes six print magazines a year and a weekly newsletter that puts technology shifts in context for business. This article first appeared in a print edition of The Innovator.

NORTHSTAR: EMPOWERING HUMANITY TO PRESERVE OUR PLANET

Stewart Bain, CEO NorthStar

As of December 2017, the world population rose to 7.6 billion people. Nearly 2 billion are children, living in an era of communications technology which not long ago would have seemed like science fiction. This generation will inherit our planet's fresh air, forests and farms, rivers and oceans, but they lack a single unifying technology to deal with the most pressing issue of all: how will they sustain their environment? If we are to bequeath a more sustainable world to our children, we must move quickly to provide a solution to preserve our planet and its surroundings.

NorthStar is a Global Information System that will change the way we see the world and empower humanity to preserve our planet, transforming traditional Earth Observation into Earth Information & Intelligence – EI2. Based on a satellite constellation with a new and powerful sensor array, NorthStar will be the first system to image, digitize and analyse all matter on the surface of the Earth multiple times per day, delivering knowledge of the Earth at a level of precision, richness and timeliness never before available. Armed with information unprecedented in human history, NorthStar will have the capacity to bend the arc of human activity toward a lasting harmony with the natural world.

Via sophisticated data analysis and predictive analytics, NorthStar's information products will be of the highest value to global sectors such as Agriculture, Forestry, Fisheries and Oceans, Environment and Water, Urban Planning, Insurance and Risk Mitigation, and Energy and Natural Resources. Around and above our planet, NorthStar's sensors will monitor over 600,000 near-space objects, protecting high-value space assets from catastrophic collisions. NorthStar will provide citizens, governments and regulatory agencies with powerful new tools to effectively monitor their activities and forecast the effects of their policies on the natural resources of our planet.

The NorthStar project was conceived by a small group of scientists and engineers whose goal was to play a part in leaving a better and more sustainable world for future generations. As our organization grows, the goal endures. It's what drives and motivates us, each and every day.

The NorthStar Satellite Constellation will image Earth and its near space orbit continuously, with refresh rates that enable coverage unprecedented in human history. Optical sensors will monitor and protect high-value space assets from catastrophic collisions with space debris. NorthStar is the first commercial system to combine Hyperspectral and Infrared sensors to observe Earth, using reflected sunlight to image and obtain a wealth of information about any object on the planet. Via software analysis and predictive analytics, NorthStar will generate real-time solutions for the world's most challenging problems and transmit these directly to end users.

STEWART BAIN

Stewart Bain is the CEO and Co-Founder of NorthStar. Stewart has twenty-eight years of experience designing and developing aerospace systems. He was part of the original engineering design team for RadarSat 1 and 2, and created the optical systems centre of excellence at CAL Corporation (later EMS Technologies and ComDev) that provided breakthrough Star Tracker Attitude and Orbit Control Systems and Optical Intersatellite Link systems for spacecraft. He has been recognized with an R&D 100 award for his collaborations with NASA Langley distinguishing his contributions to advanced polyimide composite systems for aircraft applications. He has been in the business of commercializing disruptive technologies globally for numerous aeronautical and space applications since 1996. He was a member of the Board of Directors of the AIAC and has served as the President of the Board Advisory Committee of the AQA (Quebec Aerospace Association). He is the founder of Bain Consulting International offering management consulting services worldwide for the aerospace market with offices in France, Japan, Germany and the USA. Stewart has an MBA from Queen's University in Kingston, Ontario and a Master of Engineering from Carleton University in Ottawa.

GTWN Founding President Candace Johnson is a Member of the Board of NorthStar.

THE FUTURE OF RETAIL: PARTNERSHIP OPPORTUNITIES FOR THE MOBILE INDUSTRY

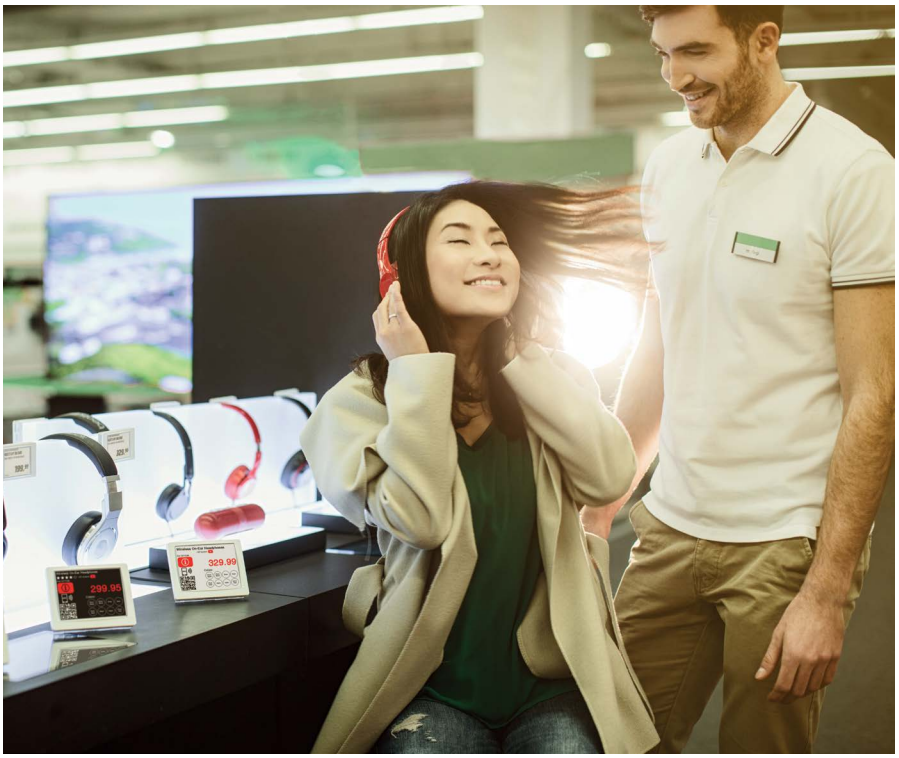
Thierry Gadou, Chairman and CEO, SES-Imagotag

The next major digital battle will play out in the retail sector, which will offer telecommunications and mobile service providers many amazing business opportunities. Where once retail was purely bricks and mortar, and then it also became virtual thanks to the Internet, we are now entering an era which we can describe as truly "omnichannel".

Consumers love shopping in stores, but they also demand the comfort and convenience of the Internet. The retailers that will come out on top will be the ones that embrace digital transformation and can offer consumers the best of both worlds, digital and physical, in one seamless service.

At present digital services typically only cover retailers' mobile websites and e-commerce sites, with no direct connection to their physical stores. And yet retailers are sitting on a potential digital gold mine: their stores! In future, each store will have its own mobile site to bring digital services to the store and promote targeted offers tailored to the store's specific context (inventory, business hours, climate, sales, etc.).

SES-imagotag is leveraging its in-depth knowledge of the retail sector and its tailored digital retail solutions to address these market opportunities. There are a number of ways that the mobile telecom industry can take advantage of these opportunities and partner with SES-imagotag in such areas as:



1 WI-FI CONNECTIVITY

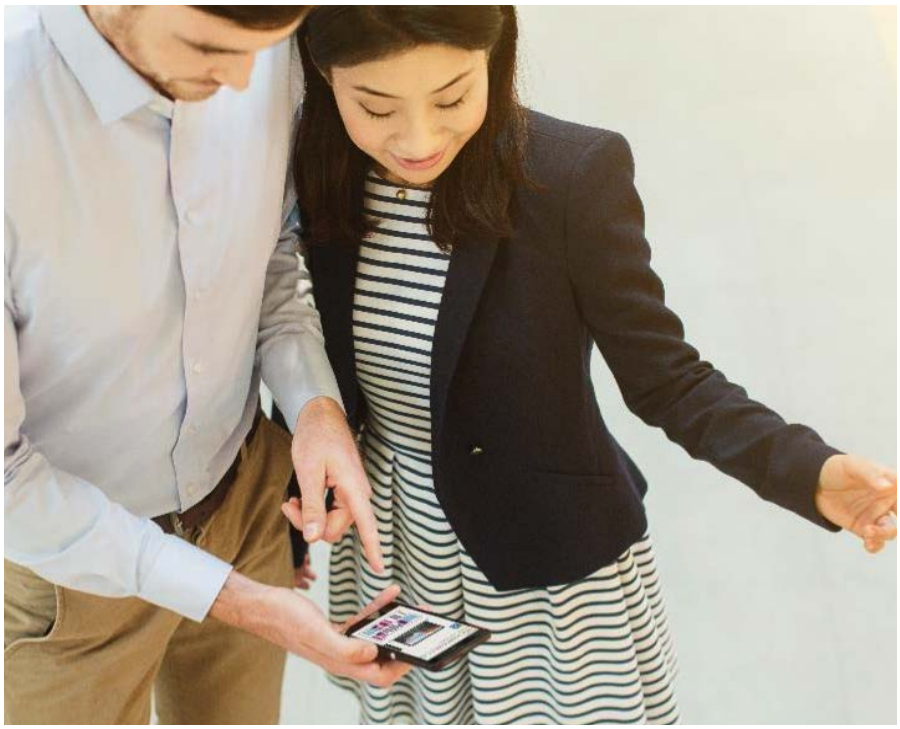
The new retail environments will provide multiple business opportunities for mobile operators. Retail stores will need mobile industry partners to provide the in-store infrastructure for Wi-Fi connectivity. As soon as customers enter the store, they will become connected into the interactive retail environment that can better identify, know, serve and communicate with customers.

2 NFC APPLICATIONS

Enhancing responsiveness, precision and quality by digitizing and automating price displays in the aisles is now imperative for retailers. Labels are an under-utilised asset. Labels are no longer just a simple, passive mechanism for displaying prices. They play a much bigger role in giving information to customers. They are “micro web pages” that display essential data like consumer ratings, in-store or online availability, related products and promotional information. HD color digital labels (at least 2.6 inches in size) are extremely effective advertising tools, positioned in front of every product in the store and remotely actionable. These wireless interactive graphical displays speak directly to the consumer at the shelf, at the precise moment of purchase. They can display a logo, a “call to action” message, a QR code, etc. and there are no limits on content they can communicate to consumers’ smartphones via a simple NFC tap or QR code scan. Because shoppers are identified, it is also easy to contact them again after they visit a store.

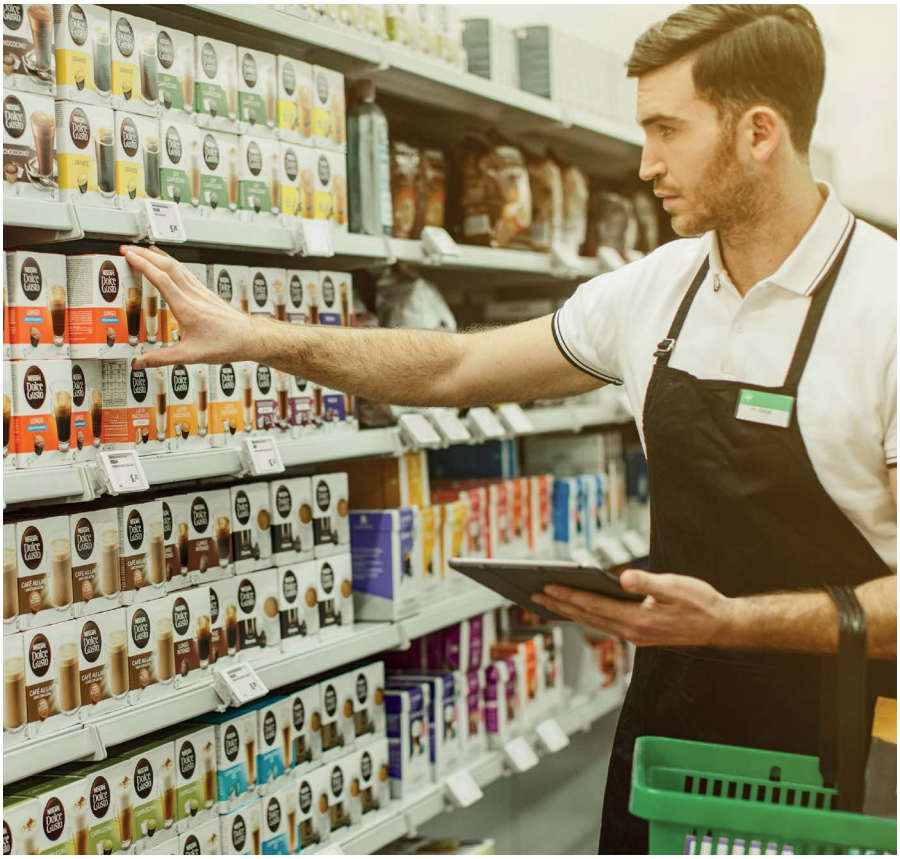
3 INTEGRATING MOBILE SYSTEMS

Retailers will need to integrate and automate a range of their in-house systems, providing a range of opportunities for mobile operators. For example, mobile pay systems can be integrated into the SES-imagotag retail solution. As the Internet of Things continues to revolutionise physical stores, retailers will need partners who can provide always-on, ultra-connected spaces that promote ultra-powerful omnichannel retail services. Retailers will need systems that enable them to know in real time which products are (or are not) on shelves or which customers are in the store and what they are looking for.



4 B2B PARTNER FOR CLOUD-BASED SOLUTIONS

Retailers need tech partners who can enable accurate management of store inventory and on-shelf availability. By partnering with a cloud-based solutions provider, stores will be able to significantly reduce stock-outs, waste, personnel costs and overstock. Sales per square foot will be maximized through ongoing analysis and optimization of assortments, merchandising and restocking. The geolocation function built into SES-imagotag digital price tags, for example, makes it possible to check the exact location of each product and the number of facings at any time. Using the resulting real planograms (realograms), managers can optimize the value added of store personnel by enabling them to focus on restocking and tidying the sales floor.



5 BIG DATA ANALYTICS

Customer data allows valuable shopper analytics based on a 360° view of customers. The "Digital Store" platform becomes a valuable source of data about in-store shopper behaviours – a considerable amount of information gathered at crucial moments in the customer relationship (trips to the store). This consumer data can then be compared with all the other data the brand collected online to form a true 360° customer profile. Retailers have begun painting a picture of their customers with CRM solutions. The influx of data from customer loyalty cards, cash registers, web behaviours and digital messages has led to the consolidation of this information in a DMP (digital marketing platform). This information can be enhanced with two key pieces of information: store visits and products looked at in the store, even before they are purchased. Combining all this information is what enables retailers to create a 360° profile of their customers so they can serve them better.

SES-imagotag: creating digital value in physical stores

For 25 years, SES-imagotag has been the trusted partner of retailers in using digital technology in stores. SES-imagotag, the worldwide leader in smart digital labels and shelf automation, has developed a comprehensive IoT and digital platform that delivers an array of services to retailers. The SES-imagotag solutions enable them to connect and fully digitize stores; automate low-value-added processes; better understand, inform and serve customers; generate quality information to continuously optimize floor inventory; prevent stock-outs and waste; and create an omnichannel service that builds loyalty and meets emerging consumer expectations.

6 WEB DESIGN AND INTEGRATION, SOCIAL MEDIA MARKETING

Retailers can also leverage "web-to-shelf" by harnessing Google at physical stores. The majority of Google searches are now mobile. This is a tremendous opportunity for bricks and mortar retailers: by listing their products with information about price, availability and location, stores can finally attract consumers in their neighbourhood who are looking online for a particular product or service.

In summary, the new age of omnichannel retail will provide the digital tech sector, and in particular mobile carriers and service providers, with a vast range of business and partnership opportunities. SES-imagotag, the number one solution provider in electronic shelf labelling and digital signage, is ready to work with partners on both sides of this equation, to help bring about this new and exciting era of retail.

"Thanks to digital, physical stores will once again become the most powerful driver of profitable growth for retailers." – Régis Schultz, President of Monoprix

THIERRY GADOU

Thierry Gadou is Chairman and CEO of SES-imagotag. Mr. Gadou serves as a Managing Partner and Member of Investment Committee at NexTFund Capital.

GTWN Founding President Candace Johnson is a Member of the Board of SES-Imagotag

THE FUTURE OF MOBILE & SATELLITE CONVERGENCE

Laureen R. Cook, Executive TMT Adviser, Extelcon Consulting

In the next decade, the mission of the satellite industry is to enable affordable Internet services for all, which is rather similar to that of the mobile industry. To achieve this mission, industry leaders are taking a commercial approach towards reducing the costs of Space Communications by commoditizing the development of satellites so that they can be manufactured at a lower cost, with increased capacity, higher throughput, and lower latency.

High Throughput Satellites (HTS) Low Earth Orbiting Satellites (Leo Sat) technology utilizing Ka and/or Ku bands, represent transformational telecommunications technologies, propelling the satellite industry to re-think its approach to the market from an entirely different perspective. Leo Sats will be deployed as a conduit for the converged extension of the Terrestrial Internet, either fixed or mobile, by providing fiber-like connectivity to remote locations on a global basis and /or connecting directly to end consumers in remote locations.

New technology has challenged the satellite industry to take a mass market approach and factor time to market into the development and deployment of new constellations, yielding economies of scale, in order to increase internet penetration and reduce the cost per Gbps by 50% of the global average of $6.0 US. This is the same approach that was taken by the mobile communications industry in the early 1990's, with the standardization of GSM or 2G in Europe, reducing the cost of voice and eventually data, handsets and capex.

With the evolution of global mobile standards moving from voice at 2G, to voice & data at 3G and data prevailing on 4G/LTE, the demands for high capacity throughput, and requirement of big pipes to properly deliver 5G is on the horizon in order to support commercially viable networks circa 2023. According to the GSMA, 2G/3G/4G has grown from 4.016m subscribers in 2008 to 5.2m in mid-2017 and is anticipated to grow to 5.6m subscribers globally in 2020. Growth of mobile has risen between YE 2008 to 2014 with a CAGR and is expected to grow from YE 2014 to 2020 with a CAGR of 4.2%. Emerging markets will account for 9 of 10 subscribers between 2016 to 2020, with APAC representing two-thirds of subscriber growth globally. Subscriber growth is expected to reach 6.2% in Africa, the worlds' most under penetrated mobile region.

Accelerated growth of mobile communication has been made possible by innovation and standardization, yielding to economies of scale and cost savings related to the network capex requirements, increased miniaturization & functionality of infrastructure, handsets & devices and increased voice and data (Gbps/Mbps) rates. Mobile, once the communications choice of the rich, has become affordable to the masses and in many cases, has become a lifeline to the poor in remote locations. Today, the mobile internet provides remote villages with access to the developed world, provides the basics of safety and security, as well as providing vital information related healthcare, education, agriculture and banking services; all vital services in developing markets.

Of the 7.4b people on this planet, over 4.0b do not have access to the Internet. Of the 2.5b people living within 3G/4G network coverage, 1.6b live outside the Mobile Broadband Network. Of those without internet access, 75% are concentrated in 20 countries

that are disproportionately rural, low income, elderly, illiterate and female. According to the World Bank, a 10% increase in broadband penetration equates to a 1.38% increase in GDP in developing countries. Further, a 10% increase in mobile penetration equates to a 0.81% increase in GDP, while a 10% increase in fixed line penetration equates to a 0.73% increase in GDP. Globally this equates to 22% or 1.628b of the world's population which does not have access to or is not connected to the Internet.

The percentages change dramatically by geography. When we compare the EU at 2% to that of Latin America at 9%, Asia Pacific at 21%, the Middle East at 22% and Sub-Saharan Africa, where 57% of the total population does not have access to or is not connected to the Internet. Both Mobile and Fixed Broadband networks are dependent on the quality of the Fiber over which they run, in order to provide the necessary capacity and throughput to support these technologies and accelerate economic growth.

Leo Sat Constellations such as Spacex, One Web, and Leosat are being developed to provide Gbps of capacity, with a latency of <=50ms, making them the first satellite constellations to enable the latency and throughput required to properly support 4G Mobile Networks and potentially 5G in the future, as this technology evolves. Leo Sat constellations will provide fiber-like connectivity to the most rural parts of the planet. Low Earth Orbiting constellations will supplement and extend existing terrestrial fixed and mobile broadband networks, by providing fiber-like connectivity over satellite backhaul, utilizing new technology, where it had previously been cost prohibitive to deploy fiber and/or connect directly to the consumer.

By calling for innovation, leveraging best-in class off-the-shelf technology, and re-purposing existing technology, Leo Sat constellations are challenging the satellite industry to create a standardized approach to the future of satellite communications, thereby increasing economies of scale and driving down the capex costs of the space constellation. Reduced capex requirements for the design and production of Leo satellites, launchers, fuel consumption, OSS/BSS systems, and user terminals, will drive down the costs associated with the satellite industry for the space and terrestrial network elements and components, as the design and production facilities will be re-purposed for future mass-market constellations.

Leo Sat technology is being financially backed by both the manufacturing and service provision industry leaders from the mobile and satellite industries including: Softbank, Qualcomm, AirBus, Boeing, Thales, Hughes, Virgin Orbit, Bharti Airtel, and the Salinas Group. Visionaries such as Elon Musk, Greg Wyler and Richard Branson are backing new Leo Sat space ventures. The investors in Leo Sat technology represent all aspects of the mobile and satellite value chain: Space Craft Manufacturers, Mobile Network Operators (MNO's), Antenna Manufacturers, Chipset Manufacturers, User Terminal (UT's) and Antenna Manufacturers, and OSS/BSS platforms.

A mass market approach is being applied towards the development of User Terminal (UT), which is anticipated to reduce the delivered market cost of mechanically steered (Dual Parabolic) UTs by 95% to about $1000 - $3000 US for the Enterprise, Corporate/SME, Cellular Backhaul, and Government markets. Technological advances are underway to provide phased array flat panel electronically steered antennas, at a cost delivered to the market at under $500 US, representing a >= 99.4% price reduction from today's costs. Reduced User Terminal (UT) pricing will diminish the barriers to entry and make satellite services more affordable to the Enterprises, Villages, Schools, Hospitals and Consumers in remote locations.

Leo Sats will deploy Gbps of fiber-like coverage to developed and developing countries between 2020 and 2024. These satellite constellations will support a range of markets, including: satellite broadband, cellular backhaul, small cells, enterprise, M2M/IOT,

connected vehicles, maritime, aerospace, and the government and military markets.

For developed nations, Leo Sat constellations will provide alternative, redundant routing and disaster recovery capabilities to mainstream networks, normally accessible to multiple fiber alternatives. In developing countries, terrestrial mobile and ISP connectivity will be extended wherever possible into rural or remote regions, and/or to provide satellite coverage directly to the end user where no, or limited viable alternatives exist today. Leo Sat services will be capable of supporting high speed Internet, VPNs, voice, video, IoT applications, conferencing and gaming in real time, supporting true 4G/LTE mobility and beyond.

LAUREEN R. COOK

Laureen R. Cook, Executive TMT Adviser at Extelcon Consulting. She was formerly with the IFC (World Bank), as Principal TMT Advisor, in the Global Telecommunications, Media & Technology investment sector, where she developed new business and evaluated TMT investment opportunities in Emerging Markets; providing guidance to the regional teams on new projects and portfolio companies, structure & operational improvements, from concept through to exit. Prior to joining the IFC, Laureen was with Alcatel-Lucent as Vice President 4G/LTE Strategy. She holds an MSc in Telecommunications Engineering from Rochester Institute of Technology, and an MBA from Long Island University in New York. In June 2017, Laureen was named as one of the Top 50 Women to Watch in the Telecoms Industry by Global Telecoms Business.

01 How have you deployed your passion and innovation as a leader or entrepreneur? What is your secret sauce or pixie dust?

The Telecoms industry is like no other, in that technology is consistently changing, getting faster, better and smarter with every generation of Mobility. It's the constant innovation, that keeps me engaged and passionate about this industry, which pushes the Alpha in me to constantly achieve more. To do so, I construct multi-cultural teams of highly talented, enthusiastic people, who don't take no as an answer and strive for perfection in their specific areas of expertise.

02 Give an example of a project or business that you're really proud of?

The project that I am most proud of throughout my career was the first national GSM Network, PT Satelindo in Jakarta, Indonesia. We could track the growth in GDP based on the rollout of our national network coverage. This was when I realized that mobile telecoms was so much more than just a means of communication, but rather a necessary tool for developing countries to help grow their GDP by providing a means of business & data communications in addition to being a life line for delivering such basic services such as health, safety and mobile banking to rural and remote areas.

03 What tips or lessons would you pass on to the younger women networked into the GTWN?.

would suggest that you reach out to someone you trust to be your mentor; male or female. This should be someone that may not always tell you what you want to hear, but truly has your best interests at heart, taking into consideration your personal and professional aspirations.

04 Name a challenge for women in the GTWN to achieve in the next 25 years as we step up to the complex world in this current "Mobile Century"

Unfortunately the challenge of the next 25 years is quite similar to that of the past 25 years, which is to have equal representation of women and men on the Boards of TMT companies on a global basis, along with equal pay for equal work. As progressive as the TMT industry is from the technological perspective, is as oppressive as we are regarding Board and "C" level female representation. Time is up, this needs to change!

INTERNATIONAL CARRIERS' PATH TO THE IOT GOLD MINE

Isabelle Paradis, President HOT TELECOM

The Internet of Things (IoT) is potentially the most significant driver of new developments, technologies and revenue for telecom operators since the evolution of the Internet itself. Strong words, but the increasing opportunity to derive value from the collection and analysis of data from all the objects surrounding us is rapidly moving from a vague idea to a fully realized reality.

Although many white papers and articles have been written about the opportunities in transportation, healthcare, education and so on, much of the focus has been on the role that mobile operators will play in IoT. However, a significant part of the value chain for global IoT applications will require the involvement of International carriers, and little has been said about if and how these players should position themselves in this complex equation.

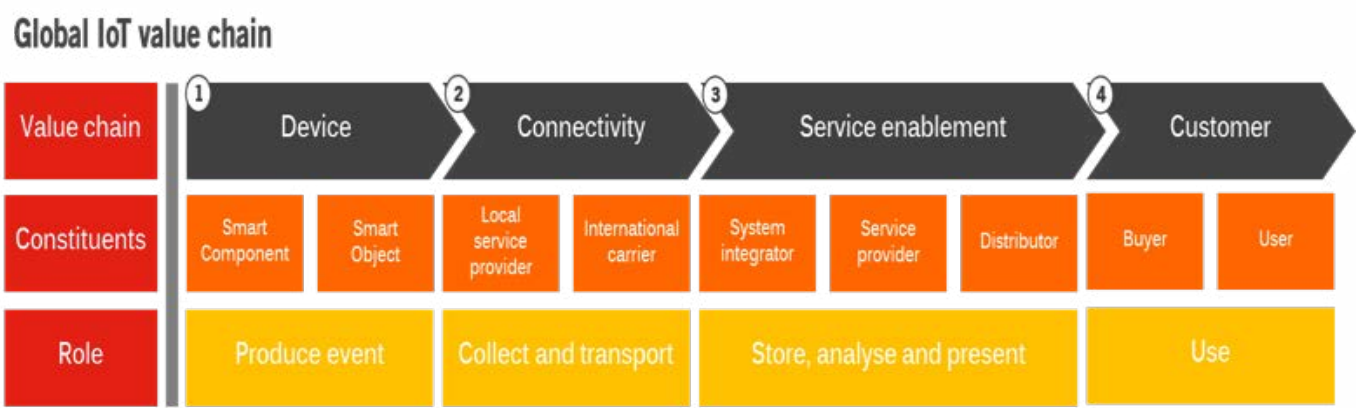
International carriers are at a turning point in their evolution, with many looking for solutions to move away from the basic voice and data transport functions, to re-invent themselves into high value solution providers and the aggressive support of IoT could be an integral part of this strategy.

This white paper therefore focuses on the different roles that International Carriers can play in IoT and what steps they need to take now to guarantee a future that is more than providing the bit pipe necessary to make things work under the covers.

The IoT value chain is composed of 4 key components, each with its own set of opportunities and challenges: The device, the connectivity, the service enablement and the customer.

1 The Device

All IOT applications start with the device which produces the event, which could be as simple as a status update all the way up to full motion video. These devices are composed of both smart components (SIMs, sensors, transponders) and smart objects (residential heating system, security system, healthcare devices as well as many objects involved in transportation — cars, trucks, trains, planes or ships. The wide range of use cases for these applications results in a rich set of requirements for the smart objects. Some will remain fixed in place for much of their lifetime, others will move both nationally and internationally. With our focus on the International IoT value chain however, all smart objects are assumed to be mobile at some point in time and will require to be accessed wherever they are. Additionally, the data they generate will need to be transported back to the data centres where it will be



stored and analysed. Which brings us to the next element in the value chain: the connectivity.

2 The Connectivity

Collecting data is a key part of the value chain. While mobile network-based collection is a key element, some developments in low power wide area (LPWA) radio (both point to point and mesh approaches where the devices can reach another device that forwards the signals to other devices until a concentration point is reached) can offer a solution to fixed devices that cannot bear the cost of a dedicated GSM, LTE or even 5G radio system. In the case of global IoT support, however, a device will need to be accessed wherever it is and this will either take place via mobile networks, for easy to reach locations, or at the other end of the spectrum, via satellite based solutions to reach planes, ships and similar transport services.

With basic data collection in place, the data then needs to be transported to an environment where initial processing takes place. In a global or regional IoT environment, data will need to be transported internationally back to the cloud computing environment where the data can be stored and analysed and key alerts either processed and instructions returned to the device or forwarded to a central control centre for human intervention.

This is where International carriers will initially see their main role and those carriers with a comprehensive global backbone will be well positioned to address this need. In addition, different types of data will require different types of transport quality and security. Carriers will therefore also have to be ready to offer class of service (CoS) treatment with Service Level Agreements (SLAs) tailored to each traffic type. Some more critical traffic will require low latency (emergencies in a car system for instance), while other traffic may just be 'I'm OK'` type information and require less immediate treatment. The need for low latency for data collection and rapid response will likely require a network of regionally based computing environments and international carriers are well positioned to provide these resources.

As we will explain later, international carriers will provide many of these services via their normal supply relationships for transmission services or roaming support, unless they take the initiative to broaden the scope of their connectivity service.

3 The Service Enablement

Once the data has been collected and transported back to a cloud computing environment, it then needs to be stored and statistically analysed firstly to immediately respond to the alert or issue if necessary and then to glean a deeper understanding of the problem or opportunity that comes from a broad Big Data approach to this mass of information. For example, applications to predict which components in a car are likely to fail soon would drive responses to warn the driver or to propose a service visit if time permits. Other analytics could be aimed at identifying opportunities for cost reduction in other industry verticals. All in all, this area is key to the value of the IOT chain. stem integrators, service providers and distributors will be involved in this phase of the value chain to support service provisioning, data and application management, data analytics and billing depending on the nature of the application.

In the case of a global IoT application, many of the necessary computing resources to support these activities could be operated in cloud computing environments hosted directly on the high capacity secure international networks operated by international carriers.

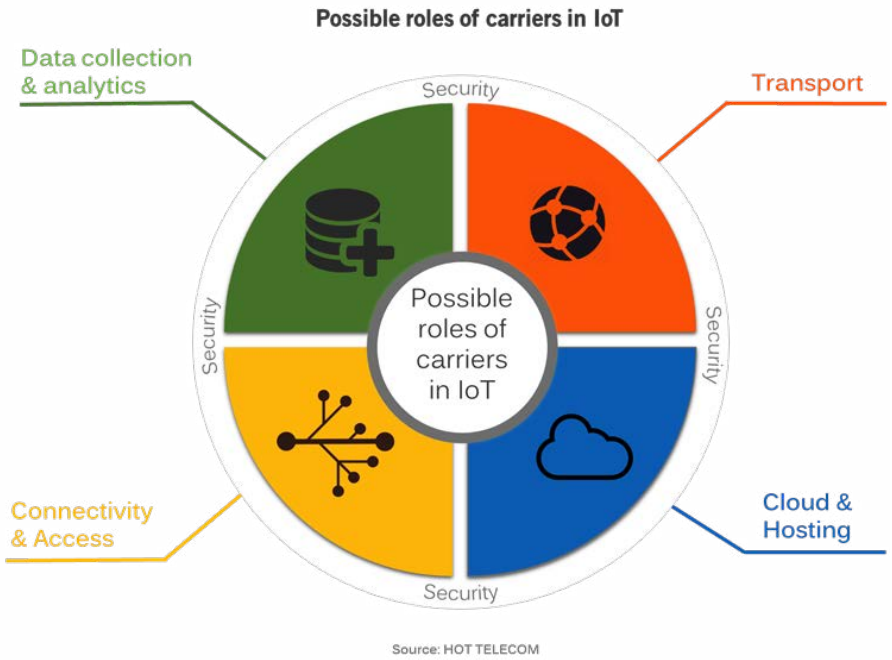
4 The Customer

The final and most important part of the IoT value chain is the customer, which could range from the end user directly buying the service all the way to major multinational corporations. This variable will have a great impact on how the service is delivered, supported and billed. Also, considering the ever-growing number of IoT applications, all participants in the value chain will need to be able to develop flexible infrastructure and business models that can easily be tailored for the varying needs

of these customers.

With International carriers under constant pressure to find new sources of revenue, and with many looking to move away from the commodity business and beyond the role of a pipe provider, IoT may well be a way for some of them to achieve these goals.

We will now discuss the possible roles a carrier could play in the IoT environment and define the capabilities they would need to acquire to be able to operate at different levels of this value chain.



Source: HOT TELECOM

POSSIBLE LEVELS OF CARRIER INVOLVEMENT IN IOT

International carriers can potentially choose from many approaches of increasing value in the world of global IoT applications as follows:

Level 1 Transport

International carriers already have extensive trans-border (and some national) transmission networks and internet backbones. Many are building secure and private IPX networks for services that demand guarantees of throughput, latency or loss. They are therefore well positioned to play a key role in the International or regional transport component of the IoT value chain.

To achieve this level of support, carriers would not need to take any specific action, apart from ensuring they manage a well dimensioned regional or global resilient and adaptable backbone, which also offers CoS treatment to support different needs in terms of quality and security. In this case the IoT traffic would be transported as any other data traffic.

Carriers would either be the international transport provider for a mobile operator's customers (end-users or enterprises) or would partner with multiple mobile operators to provide the access and connectivity to a company in an appropriate industry vertical.

In that sense, international carriers who do nothing will gain some benefit from the spend on IoT. However, it will be purely as a supplier of data transport in a competitive environment.

Level 2 Hosting

A growing number of carriers are building cloud and hosting capabilities over their International backbone. Capitalising on this new capability, carriers could move one level above the transport function to offer global cloud hosting to enterprises looking to securely access their IoT databases and applications (analytic software) from anywhere in the world. An IoT application located on a global carrier's IPX for example could offer this type of functionality with SLAs and security.

Again, this application is not necessarily new to many carriers, and would be seen only as another type of cloud hosting customer/vertical. For example, a company building a Europe-wide solution for an automotive company can approach the appropriate international carrier to establish the necessary transport requirement between countries and contract for data centre and cloud computing resources to be centrally hosted over the carrier's cloud if needed.

Level 3 Local Access

The next level of support could be the extension of the carriers' role to include local access. But how can an international carrier that has tended to focus on trans-border issues compete in a space usually dominated by mobile operators?

Firstly, many international carriers have a much wider range of functions and capabilities in their group organization – some have multiple mobile networks, others are major internet backbone providers, still others have large consulting groups well used to developing proposals for multi-national corporations. A key starting point is to utilize all the resources of the group in establishing an end-to-end offering.

Beyond that, the next step would be to fill in gaps. It is hard to envisage being able to offer a full multi-national solution without full coverage for access to the objects in that region or globally. International carriers that are part of a Mobile group are obviously at an advantage here, but no single mobile group has operations in all countries.

A possible solution to fill in this mobile access gap in a region would be to partner with, acquire or launch data MVNOs to provide the necessary local access to IoT devices. Some MVNOs already exist with this aim in mind and so a partnership or an acquisition could be quick ways of getting the access issues resolved for the international carrier.

As an interesting side development, making investments in some of the unregulated radio solutions could also be attractive. It is perhaps not clear if the service provider will install these or they will come pre-installed in the intelligent object but having alternatives to expensive cellular connections could be advantageous.

With these steps in place, the international carrier would be able to propose a comprehensive solution of access, connectivity, data collection and simplification and, finally, secure cloud computing resources to a major manufacturer or to the industry vertical.

But one thing is certain, whatever level of support International carriers decide to offer in the IoT world, they will have to do so with security of the data in mind. In a world where security of the information is moving up in priority and complexity, security and fraud management at the transport, hosting or analytics level will be key.

Level 4 Data Collection and Analysis (End-to-End Offering)

The last piece of the puzzle for International carriers to be able to offer an end-to-end IoT offering to major corporations and create an offering that encompasses all the elements of the IoT ecosystem to include data collection, device and data management, analytics and applications capability for the corporate customer.

Many of these advanced capabilities may already exist within a few of the International carriers who are part of a large group which also offers system integration, software development and consulting to enterprises for example. However, for many International carriers, this would represent a brand-new set of capabilities, for which they have little or no experience.

Realistically, International carriers who want to offer these services as part of their IoT bundle, would therefore need to either acquire or partner with system integrators, service providers and distributors to deliver the complete service enablement part of the IoT proposition, which is said to represent over 60% of the total revenue of the IoT value chain.

An international carrier able to provide all four levels of the IoT solution would indeed be in an ideal position to benefit from the growing global IoT opportunity.

Again, staying with the focus on the international opportunities, we see market opportunities breaking down into three potential customer groups (as outlined in the diagram on page 14) with different needs and possible levels of involvement for International carriers: Consumers, Enterprises and Transport.

CONSUMER

The Consumer segment is

undoubtedly going to be major, but equally, the majority of consumers do not spend much time outside their home country and so the opportunities for most international carriers are probably in support roles around travel. For instance, ensuring that health applications around the monitoring of implanted devices can be extended globally to whichever location the person happens to travel.

However, international carriers with a dominant domestic operator as part of their group could have a significant edge here. The domestic operator will have a direct retail relationship with consumers and the international arm can then extend those capabilities globally. It is difficult to envisage how an international carrier without such an extensive domestic set of relationships could build that relationship with an end-user even though that would be a very valuable piece of the jigsaw.

The range of consumer opportunities is broad, but will certainly include:

- Mobile devices
- Automobile connectivity and entertainment
- Wearables, including fitness and health related devices
- Home security and control of environment

ENTERPRISES

Providing services to Enterprises of all types and complexity is one of the key opportunities. International carriers can leverage their existing relationships and local presence to provide a multinational service platform offering a number of applications in the industrial and commercial sectors. For instance, multi-national corporations will require solutions to help them manage:

Automotive – both maintenance, service and safety related as well as user applications enabled by the manufacturer

Industrial machinery and production systems monitoring and repair management

Agriculture sector where autonomous farm machinery is already being deployed and requires accurate positioning and advanced data collection to optimize food production

- Asset tracking across the entire supply chain
- Power and Energy infrastructure with high demands on safety as well as minimizing diversion of supply for fraudulent or illegal purposes
- Heating, Cooling and HVAC system monitoring and optimization across a regional deployment
- Mining Operations and the resultant supply chain for minerals and commodities

TRANSPORT

Finally, there is the transport segment, although this can overlap, in terms of the potential customer base with Enterprises. Transport here includes:

- Aircraft movement and optimization
- Shipping, particularly as part of an overall supply chain optimization
- Ferries and passenger vessels
- Trains – both passenger and freight

In the above segments, wholesalers can structure services to improve the value proposition for multinational corporations seeking to connect directly to their products and services to monitor performance, provide pre-emptive maintenance, reduce truck rolls, improve service levels, and enhance product design and functionality.

REAL LIFE EXAMPLES

The market is at a relatively early stage for implementing such services. Yet, there are two examples that point to what the future may hold.

The first example is the new service by NTT Com that

provides secure connectivity for IoT applications enabling corporations, for example, to monitor the operational status of exported machinery and vehicles and manage cross-border supply chains. These companies can now access, operate and manage connections that are not in the home network without having the need to sign multiple service contracts in each operational market.

The second example is an MVNO set up by Panasonic to provide connectivity to its business devices, such as a monitoring camera or a heating and cooling system. The service includes secure cloud storage for user data such as video.

These examples highlight the different opportunities where wholesale operators can play an important role in enabling IoT applications through a comprehensive service offering that includes connectivity, transport, cloud hosting and data analytic services that bridge different markets in a global marketplace.

The time is ripe for International Carriers to be establishing their strategy to play in this new developing global infrastructure. To do nothing will relegate the carrier to a role as a provider of a commodity service – transport. The need to start planning now for the internal developments and acquisitions necessary to allow that provider to be a key enabling partner for the largest global companies is our key recommendation.

Thinking more broadly, we believe that carriers should be considering the following areas for investigation and investment:

CAPITALIZE ON YOUR CURRENT GLOBAL PARTNERSHIPS

One the most complex prerequisites is negotiating and closing with local players on country-specific connectivity partnerships and cloud hosting services, as well as navigating fragmented regulatory environments. Telecom wholesale operators are uniquely positioned to address the IoT needs of these enterprises by leveraging their existing partnerships with local MNOs, data centre operators and managed service providers to offer a one-stop-shop for enterprise IoT solutions. The key is to start that process of investigation and establishing the necessary agreements and approaches to make it a smooth offering when the opportunities arise.

INVESTIGATE NEW WIRELESS ACCESS TECHNOLOGIES

We earlier discussed the potential establishment of IoT-centric MVNOs. These are expected to come to market in the next few years and would bundle different wireless access technologies – not only those based on 3GPP cellular technologies. These MVNOs would have optimized backend networks that match the requirements of the IoT service model and a go-to-market strategy that enables the IoT business case. LPWA is an example of emerging connectivity technologies that are specifically targeted at IoT applications characterized with intermittent, low throughput data transfer and longevity of field operation reaching up to 10 years on a single battery. LPWA technologies operate in the license-exempt spectrum and therefore are open to anyone to deploy those networks. We recommend that carriers investigate new technologies in this space and also consider establishing an IoT-centric MVNO to broaden the opportunity towards providing a full-service access solution to major industries.

DATA ANALYTICS AND CLOUD SERVICES

Finally, as enterprises and application providers evolve towards building and leveraging IoT based solutions, additional requirements emerge for data and application hosting, compute, storage and network access, and for the ability to manage and utilize IoT data. This is addressed through two ongoing developments that should be part of the planning and investment activities of international carriers interested in being a key part of

these solutions:

a) The rapid introduction of NFV/SDN paradigms in the data centre and progressively in the network fabric which allows the implementation of sophisticated cloud-based service creation and orchestration solutions for the enterprise and application provider customers.

b) The integration of big data management models on top of the cloud fabric allows a more efficient ingest and processing of the IoT generated data adding accurate predictive ability.

CONCLUSIONS

The opportunities for growth into higher value activities beyond international connectivity are extensive as the IoT requirements gain market traction. International carriers can successfully operate in this space and should start to build their business and investment strategy now to fully profit from the growth of this new segment.

ISABELLE PARADIS

Isabelle Paradis is President of HOT TELECOM and has spent the last 23 years working with most of the Tier-1, Tier-2 operators and wholesalers on all continents, looking at how to improve and launch innovative services. She has published several articles and reports on the subject and has spoken at numerous conferences around the world to share her views on the future of the international telecoms business and its transformation. She is also passionate about encouraging the involvement of women in technology and science and conducts multiple panels and interviews with leading women globally.

VICTORIA HERNANDEZ

Victoria Hernandez is formerly a C-Level executive of major telcos such as BT, Orange and Proximus, and is now based in Paris. She is also a Founding Director of the GTWN, a Business Angel, Board Member and "C" Leader in the telecoms industry and fintech in Europe and Abroad.

01 How have you deployed your passion and innovation as a leader or entrepreneur? What is your secret sauce or pixie dust?

My secret passion is for constant learning- about the industry and the emerging technologies and their application, but also about human beings and society and how they relate and use technology. The telecoms sector has one of the most complex business models in the industry. So many variables to take into account! Macroeconomics, regulations, consumers' cultural differences and of course the technology. If you are not in a state of constant learning your knowledge can become obsolete very quickly. To build a successful business you need motivated and diverse teams who can keep up with such a fast and challenging environment. This is what makes technology really exciting.

02 Give an example of a project or business that you're really proud of?

The project I am most proud about is when I was at the front line of market liberation in Europe. I was Alliance's Director of BT at that time and I set-up a number of national telcos in continental Europe which today are up and running very successfully. Being the challenger of the former monopolies was hard work but also very exciting. Nobody remembers now that at that time getting a telephone line could mean more than a one year waiting period and communications tariffs were outrageously expensive. Bringing competition to the European telco markets created thousands of jobs, made communications much more widely available and affordable with better services and brought about new business models. It was good for the economy as well as consumers and contributed to real progress in our society.

I am also proud that I have been a member of the Global Telecom Women Network for many years and can count as close friends so many inspirational women who belong to our association.

03 What tips or lessons would you pass on to the younger women networked into the GTWN?.

I would suggest to younger women that you need to be competent at your work, but you also need to be yourself. Don't give-up your own personality and your own aspirations, dress however you want, put make-up on and wear heels (but only if you want) and learn to say NO, because if you are an expert in your domain, the business world will recognise and respect the professional you are.

04 Name a challenge for women in the GTWN to achieve in the next 25 years as we step up to the complex world in this current "Mobile Century"

The challenge of the next 25 years is to make a good use of technology as human beings. I am referring, in particular, to questions around the ethical use of, for example, biotechnology. We need to ensure that, as we roll out new technologies we continue to respect the privacy of individuals, that we are responsible in how we use Big Data combined with Artificial Intelligence applied to Social Networks, and that we do not undermine our freedom of choice as individuals and of our democracies. There is a lot of work to be done on this front and in parallel to the development of these emerging technologies. I would also include, in this regard, the obligation we have as parents to teach our children to use technology wisely and appropriately from a very early age. Kids need to jump, run and play, and should not be just texting each other all the time. There is a code of "good behaviour" we, as parents, need to provide to our children as an essential part of their education.

MICHELE MERRELL

Michele M. Merrell is a senior level telecommunications and technology executive with 30 years in the corporate world. She is the President of Merrell Consulting Group, a global consulting consortium. She serves as a Board of Director for three corporations in the telecommunications industry. Michele is on the international board of directors for the Global Telecom Women's Network (GTWN), and is the North America President for GTWN, an organization that actively promotes and mentors women in the global telecommunications and technology industries

01 How have you deployed your passion and innovation as a leader or entrepreneur? What is your secret sauce or pixie dust?

I began in the mobile telecommunications industry in 1992 as a young person, and found the rapidly evolving industry to be fascinating. Now, 25 years later, and still a part of the industry, I can say that it has been a fabulous life experience having worked for several carriers, as well as on the distribution/supply chain area of telecommunications, and also in the technology arena. I have seen the entire mobile ecosystem evolve over this timeframe into the worldwide industry powerhouse that we are here in Barcelona celebrating during Mobile World Congress. I now currently serve on the Board of Directors for several international telecommunications companies.

02 Give an example of a project or business that you're really proud of?

For the last two years, I have worked to help bring an end to a monopoly mobile telecommunications market in the Bahamas, with the successful launch of a new telecom carrier, Aliv. For the first time in 25 years, Bahamians now have a choice in their mobile telecommunications provider. From working through the RFP with the government, to shaping the launch strategy, assisting in hiring senior level telecom professionals to run the new start-up company and also developing the brand strategy, the Bahamas' newest LTE network is now ALIV. This new company brings never before seen value for calling, texting and data usage for consumers. They offer a choice of premium products and services, international roaming delivered through strategic partnerships with 600+ network operators in almost 200 countries.

03 What tips or lessons would you pass on to the younger women networked into the GTWN?.

Networking remains paramount to developing your career path, and it is not something you should engage in only when you are in career transition – it is literally a skill that you should develop and utilize constantly. The GTWN has an absolute wealth of strong mentors that are willing to share their expertise, their network and their learning experiences with mentees coming up through the telecom and technology industries.

04 Name a challenge for women in the GTWN to achieve in the next 25 years as we step up to the complex world in this current "Mobile Century"

At some point, we need to make the shift from gender-based conversations and own our areas based on our merit, our talent and our contributions to the mobile telecommunications and technology industries. While there is still a glass ceiling in some organizations, I believe that more and more, we are making progress, our value is being recognized, and there is no doubt a direct correlation between organizational effectiveness, profits and the impact that women have on successful organizations. I would like to see more women achieve Board of Director roles in companies, to help shape the culture, the organizational effectiveness and impact on the bottom line.

SOCIAL TRENDS

ARTIFICIAL INTELLIGENCE, MACHINE LEARNING AND FORESTS OF SMART ROBOTS

Finnoula Taylor, MSc Graduate in Artificial Intelligence at the University of Sussex and Janice Hughes, Founder and CEO of Redshift Strategy

According to one hedge fund manager the machines will have taken over within a hundred years. The human race as we know it today will have lost control due to our inability to comprehend and master trillions of very different networks and data points simultaneously.

In a recent test, Facebook found two AI machines, Bob and Alice communicating in their own derived shorthand language, well beyond the limits of human comprehension. Added to this Elon Musk and Sam Altman are concerned that AI will create a dystopian apocalypse. They see the human mind hard wired through a neural lace into supercomputers and they fear that this could represent "humanity's biggest existential threat". From these fears they have created "OpenAI" a non-profit research company to ensure that the benefits of AI are spread widely and that Artificial Intelligence does not become a threat to civilization.

Within the next two decades artificial intelligence and machine learning will have transformed every aspect of human life. Advances in speech recognition will allow us to talk to all manner of devices in our homes and summon our cars from the parking lot. Computer science and data analytics have already taken over from IT and informatics

and propelled us into an era of algorithms, data visualisation and cognitive dynamics that only a few people will understand in the future.

In spite of Alexa and Siri seeming so familiar as they converse with us, deep language learning is still a big frontier ahead of us.

While Pepper the robot, designed in Paris by Aldebaran and now owned by Softbank, speaks eight languages, the paradox remains that the level of understanding is limited and dependent on Pepper only being asked very simple questions. We are still five to ten years away from easy and unstructured conversations. AI is far from being able to draw sophisticated inferences and still depends on finding simple matches between crudely defined variables. AI is not superintelligence and while machines can exceed humans in singular tests of chess or Go they cannot multitask and use judgement and intellect, in the same way as humans.

Movement adds to the complexity. Pepper can dance in a limited way but walking robots find it extremely difficult to replicate human characteristics that appear relatively simple such as bipedal movement, but are actually highly complex. This is not surprising considering the evolution of human bipedalism began in primates about four million years ago. The earliest hominid with the most extensive evidence for bipedalism is the 4.4-million-year-old Ardipithecus Ramidus. Boston Dynamics recently had a breakthrough with the walking Atlas robot so it may not be so far off, but it still consumes far more energy and processing time than any human.

The next generation of entertainment gadgets - machine to human and human to machine communications that are already with us, will add swarm technology that can drive drones in tight flock formations in a similar way to birds and carry out nonstop surveillance.

We may be waving a hand, like a Harry Potter wand, to send us to new channels or to another person who's joined our computer game. Virtual and augmented reality will take us along another path in a world where we might balance on an imaginary wire between two buildings or encounter a shark up close, in the Mariana Trench. It feels as though we are on a fast moving technology track but one that goes in many different directions and is highly fragmented with different operating systems. AI has been designed to do one task at a time and there's no general all-purpose ecosystem.

Most of our day to day contact with AI and machine learning will come from our mobile phones and our smart home devices but beyond that we'll be less familiar with the smart AI based systems enabling industry to operate far more productively than ever before.

The Internet of Things is creating new ways for businesses to save time and money. There are smart

ecosystems that link location-specific dynamics with mapping, security, real time tracking, and knowledge-sharing networks. There will literally be millions of these new IoT services threading their way into the fabric of our businesses and into our everyday lives, but for the time being they will remain highly fragmented.

With the launch of 4G and 5G networks there will be a rapid shift to the adoption of new software and technologies right across the value chain of the mobile and telecoms sectors and these advances will depend upon the analysis and feedback from the sea of 'big data' that remains relatively underdeveloped and untapped in the telecommunications sector, relative to social media.

Let us focus on the mobile industry for a moment and on three areas alone where AI and big data could transform the size and structure of this vast sector. The three areas of AI developments that we will focus on below are infrastructure and smart energy, remote sensors and content monitoring.

Infrastructure and smart energy: There are 4.3 million telecom transmission towers currently deployed worldwide and these are expected to grow tenfold to 50 million as mobile operators deploy their 4G and 5G services globally and support the inexorable growth of mobile data traffic of 40-60% per year. The carbon emissions from these towers equate to millions of tonnes of CO2 per year. Apple's data centres are now fully powered by renewable energy that the company buys in and generates on site. Other big-name companies like Facebook, Google, Amazon and the telecoms majors are also under pressure to 'go green' and minimize their environmental footprint. Smart tower operators and some mobile companies are already using smart renewables. In many emerging markets tower operators are finding that solar power is simply cheaper than diesel or kerosene. Falling costs in Asia mean that solar panels and small hybrid controllers make them cost effective, where there are extended sunlight hours and where the latest lithium battery storage systems are being widely adopted. Billions of bits of data on cost savings and efficiencies can be driven through by the smart

controllers will flow around the world optimising energy usage, machine to machine, without any human intervention except to monitor the financial benefits of such advances.

Remote sensors: Massive data links and AI feedback worldwide, will enable remote sensors to inform mobile operators of the radio spectrum "not spots" and "hot spots" that we all suffer from and the operators will be able to improve the efficiency with which they deploy 4G and 5G frequencies to give their customers far better reach and coverage at superfast broadband speeds.

Content monitoring: In order to develop and distribute sports and TV drama content to customers, the mobile operators will have to deploy small cells, fiberisation, micromesh and cache content at the edge of their networks. Equally this means that they will need AI and machine learning to make recommendations, for personalisation and for advertising sales monetisation. The content industry will be transformative across the whole communications and media sector.

The mobile industry with its 5.5 billion subscribers and its contribution of $4.3 trillion to global GDP, will go on to create millions more jobs and will add hugely to the global economy. The telecoms sector will need to recruit even more people and with broader skills than exist today. We need to ensure that the schools and universities are ready for this and that entrance can be opened up to candidates from all walks of life. Perceptions of the ideal skill base for the industry need to be much bigger and broader than they currently are. Equally re-skilling also needs to be open and transparent and picked up at any time without restricting AI to only a favoured few who are considered to have the perfect qualifications.

FINNOULA TAYLOR

Finnoula Taylor is working on her MSc degree in Artificial Intelligence at the University of Sussex. In this photo she is tracking chimpanzees in Ugalla, Tanzania and collecting data on the feeding and social behaviour of this threatened primate group.

JANICE HUGHES

Janice Hughes is Founder and CEO of Redshift Strategy and a Founding Board Member of the Global Telecom Women's Network.

LOOKING BEYOND DIGITALIZATION: THE HUMAN FACTOR

Carla Cico, Member of the Board, Allegion

"Digitalization is changing the way we do things", or alternatively, "IoT is changing our daily life": these are the most common statements that we read and/or hear on a daily basis.

At the World Economic Forum 2018 in Davos, Alibaba founder and Executive Chairman Jack Ma spoke at length about some of the key challenges he considered were facing the world, among them being the impact on society of new technologies. "Artificial intelligence (AI), big data is a threat to human beings", he said. "I think AI should support human beings. Technology should always do something that enables people, not disables people. The AI and robots are going to kill a lot of jobs, because in the future it'll be done by machines. Service industries offer hope - but they must be done uniquely." Given these challenges to human autonomy and way of life, what then are the ways we can ensure that humans remain in control of the process of transformation?

We often speak about digitalization, IoT and AI as if they have come down to us from a different planet and have landed on Earth to conquer humans, who then need to react to this invasion and do something to protect themselves.

Rather than find this attitude frightening, I myself find it rather puzzling, and if the stakes were not so high, I would find it also rather amusing. Why? Because we created this so-called "monster" and now we do not seem to know how to protect ourselves from it.

Maybe it is time to put digitalization, IoT and AI in perspective and to think how we can make the best use of these technologies and not become their slaves, either in our corporate or in our personal lives.

Firstly, behind all these technologies lies the most powerful "engine" - the human brain. This gives me comfort because if the human brain has been able to develop these technologies, it should also be able to control them too and use them appropriately in order to make our life easier and more comfortable, while minimizing the negative impacts.

Secondly, we think about digitalization as mainly a "technology" thing, but it is not just this: digitalization is an enabler. It allows us to do and to look at things in a different way, while taking advantage of the many features of the technology, therefore it is not just an end in itself. Having said that, digital transformation will not be successful if it is not driven and supported by the people involved, be they in top management or the workers on the production line.

The reason why many companies fail in the digital transformation process is not because they do not have the proper technology. They fail because they do not have the right people in place and the right organizational culture to deliver it. If we look back in our history, we can see that every time there was a major transformation in industry, some companies were successful while others failed. The reason then, as now, was due to the people involved and their lack of vision.

Digitalization brings a change of culture to any organization: this is why it takes time and why it needs daily attention. Merely introducing a new technology will not work. You can change the technology, and change the process, but without appropriate attention to the human resources involved, you will be doomed to failure. Each person involved brings a unique set of skills and competencies, against which a mere technology and/or a machine cannot compete in a process of continuous disruption.

Therefore, if companies are seen to be failing in the digitalization process, is this because the CEOs and C level executives have suddenly all lost their grip? I do not think so. I think that the failure we see in these companies is more due to a lack of planning and foresight, and a lack of understanding of where these companies are at, that is what technological tools you already have, and what type of human resources you have, as well as what you need.

Once you have identified both of these things, before you look outside the company for help, make sure that you have made the best use of what you already have available: this is already the first step in the digitalization process. Only then should you look at what you need to add: digitalization is expensive and it takes time, so you need make sure you do not waste resources.

My advice for senior managers embarking on the digitalization process is to make a plan and stick to it, making sure that it is not just seen as "your" plan, but that it is adopted by each and every employee as their own plan. If you can bring all of the company on board, the chances are much better that you will succeed.

Technology should be used to enable people to work and to perform their tasks better, it should not be seen as a substitute. No matter how much technology or robotic process automation is used, it is the knowledge and the emotional intelligence that makes humans different from both animals and robots, and these will be the ultimate differentiator between success and failure.

Today it is fashionable when we talk about human resources, to speak about "talents" - how to attract talents, how to keep them and so on. The underlying definition of talent, in most of these cases, is "a person who understands technology". In other words, most companies when they do their admission tests look for people who understand algorithms, technical platforms and so on. Very seldom is there a requirement to show how good the person is in communicating, in problem solving not related to mathematical skills and in interpersonal relationships, among other things.

Maybe it is time to focus more on attracting people to technology with more "human" skills, who are able to interact with others, and able to think independently, able to write a coherent essay and able to extract value from all the data available. Because so-called big data are not useful if you do not know how to interpret them and to use them properly: for this you need to evaluate the human factor.

Education will play a fundamental role from an early age in this process. Instead of just giving kids tablets and smartphones, we should also give them Lego and/or any other toys that will help them to develop the characteristics that are part of the human DNA: sensitivity, emotion and reasoning. Kids should learn to play together in a group to develop their social skills, and not just play alone with their smartphones.

I am a technologist and I support the use of technology, but it needs to be properly used so that it can make our lives better. As leaders in our industry, it is our duty to use technology appropriately, both in the corporate world as well as in the private domain. If we succeed in doing so, we will leave a much better world to the next generation.

CARLA CICO

Carla Cico is an award-winning CEO with global experience delivering outstanding shareholder value within publicly listed companies, PE houses and VC's. Ranked by both Forbes and Fortune Magazines as "One of the Most Powerful Women in International business" and elected the "Best International CEO in Latin Americas Telecommunications sector" by Reuters. Her expertise and skills driving and transforming businesses across multi-sectors including: Telecoms – Brazil Telecom and Telecom Italia; Infrastructure, Property and Consultancy is internationally recognised. Carla currently holds a number of non-executive positions internationally.

UNDERSTANDING WHAT DRIVES THE NEXT GENERATION: HOW TECH COMPANIES CAN LEARN TO EMBRACE GEN Z AND GEN ALPHA

Gema Esteban Garrido, Digital Strategy and Analyst Relations Director, Telefonica

Human beings tend always to look back to the past when we want to see what's coming in the future. As we get older, we may also become more set in our ways, less flexible and resistant to change. We may even look with envy at the next generation and all that they have, and want to be like these young, modern, handsome, "techies".

They were born into the 21st Century - an era where having WiFi is at the base of their Maslow heirarchy of needs[1] , an age where communication with your friends is ephemeral and takes place on an Internet server. They are the famous "Gen Z", or those born between the years 1995-2010., or the so-called Gen Alpha, born in the second decade of this century. These are the younger siblings, or even children, of the famous "Millenials", whom all the big companies have until now wanted to embrace.

If any of you has the privilege of having a child in either of these two younger age groups, you will probably be very interested in finding out more about what drives this new generation of tech consumers, and how it relates to your own experience with your children. Above all, it is important to recognise that your children are not "weird" and that, due to the impact of both scale and globalisation, their behaviour is typical of a very high percentage of the world's younger population today.

They were born surrounded by digital mobile technology, a social network as a way of life and a preference for communicating visually, with images rather than words. But although they have grown up with a Smartphone within reach, they are not necessarily more technically advanced or computer literate than the two previous generational groups (X and Y (Millenials)). For example, according to market and brand research firm Kantar MillwardBrown[2] , 3 out of every 4 new graduates in Spain already have had some type of computer training by the time they start their first job. So, what are the key features that differentiate Gen Z from their predecessors?

INSTANTANEITY

Firstly, Gen Z has a much shorter attention span (of 8 seconds versus 12) than the previous generation. Society has evolved towards what we could call "instantaneity", that is, the value of the immediate. Start-ups are advised to be able to tell their business story in an "elevator pitch", in no more than 10 minutes. Gen Z expects more and more personalisation and relevance of information, while valuing the instantaneous, the fast. The growing use of personalised stories on Instagram or Snapchat confirms this theory. The smartphones of our teenagers are full of little elaborate videos that convey moments, feelings, desires or anger about a part of their life

1 Maslow's hierarchy of needs is a theory in psychology proposed by Abraham Maslow in his 1943 paper "A Theory of Human Motivation".

2 http://www.millwardbrown.com/

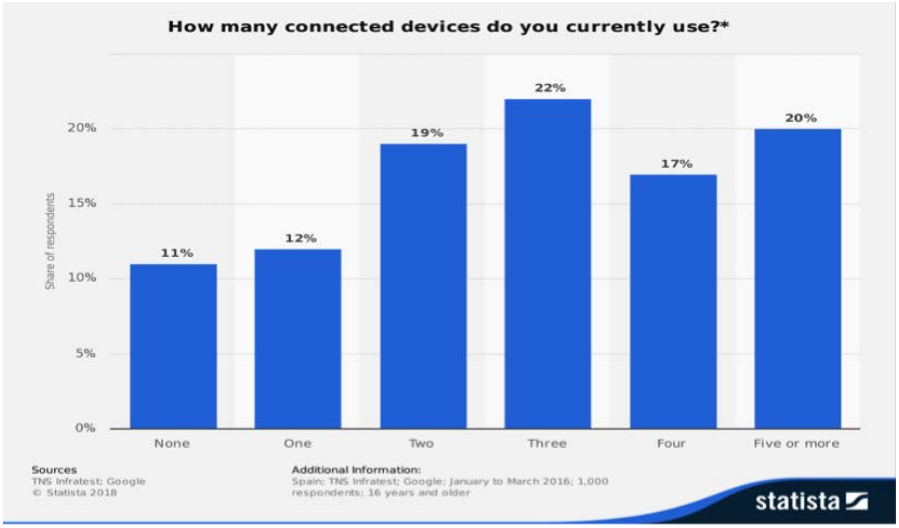
that they share ephemerally with their network.

This revolution began in 2009 when Apple launched the iPhone 3GS with a built-in low-resolution video camera and made it available to millions of users. From then on, the growth of apps for photo editing or publishing content in real time on the Internet was exponential.

Today a young teen could earn a considerable salary directly proportional to the followers that they have if they use, for example, https://www.21buttons.com. This

is a social network that allows its users to advertise clothes and other fashion accessories and receive a percentage of the purchase made by any of their followers in any of the brands that are sold.

The way new generations use, share and consume content is fresh, unprepared, and very real. For example, Everlane, which positions itself as an ethical and trustworthy clothing company, uses Snapchat to bring and customise their products to their customers in a completely new and transparent way: “without cameras, without editing, live. It’s beautiful and it’s the platform for the new generations.” This



fascination with the real and the immediate could explain why sometimes we are surprised when our children are completely fascinated by a youtuber who is simply telling us that he has just got up, or what he is having for breakfast. This generation want doses of reality in abundance, they do not want fakery, they want to experience the real world. The two main passions of Gen Z in terms of creative content are music and humour. They expect well designed experiences coupled with an aesthetic sensibility.

This attitude is in stark contrast with earlier generations who have experienced the world in the opposite way, as part of the great theatre of TV, the media and the traditional marketing and branding of companies.

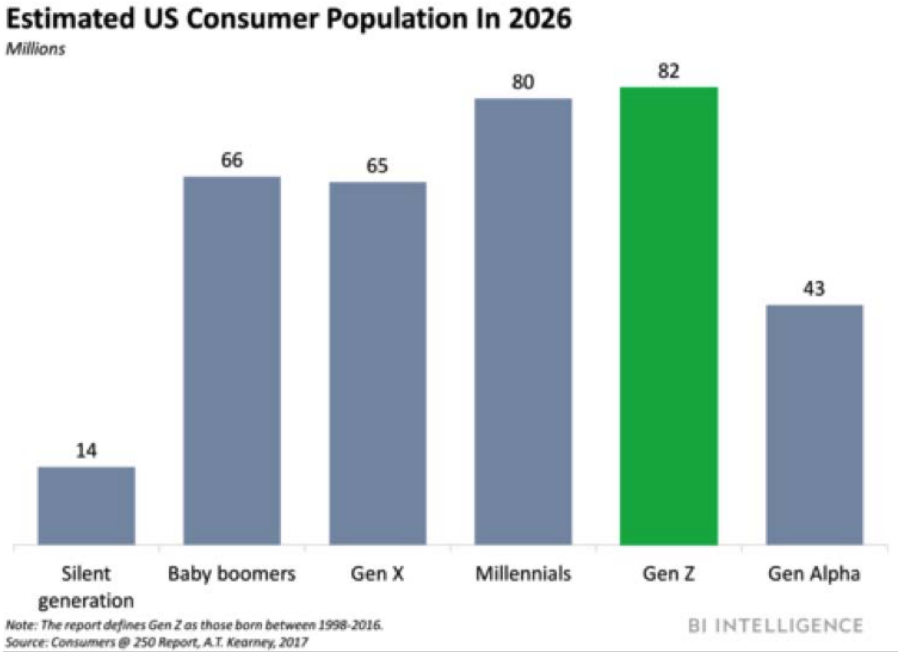
Young people today spend more time consuming media and internet than they do sleeping. Today the average number of digital devices used by each individual is 3.6.

A further differentiator for Gen Z is their preference for visual communications over voice. In 2013, 96% of adults made at least one voice call per week. This percentage has fallen to 75% in 2016. The reduction in the number of voice minutes and calls in the world is dramatic and has largely led to the commoditisation of voice calls and even SMSs, which were once the major revenue generators of the telcos. The new type of communication is visual. Almost two billion images are uploaded daily to the internet, Google alone has 13.7 Petabytes of information.

VALUES & PRIVACY

This newest generation genuinely values honesty and transparency much more than its predecessors. How much importance you place on your own privacy is increasingly seen as an important differentiator. There is an increasingly negative perception amongst this group towards advertising and how intrusive this may be. The use of adblockers is growing, suggesting that they have a low boredom threshold and are much less tolerant of intrusion, both online

and on their mobile. This may be because they perceive the digital world as really their own space and having advertising there is even less welcome than for other generations.



Another characteristic of Gen Z is that they have "social conscience": 60 percent want a job that impacts the world, 26 percent do some type of volunteering and 76 percent care about the impact that humans have on the planet. They also believe in purposeful work. They were born with the DIY culture (Do it yourself), so they are accustomed to solving problems and needs in a personal and focused way. 76 percent of these young people want their working life to be directly related to their current passions and hobbies. 72 percent say they do not intend to receive orders from a boss, EVER. They are therefore willing to start up their own companies and be their own bosses.

CONCLUSIONS

In 2026, most consumers will be Millenials or Gen Z.

Society and companies will have to adapt quickly to the new type of consumer and business behaviour, which I would define as inherently technological. The business model and approach will have to change radically: companies will have to evolve their monolithic management model of the 1980s to a new model, which is more flexible, agile and more fluid and far less structured to attract this talent. We will have to learn how to make them fall in love with us to get them to buy our products and services. We will have to get to them on the Internet to be able to interest them and to let them trust us. The products we provide to them will need to be completely different, based on a mobile platform and more "as a service". In short, we expect significant changes which, as always, will be led by these new generations.

GEMA ESTABAN GARRIDO

Gema Estaban Garrido is a "Digital Executive" with Telefonica. She is an expert in breaking down silos. She has considerable experience in working with technology, understanding and spotting trends, and identifying consumer behaviours to adapt business strategy to new consumer needs. Gema has developed and grown an influential network to position Telefonica to compete effectively by finding solutions in a complex business environment.

SUSTAINABLE DEVELOPMENT GOALS — ROOM FOR COMPANIES TO LEAD

Elaine Weidman-Grunewald, SVP, Chief Sustainability and Public Affairs Officer, Ericsson

When I am talking to groups about sustainability, people often ask me how highly it rates on today's corporate agenda. Simply put, the UN's Sustainable Development Goals (SDGs) provide investors, and therefore companies, with insights into how government decision-making and company behaviour will shape the development of the global economy over the next fifteen years. It also provides a powerful framework for companies to manage their impact on society, and relate to the most important issues of our time.

The Global Goals outline the most significant sustainable development challenges of our time. For the first time, we are seeing a focused outreach to engage the private sector in solving some of these problems. So in addition to raising awareness among consumer and investor bases, Sustainability is rapidly increasing in importance due to a growing awareness that no one government, company or actor can solve these problems alone.

The focus of sustainability is about balancing economic growth with social and environmental priorities, and recognizing the interdependencies among these areas. , economic development with the impact on the environment and the nexus between different areas such as energy, water and agriculture or access to electricity and socio-economic development. The 17 Global Goals are highly integrated, which means progress on all of them is needed to open up all the business benefits they offer, as well as the overall societal gains. For instance, the research shows that effective action on climate change can be linked to achieving the objectives of strong economic growth and ending poverty, while access to affordable energy will help reduce inequality and support sustainable industrialisation in the developing world. At the same time, major investments in infrastructure and innovation will be needed to meet the environmental targets set in the Global Goals.

Sustainability is also rapidly becoming a differentiator for employers who want to be seen as an attractive option for millennials, who are more likely to choose to work for a company that has a vision and goal to support a sustainable and inclusive future. A 2017 poll of some 15,000 employees showed that 77% of employees have increased satisfaction because of Sustainability and Corporate Responsibility and 88% see this as a competitive advantage for the company.

Beyond these reasons, there is a clear business case to support the need for companies to lead in sustainability. In the report Better Business, Better World, by the Business and Sustainable Development Commission, the business case for sustainability is evaluated from a macro perspective. The conclusion of the Commission is that greater sustainability can help business overcome global barriers to growth and deliver trillions in new market value. The report also identifies actions that business leaders can take to capture their share of the prize and set the world on the path to a sustainable, inclusive economy.

In short, the research shows that the Sustainable Development Goals (SDGs) or Global Goals — to end extreme poverty, inequality and climate change by 2030, offer a compelling growth strategy for individual businesses and for business in general. Achieving the Global Goals creates at least $12 trillion U.S. in opportunities in

four economic systems examined by the Commission; food and agriculture, cities, energy and materials, and health and well-being can generate up to 380 million jobs, mostly in developing countries.

There is increasing understanding of and interest in these sustainability-related business opportunities. A focus on sustainability also provides an engagement model internally as well as externally, i.e. both with employees, with customers, investors as well as different societal stakeholders.

For example, at Ericsson, with the SDGs we have explained our ambition to become "a responsible and relevant driver of positive change" to our four stakeholder groups: investors, customers, employees and society at large. In the same poll referenced above, some 86% of employees feel that we are living up to this. We use the SDG framework in our annual Sustainability reporting as well as highlighting proofpoints on our company website of Ericsson technology, advocacy, innovation and expertise, to explain how they are helping to achieve each one of the Sustainable Development Goals, as well as through our social media channels.

Through research together with the Earth Institute at Columbia University in 2015, we highlighted that ICT is a basic infrastructure to not only enable but in some cases accelerate achievement of the SDGs; and just as important for reaching the Goals as investments in electricity, water and transport. It is also a framework to demonstrate our innovation and scale throughout the world with solutions we have deployed in areas such as climate change, internet for all as well as the circular economy.

Importantly, through our focus on sustainability we also learned the importance of top management commitment as well as widespread engagement possibilities for our employees. We created ambassador roles for our Executive Leadership Team at the launch of the SDGs in September 2015, and subsequently linked employee volunteer opportunities to one or several of the Global Goals. Both of these efforts have created momentum within the company and across the industry to support achievement of the SDGs.

Ericsson also helped pioneer the SDGS into the mobile sector. We conducted early research with Columbia University, exploring how ICT could accelerate the achievement of the SDGs as part of the launch of the goals in September 2015. We were the first company to bring the SDGs to Barcelona at MWC 2016, and thanks to the great initiative by GSMA, the mobile industry is now the first entire industry to embrace the goals.

In short the SDGs provide a bold new framework that all companies can embrace, and can contribute to. Whether you support one goal, or all the goals, making the goals relevant to your core business is the most important factor in engaging any of your stakeholders, and the fastest way to make a connection to your bottom line.

ELAINE WEIDMAN-GRUNEWALD

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USING RADIO WITH MOBILE PHONES FOR SUSTAINABLE DEVELOPMENT: LESSONS FROM AFRICA

Heather E. Hudson, Professor Emerita, University of San Francisco,

INTRODUCTION

Radio remains the most widely used medium in much of the developing world. More than 75 percent of households in Sub-Saharan Africa (SSA) have radio sets. In the past decade, cellular network coverage has expanded to include rural areas, and mobile phones have also proliferated, even among low income rural populations. By mid-2017 according to the GSMA, there were 420 million unique subscribers in SSA, equivalent to a penetration rate of 43 percent. Thus many households, even in rural regions, have access to a mobile phone.

Farm Radio International (FRI) helps African radio stations to produce engaging programs with messages to help farmers with techniques to improve agricultural practices and nutrition. FRI has now developed innovative techniques that integrate mobile phones with radio programming to enhance interactivity and farmer participation, and can help to increase adoption and scaling-up of agricultural innovations.

THE CHALLENGE OF FOOD INSECURITY

Some 220 million people in sub-Saharan Africa (SSA) do not have enough to eat; three quarters of them live in rural areas. They depend on farming to feed themselves and to generate income for other needs on land that is often prone to natural disasters such as drought or floods

Despite the development of agricultural innovations that have a clear potential to enhance household food and nutrition security, a major challenge remains to increase the uptake of these practices by smallholder farmers and to scale-up these practices over larger populations and geographical areas. Smallholder farmers' access to relevant and timely information regarding these practices is thus a necessary component to enhancing food security in rural areas.

INTERACTIVE RADIO FOR DEVELOPMENT

Radio programs, often in conjunction with agricultural extension and other outreach activities, have been frequent components of agricultural campaigns. Researchers learned several decades ago that mass media plus audience interactivity was more effective than mass media alone in increasing both knowledge and adoption.

Interactivity has been found to increase learning and adoption of new practices through such techniques as listening groups and classroom activities to accompany

instructional programs, and more recently through interactive technologies such as mobile phones.

For more than 30 years, FRI has developed agricultural content for use by African radio stations, and in recent years has trained African broadcasters to produce and deliver development programs for farmers. Building on this experience, FRI has recently undertaken several initiatives to introduce participation and interactivity in rural radio campaigns as part of a strategy to increase knowledge and ultimately adoption of improved agricultural practices that could increase food security.

Technologies ranging from recordable wind-up radios distributed to community listening groups to interactive voice response (IVR) systems are components of FRI's interactive radio strategies. These innovations enable FRI programs to expand from a one-way information delivery medium to provide a platform for knowledge exchange and discussion among farmers.

The interactive strategy is known as a Participatory Radio Campaign (PRC). The PRC is a planned series of radio programs broadcast to a targeted farming population over a specified period of time (usually about four months), and is intended to help farmers adopt a particular farming practice or improvement. PRCs are designed to engage farmers in the selection of topics and to engage farmers at every step.

A key component is a Community Listening Group (CLG) whereby farmers listen to the programs and discusses them, and provide regular feedback. The CLG provides interactivity through discussion, but also uses mobile phones to provide feedback and interact with the radio programmers and resource people interviewed, such as extension officers. Many of the listening group participants are women, who are often the primary means of support for their families.

ENHANCING PARTICIPATION THROUGH MOBILE PHONES

FRI has developed a suite of tools called Uliza (meaning "to ask" in Swahili) to both simplify and increase interactions between audiences and broadcasters. With Uliza, listeners can sign up for specialized services like SMS advisories or automated weather forecasts and can share feedback and ask questions. The results are displayed for broadcasters in real time on a digital dashboard. Uliza can help broadcasters gather important audience information to better understand the impact of their radio programs and how to improve them without spending time and money in the field.

Mobile subscribers typically using "pay as you go" pricing models to prepay for service in small increments. Rather than paying for SMS or voice calls, users may call and let the phone ring once and hang up, known as beeping, to signal a message to someone they know. FRI has adapted this technique as a means for farmers to provide feedback about radio programs. An example is Beep-2-vote, in which a broadcaster

might ask listeners to vote on what topic they want to hear about the following week by beeping a different telephone number for each choice. The broadcaster can tally the votes using Uliza, and announce the winning selection on the air.

Since some farmers may be illiterate and unable to type an SMS, another feature that can be added to beep-2-vote is voice messaging. Farmers' opinions can be recorded and then played on the radio using the "Beep2LeaveVoice" message service. This service has also been used for buyers and sellers, who leave their contact details, which are then aired during the radio broadcast.

Low-cost software is used to build a database of mobile phone numbers. The station can organize its contact list using a web browser on a computer and can set up call outs with auto-dialing, such as reminders to listeners 30 minutes before a program. While the station must pay for the SMS messages, they can be a cost-effective means of encouraging listening and participation.

Interactive Voice Response (IVR) systems can be used to provide several forms of interactivity. Listeners can call a number, hang up, and be called back by the system so that they do not have to pay to opt-in for future information. IVR systems can also be designed with menus for polls or quizzes. The listener can call the IVR number, hang up, and receive a return call offering prompts to select choices from menus.[1]

THE IMPORTANCE OF INTERACTIVITY: CASE STUDIES[2] : INTERACTIVE FARM RADIO SERVICES IN EAST AFRICA

An interactive radio project was designed to help small-scale farmers to increase production of nutritious food in the context of a changing climate. The fifteen-month project was carried out in Ethiopia, Malawi, Tanzania, and Uganda. A radio station partner in each country was trained in the PRC approach. A participatory model including listening groups and mobile phones was implemented to provide an opportunity for farmers and researchers to interact to discuss and address agricultural challenges together

As might be expected, listening to more radio programs was associated with higher scores on the quizzes about the innovations presented in the programs. Those who listened to half of the programs scored more than 45 percent higher than those who did not listen to any programs, while those who listened to all the programs scored 68 percent higher on the knowledge quizzes.

Listening to the PRC also had a significant impact on the number of households implementing at least one of the promoted practices in Malawi, Tanzania, and Uganda. In Uganda the percentage of listeners implementing at least one practice was 2.7 times the percentage of non-listeners, while in Tanzania it was 2.9 times the percentage of non-listeners. In Malawi, 1.9 times the percentage of listeners compared to non-listeners implemented at least one promoted practice,

Overall, evaluation results indicate that the mobile phone-enhanced participatory radio was effective at increasing awareness and at facilitating farmers' decisions to adopt the promoted practices.

1 For more information, see www.farmradio.org

2 For more details on the research methodologies and findings, see Hudson, Heather E., Mark Leclair, Bernard Pelletier, and Bart Sullivan. "Using Radio and Interactive ICTs to improve Food Security among Smallholder Farmers in Sub-Saharan Africa." Telecommunications Policy, August 2017.

VITAMIN A: ORANGE SWEET POTATOES

Vitamin A deficiency is a widespread health challenge in Sub-Saharan Africa (SSA) that can lead to anemia, decreased growth rate, increased vulnerability to infections, and reduced childhood survival. As many as 43 million children under the age of five in SSA are considered at risk for vitamin A deficiency.

Orange foods are rich in beta-carotene, necessary for vitamin A production. In many parts of SSA, sweet potatoes are a staple crop for farming families, but the traditional African sweet potato is pale yellow with a low content in beta-carotene. New varieties of African sweet potato known as "Orange Fleshed Sweet Potato" (OFSP) have been bred that contain much more beta-carotene while also addressing consumers' preference for flavor and texture.

To scale-up the production and consumption of OFSP, FRI launched a three-year initiative using participatory radio and mobile phone strategies in Burkina Faso, Ghana, Tanzania, and Uganda. In Ghana and Tanzania, scores on knowledge quizzes about OFSP were more than twice as high among listeners as non-listeners. In all four countries, the percentage of listeners who cultivated OFSP was significantly greater than the percentage of non-listeners. The increase in Ghana was greatest, with 8.9 times the percentage of adopters in listening vs. non-listening communities, followed by 2.3 times the percentage in Tanzania.

The percentage of listeners who consumed OFSP in their household within the past week was also significantly greater among listeners compared to non-listeners, with consumption highest in Tanzania and Uganda. Thus, the combination of radio plus interactivity using mobile phones increased awareness of orange sweet potatoes, and more importantly, a significant increase in both cultivation and consumption of these Vitamin A-rich crops.

CONCLUSION: MOBILE PHONE INTERACTIVITY CONTRIBUTES TO ADOPTION

The findings of FRI's participatory media projects show the effectiveness of mobile phones and software that can be used for feedback, comments, dissemination of additional information on demand, and aggregation and analysis of user data. These techniques could be highly relevant for increasing awareness and adoption of innovative agricultural practices in Sub-Saharan Africa. They also appear promising for other development sectors such as health, education and community development, and for other developing regions.

HEATHER HUDSON

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PAYING IT FORWARD WITH THE MULTIPLIER EFFECT

Vicky Sleight, Chief Perfect Officer, Perfect Limited

So how do we move forward in this complex world? We need to create culturally competent and globally inclusive workplaces. We should all be able to work in environments where everyone can thrive, but to do that we need to lead the way and create them.

Despite the consistent efforts of many enlightened leaders in the tech sector, including the members and supporters of the GTWN, it has become clear that the lack of diversity in the industry is a multi-faceted challenge that will not be easily fixed. We all have a part to play in the new strategies and approaches that are needed. I have always sought out, supported and created new ways to implement programmes that not only increase awareness but also aim to accelerate the female digital economy.

My driving force and commitment to improving diversity and inclusion stem from my own experiences in learning how to thrive as a female leader both within the corporate arena and since setting up my own consultancy business. I have found that one of the greatest supports for my career and ambitions has been found with both the women and the men who have sponsored and mentored me. These are the ones who believed in me, helped me to understand my own strengths and to build upon them. They have also helped me recognise that the feeling of being an imposter is part of a phenomenon that many people struggle with every day and is a barrier that can be addressed.

These sponsors extended and showed their faith in me and introduced me to industry leaders. They helped provide the platform to not only advance my career but to do it with impact. I will be forever grateful to each one and this has been my driver to #payitforward -to celebrate the leaders who have shaped my past to my present, and an opportunity to spotlight and sponsor new pioneers who are building an even better future. These are actions I am proud of. I love to see a diverse range of young, inspirational future leaders, being happy and successful.

Whilst we still have our work cut out to improve diversity and inclusion in our industry, there are many good initiatives that are being undertaken in many areas that, taken together, will make progress happen. One perfect example is the Connected Women initiative of Cisco. I was fortunate to be part of a very inspiring discussion forum organised by Cisco at Mobile World Congress in 2016, at which the brilliant women leaders at Cisco proposed an initiative on how we could all, as individuals and leaders, move the needle on diversity in tech. Imagine the impact if every single one of us, sponsored an inspirational, diverse pioneer and helped them to advance their career? The 'Multiplier Effect' was born and launched at MWC in 2017 by Cisco CEO, Chuck Robbins. I am proud to support this initiative and to promote it as something that we should all want to take industry wide. It aims to create and build a full pipeline of diverse talent that continues to grow and multiply.

Every single one of us can participate and take an action. To sponsor someone means to take an active part in their career advancement. To provide advice, guidance and feedback, introduce them to the right leaders and share best practices. This isn't mere mentoring, it's a focus on helping someone achieve their goals and career ambitions more quickly than would otherwise be possible. What is amazing is that this movement it is already multiplying. So many leaders are taking a stand and signing the Multiplier Effect Pledge. I would

encourage you to join us at http://multiplydiversity.com.

To demonstrate our commitment to this initiative, at Perfect Ltd we will be continuing with this approach and incorporating the Multiplier Effect Pledge into our programme to support diversifying talent. I am very proud that In the UK on 15th March with the support of Ricoh UK we are launching a global leadership development programme to Lead Braver, Stronger Smarter with Perfect and Mischief Business Engineering. The aim of the programme is to overcome inherent barriers to leadership and personal success caused by the Imposter Phenomenon.

The Imposter Phenomenon has recently been highlighted by Melinda Gates[1] as a major challenge to achievement of full potential in the tech sector. It is something that affects many of us – both women and men - and has been the subject of academic research for more than 40 years. Many of us, I am sure, know that illogical but very real feeling that sometimes overcomes us of somehow being an 'imposter' who will be found out sooner or later. It is a condition that is preventing the advancement of highly skilled leaders and diverse leadership teams. Our targeted new programme will couple lessons and approaches learned from research into the imposter phenomenon, with the revolutionary framework of The GC Index® to help participants radically rethink how they can nurture their own key talents for greater career impact. Never before has empirical research into the impostor phenomenon been melded with such a powerful leadership framework and applied with a commercial lens.

In my opinion, the key to long-term success in achieving diversity targets in the tech sector is to transform individual action into collective power. We all need to contribute and understand how you can make an impact as a leader and as part of a diverse team in a complex world. Always remember to #payitforward - Whose success will you make your business starting from today?

1 https://www.linkedin.com/pulse/how-tackle-impostor-syndrome-new-year-melinda-gates/

VICKY SLEIGHT

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A proven thought leader and expert in diversity and inclusion within Tech through her development of successful initiatives such as GSMA Connected Women, Vicky has formed her own consulting company - Perfect Ltd. Through this she is continuing her work within the industry to further clients' business development and diversity and inclusion strategy's. Also part of the network of GCOlogists www.theGCindex.com. The GC Index® is a radical re-think of how organisations should identify and nurture key talent in the future; identifying leaders — game changers - at all levels in organisations who have the power to make the greatest difference.

www.theperfectlimited.cpm
www.braverstrongersmarter.com/leadershipprogramme/

CASE STUDY: SOLVING THE STEM SKILLS CHALLENGE

Dr Terri Simpkin, Managing Director, Mischief Business Engineering, (UK & Aust.)

I have spent a good deal of my professional time over the past two decades sitting on panels or delivering key note sessions on the status of workforces and the skills agenda. While the industry focus changes, by and large the topic and challenges remain the same: not enough people, mismatches of skills and lack of diversity.

My focus recently has been on the burgeoning data centre sector. Few people really know what magic happens inside data centre facilities or indeed, how enormous the sector is and so I have come to truncate the explanation of what it is and its purpose by suggesting "it's where the internet lives." As far as an industrial sector goes, it's about as critical to our daily lives as it gets. It is becoming as important to our lives as any other utility, but we tend not to see the same level of hysteria when there's a short-term power cut than if our wi-fi goes on the blink. From traffic management systems to Twitter and from banking to emergency services dispatch, all that internet traffic goes through a data centre somewhere.

Given the importance of data centre activity to our everyday lives, it's a little concerning that barely a week goes by without a data centre industry event, think tank or trade publication declaring that skills gaps, capability shortages or talent wars are ravaging the sector as a by-product of the general STEM skills shortage. The message is clear: it's hampering growth and putting at risk the critical infrastructure which underpins the digital economy.

Whilst engaging in presentations on the topic at events across the globe I gaze out across the audience and the picture is the same. A sea of engaged, somewhat frustrated and sometimes bewildered men. Usually white men, usually employed in largely middle-class occupations often nearing the maturity of their careers.

Without wishing in any way shape or form to disparage the character of the audience population, its uniform nature is cause for concern. Indeed, the sector itself has been doing a bit of navel gazing of late suggesting that the industry is recognising that perhaps this lack of diversity is a growing challenge which governments and industry have failed to address adequately over the past 15 or 20 years. There is also a growing sense that the STEM skills shortage is an economy-wide crisis. In fact, the rhetoric surrounding difficulties in finding skilled labour across a range of sectors has been decades in the making and largely untouched by a logical estimation of the worth of the diversity agenda.

But while the issue of broadly based skills shortages and capability mismatch is now well known, resolutions (particularly those resting on broadening out the diversity of the data centre workplace) are thin on the ground and what initiatives are in place are failing to keep pace with the rampant demand for people and their skills.

Indeed, attend any industry trade show or conference and any number of good, often repeated, ideas are put forward with well meaning enthusiasm or disheartened frustration. More often than not, ideas from the floor suggest training more people, better targeted university/ vocational curriculum and 'getting into schools'. This is often followed up with a lament suggesting "I'd love to hire more women, but they don't apply".

A raft of published research reports on skills shortages across STEM industries, illustrate clearly that

industry players should realise that the skills gap is a not a future matter despite the narrative. It's here now and has been for at least a decade. A 2016 Manpower report suggests that globally 40% of all employers report experiencing skills shortages, the same as in 2006. The data centre sector, sadly, is at the back of a very long and entrenched queue for the attention of potential entrants to the sector and career changers.

So, what is going on? Why is managing out of a skills and labour crisis so difficult given that is seems to be a no-brainer that diversity is key to the response? Well, let's look at the data centre sector as a case study for why simple resolutions won't cut it.

It's not just about skills.

Sadly, the issue of skills and labour shortages in STEM is a much more confounding beast than these general and piecemeal suggestions can cope with. If it were a relatively simple matter of putting more people through training the situation would be sorted quite quickly. Structural factors such as an aging workforce, a global market that makes it relatively easy for people to move across borders and traditional workplace structures are impeding the effort to get people in general, and those from non-traditional backgrounds in particular, into the data centre sector.

Retirement rates, a lack of succession planning and labour turnover contribute to a challenging human resources landscape. The sector is unable to train enough people to fill existing vacancies and keep pace with vacancies generated by continued, unabated growth, technical innovation and market complexities.

This situation is compounded by a mismatch in expectations of hiring/line managers and those charged with managing recruitment. It has been reported anecdotally that this disparity of role/person expectation may well be overlooking people who could do the job, but are falling foul of out-dated competency frameworks, implicit bias, recruitment wish lists (i.e. skills demands that are unrealistic or unwarranted) and slow recruitment and selections cycles.

It's such a vibrant sector, why wouldn't people want to work here?

Put simply, it's not on the job seeker/career changer radar.

The data centre sector has an image problem. Potential applicants (from entry level to career changers) have only a blurry, if barely perceptible image of what the sector does and can offer. It's a bit of a long-standing point of amusement, that most people currently working in the sector, particularly those with some longevity of tenure, have fallen into it by a mysterious process of luck.

Many of the industries from which the data centre sector has emerged (for example, IT, engineering, facilities management, communications) have been bemoaning difficulty in finding skilled people for decades. The problem has simply transferred itself into the data centre sector and it is now competing with those well established and better-known sectors for talent.

So too, there is a much clearer picture of prospects and expectations in say, traditional mechanical engineering industries such as manufacturing so it's little wonder that the data centre sector is well and truly behind the labour attraction eight ball.

The sector finds itself competing in a very crowded market for capability with a poorly articulated employer brand. Why would talented people who already have a good understanding of where other jobs exist, take a risk on a sector that is largely 'dark' and generally little known. In a frantic race to secure talent where traditional industries are already two decades in front, hoping that people will fall into a data centre by accident is not a good recruitment strategy. A proper response demands a global, sector wide, branding and awareness raising campaign that clearly appeals to traditional as well as socially diverse labour pools.

'We just need to get into schools'

As with the employer brand

issue, the data centre sector is lagging behind the curve on this one. Most other sectors have a well-established schools strategy. In a noisy landscape of cohesive, tested and funded schools strategies, sectors like manufacturing, retail, health and the emergency services are crowding out the data centre sector.

Sadly, while it makes everyone feel a bit warm and fuzzy, sending a well-intentioned data centre employee, manager or leader into a school for a one off talk about careers is a great idea but it's not scalable. Nor is it 'sticky'; there's more to a consolidated schools agenda including support materials, site visits, visual and learning collateral. In an environment where the UK needs over 1.8 million engineers alone by 2025 , doing a few schools visits is laudable and part of a broader suite of initiatives but it simply can't reach enough pupils with enough impact to make a difference.

Again a well coordinated, approach in line with a concerted sector branding initiative is warranted. Rather than reinvent the wheel, organisations should seek to partner with those already in the game. There are lots to choose from. Pick one (or all of them!) and invest some time and energy in creating a buzz about the sector, particularly for girls and low socio-economic job seekers who may not necessarily be looking at other STEM industries.

Lack of diversity means a lack of innovation

Like most sectors in STEM industries, a lack of a diverse workforce is doing the data centre sector damage. The sector is built on innovation, new thinking and game changing technical advancement; a lack of diversity in all forms is unlikely to delivery competitive advantage.

Given that broadly speaking around 9 per cent of the STEM workforce is women the data centre sector follows suit with a rather dire lack of women across the sector. Couple this with a broader limited social diversity and an aging workforce and the future looks a little bit grim. While it's clear that a skills and capability shortage is contributing to rising remuneration as organisations pay over the odds for talent that's in short supply, the pipeline of talent into the sector and clear succession planning to meet the inevitable raft of exits from the sector as incumbents retire is a pressing issue.

Further, more strategic and coordinated interventions are needed in order to attract more talent, and also to retain it. Even when women are recruited to STEM based jobs, there is a high rate of departure. Managing out implicit bias and changing ingrained 'lad' cultures in organisations is a necessary but insufficient start. Developing leadership approaches that encourage a diverse and inclusive workforce is imperative. Engendering an organisational culture that is supported with inclusive recruitment, selection, succession and professional development structures requires a more forward thinking set of leadership approaches. This doesn't come easily or quickly, but if the sector is to meet the challenges of today as well as tomorrow there's little option.

It's a multi-faceted, wicked problem

It's been two decades since Steven Hankin of McKinsey and Co first identified the term 'the war for talent'. Demographic, organisational, change related and workforce structure factors have conflated since then to deliver a set of challenges that require a consolidated response that's smart and quick. The data centre sector would do well to devise and implement a strategic and multifaceted approach to the wicked problems associated with filling vacancies and meeting a more inclusive workforce imperative to meet the sectoral growth that is currently experienced, and to address the challenges we expect in the future.

DR TERRI SIMPKIN

Dr Terri Simpkin is the MD of Mischief Business Engineering (UK & Aust.). The flagship programme is BraverStrongerSmarter, a programme of activities to identify and diminish implicit bias in the workplace and imposter phenomenon in individuals. She has recently stepped down from her role as Head of Department, Leadership and Management at Anglia Ruskin University; a global remit covering management of the academic department responsible for UG, PG, research and commercial activity. As an advocate of portfolio career, Terri is also currently the Higher and Further Education Principal at CNet Training and senior lecturer at Anglia Ruskin University.

GLOBAL TRENDS

THE INTERNET OF THINGS: REFLECTIONS ON THE OPPORTUNITIES AND RISKS

Alicia Asín, CEO of Libelium

The potential for innovation and growth that IoT brings to any sector and, in particular, to smart cities is undeniable. We are experiencing the transition into a new era connecting the physical world to the digital world. Our vision of an intelligent world, with sensor-filled cities, allows us to imagine more efficient, habitable, safe and resilient towns thanks to the new digital era.

In terms of benefits, smart city technology is helping to improve citizen security, increase the efficiency and management of public infrastructure and promote transparency in government decisions, among many other advantages.

There are many real examples in many cities around the world that are developing projects with Libelium technology for different purposes such as monitoring pollution, identifying free parking spaces or controlling the environmental quality of roads, to name just a few examples. In all of these cases, technology is helping to promote transparency in government decision making and thereby enhance democracy.

If a public official can collect real data on the city's pollution rates that support his decision to restrict traffic, he will be able to better communicate to citizens the reasons behind this action. In this way, citizens will be able to evaluate the merits of the decisions taken about their lives and their communities based on supporting data, rather than mere opinion.

Up until now, the way we have judged our politicians is highly conditioned by their statements or those of their opponents. However, in an interconnected world,

where citizens have open and contrasting information about their city, this judgement can be more objective. Furthermore, citizens will benefit from the improvement in their quality of life thanks to applications that develop mobility within cities, such as intelligent parking systems. Other benefits will result from technologies that improve safety by detecting the environmental quality of roads and highways, or that guarantee the quality of the air they breathe, or indeed the water they drink.

On the other hand, we need to temper this very positive view of the benefits of IoT with due consideration of the risks to the individual and society associated with the ever increasing use of digital technology. For example, the apocalyptic vision brought about by the Wannacry virus attack shook many people's views of the technology. The virus not only affected more than 200,000 computers around the world but companies worldwide had to stop their business activity: among those affected, FedEx interrupted the delivery of goods in the USA, European energy companies collapsed and the machines selling train tickets in Germany stopped working.

We must recognize that security is becoming an inherent risk of IoT. The reality is that as the number of Internet-connected devices increases, the risk also raises exponentially. The forecast is that by 2020 we will have 6 objects per person connected to the Internet, which means 50 billion devices in total.

But the risk associated with having so many devices connected to the Internet and the potential for compromising them is not the only issue. The risks to personal identity and security of personal data are also of great concern, as evidenced by the NSA scandal when personal information was stolen and thousands of users were spied on. As a result, German Prime Minister, Angela Merkel, swapped her iPhone for a Blackberry to protect her privacy. She is the only person I know of who decided to do this. But the question is, do you need to be the German chancellor to worry about your privacy and security?

If we are honest, we currently consider privacy to be a secondary issue if we can get something in return. In fact, there are insurance companies that are offering premium policies if you allow them to install a device in your vehicle that measures the risk level of your driving style. But, at the same time, by signing the contract, you're selling the information about where and when you go everyday.

The same applies to smart TVs. Everyone has one at home but no one reads the 40 page privacy policy that is included in the user guide. And we should read this, because there are warnings such as "do not say anything confidential in front of your TV, you could be recorded". In the end, however, for many people convenience trumps privacy. When we speak about the importance of protecting privacy, we need to be honest with ourselves because by our actions and choices we are relegating it to secondary importance.

Complicating matters further, we all have our own opinion about the risks associated with the security of our electronic devices, the privacy of our personal information, the information we are exposed to, or the impact of robots on employment. In many cases these opinions may be in stark conflict with each other.

For example, in a survey conducted by a brand of self-piloting vehicles to potential customers, the majority said they preferred safety systems that prioritized pedestrians; but those same people also said they were not interested in buying that car if it was programmed with that algorithm.

In other words, we have a dual view of technology because of the speed with which the technology is changing, as are its uses and applications. Many of us are struggling to adapt and to balance the risks and opportunities presented by new applications of technology. Thus, if a country restricts the use of drones, it will be preventing terrorist attacks but also restricting the potential use of these devices for sending humanitarian aid.

In summary, digital technology is a tool that has brought about enormous benefits to mankind, including by stimulating economic growth, creating jobs, increasing demand, improving production processes and stimulating the creation of new business models.

The alternative, for anyone who believes the risks of the digital revolution outweigh its opportunities, is to retreat from the modern world - without risks, without worries, but of course, also without access to the Internet and its benefits.

If, on the other hand, we embrace IoT and focus our energies on how to manage the risks involved in its application, we will undoubtedly ensure that the legacy we leave from this digital revolution will be one of great progress and well-being for everyone.

ALICIA ASIN

Alicia Asin is leading the change behind IoT at Libelium, which provides the tools that solution providers need to connect sensors on industrial IoT-enabled devices to the cloud for applications like factory automation and automotive use cases. Asin has helped Libelium build out its Meshlium product - which connects sensor networks to the cloud - and has worked to focus in on smart city solutions.

Alicia Asín is the CEO and co-founder of Libelium, a Spanish IT company that has created "Waspmote", a wireless, modular and open source sensor hardware platform for the Internet of Things (IoT). Alicia is a computer engineer focused on how the IoT can change our world, starting with Smart Cities and Pre-
cission Agriculture, among other applications.

STAYING AWARE FOR SUCCESS

Ingrid Silver, Partner Reed Smith and GTWN Regional President, Europe

Having worked closely with the telecoms sector for over two decades, I have witnessed the steady, yet quite remarkable, transformation which the industry has undergone. From an industry which primarily supplied fixed telephony voice services has emerged a fantastically diverse ecosystem embedded in almost every aspect of our daily lives.

We have truly entered the age of the 'smart city', the Internet of Things ("IOT"), AI, VR, sophisticated teleservices (including tele-health and tele-education), cleantech, fintech and every other sort of tech. The possibilities, and indeed the opportunities, are endless. Equally, they will give rise to a host of new and challenging legal and regulatory issues. With this in mind, I have picked out some of the key legal and regulatory areas which those of us operating within this exciting ecosystem should be aware of throughout 2018 and beyond.

5G ROLLOUT

For modern technology, such as cutting-edge VR and AI platforms, to function, fast, reliable and high capacity connections are a must. However, before beginning to deliver next generation, super-fast 5G connection, the key players first need to secure the necessary spectrum. In the UK we have already seen two legal challenges to UK regulator Ofcom's proposed caps on the next round of spectrum auctions, for the 2.3GHz and 3.4GHz bands, both of which have the capacity for use with 5G. Major telecoms providers, Three and EE, both filed separate legal challenges, with the former arguing that Ofcom needed to impose stricter spectrum caps, whilst the latter argued that the regulator should not intervene at all. For now at least, the court has ruled in favour of the regulator.

Across the pond, a different debate around 5G is underway. A recently leaked memo from the Trump administration shows that the government is considering building its own 5G network, despite progress already being well underway for its commercial rollout as a result of long term investment from players such as Verizon Communications and AT&T. This proposition has been met with resistance by industry groups and the Federal Communications Commission ("FCC") alike, both of which have expressed concerns in respect of the proposition.

GETTING GDPR READY

With the General Data Protection Regulation ("GDPR") coming into effect on 25 May 2018, businesses operating in the European the media and telecoms ecosystem will no doubt be working tirelessly to ensure their compliance. A data breach not correctly managed can attract fines of up to or 4% of global revenue or 20 million euros under GDPR. This level of penalty is enough to make the board of any business sit up and listen.

The impact of GDPR will of course not only be limited to heightened obligations around taking steps to notify the authorities, and customers, in the event of personal data breaches. Businesses which collect and store information for reporting and marketing purposes will now need to be ready to delete or 'anonymise' that data which they hold. Processes will need to be implemented or reviewed to ensure that consumer information is collected only with explicit consent. In addition, the appointment of Data Protection Officers will become mandatory for data controllers or processors where the regular and systematic processing of personal data is done on a significant scale.

Moreover, with network infrastructure already in place, and bucket loads of experience in finding connectivity solutions, the TMT industry is ideally positioned to lead the way in delivering large

scale IOT projects. The concept of IOT does however raise a host of very significant data privacy concerns. Companies need to consider issues such as how meaningful consent can be obtained when trying to present a seamless user experience? How can they ensure ownership of data collected in public environments? How can they best protect their networks from external threats? If they successfully negotiate these tricky topics, companies operating in the telecoms, media and technology space will be well positioned to form the cornerstones of the smart cities of the future.

PRIVATE BUSINESSES. PUBLIC BENEFITS.

Cities are a unique mix of private and public spaces, with underlying assets being owned by both public and private stakeholders. With internet connectivity likely to play an increased role in the delivery of public services in the coming years, new possibilities will open up for public-private sector collaboration. The connections provided by the telecoms industry will be essential for digital delivery of previously analogue services, and engagement with the public bodies which are responsible for the delivery of those services will be essential.

Deals of this kind will require creatively structured agreements to achieve the desired result, and they will give rise to a range of challenging questions. Who will own any data which arises out of the collaboration? Do public procurement processes have to be followed? How will the services be funded? The list goes on.

HOPE FOR THE BEST BUT PREPARE FOR THE WORST.

As we become increasingly reliant upon digital networks and interconnected sensors, we also become more vulnerable to cyber-attacks and technological malfunctions. All participants in the ecosystem should seek to understand their potential exposure where relying upon technology, and put in place contingencies in the event of its failure. Non-digital, manual alternatives should be considered - something which may seem alien to companies which are led by those who have known nothing but a digital age. Additionally, where there is interdependency on multiple parties in a network it should be carefully considered how responsibility between those parties is contractually assigned when things go wrong.

CLOSING THOUGHTS

With the speed at which modern day businesses move, and the complexity involved in their operations, it is essential that they do not lose sight of the regulatory context in which they are operating. Whilst the focus for businesses will often be on pushing the boundaries of innovation, being conscious of the risks associated with any new project is important. Thinking about how those risks they can be managed through contractual means, and through an awareness of the regulatory context, will go a long way towards helping businesses succeed in the digital, connected, data driven future we are moving towards.

INGRID SILVER

Ingrid Silver is a partner in Reed Smith's global Entertainment and Media Industry Group and a digital media, broadcast and communications transactional and regulatory expert.

DOING BUSINESS IN ASIA: WHAT YOU NEED TO KNOW

Dr Gabriele Suder, Professor and International Trade Consultant

European companies often find the thought of doing business in Asia at once both stimulating and challenging, given its multi-faceted nature. With the increasing emphasis on regionalisation of trade and international investment, and the increasing number of bilateral free trade agreements in existence or on the horizon, I am regularly solicited by my Europe based clients about the secret of being successful in Asia.

Of course, each case requires in depth analysis and insight into the particular product or service market that the client is wanting to enter. However, by careful observation of the political and economic circumstances driving both national and regional policy, we can extrapolate some key trends which will have the greatest impact on Asian and Asia Pacific business activity.

Within the region, growth rates are expected to continue rising in 2018, and regional business leaders forecast significant international market expansion activity in the short and medium term. Here is a list of some of the most impactful trends and challenges from 2017 that shape cross-border market expansion and international business strategy:

1 China's one belt policy (fourth year of China's Belt and Road Initiative, linking Asia, Africa and Europe), expansionism and international networks of business, trade and development deals: In 2017, they have resulted, amongst other, in a rebound in business confidence in China and across most of Asia, accompanied by increased consumer spending and growing capital expenditure. (One of the notable exceptions however is Taiwan.)

- What it means for 2018 business in/across Asia: Ongoing investment strategy will need to adjust to uncertainty around political agendas, geopolitical risks and around the RMB to US exchange rate; diversification strategy.

2 Risks are emanating from North Korea's regime, coupled with the volatility of the US foreign policy: This has led to efforts of geopolitical consolidation in the region of the Asia Pacific:

- What it means: There is a need for extensive use of international business intelligence and expertise to strengthen resilience against uncertainty; increase agility across regional foreign direct investment.

3 Complex India: India has again proven to be a particularly complex environment for foreign direct investment due to its unpredictable regulatory landscape, and often differing rules from one location to another. In addition, Asia's third-largest economy suffers from uneven results of Prime Minister Modi's policies, such as the recent example of the goods and services tax (where India's entire services sector was hit by an increase from 15 to 18 percent).

- What it means: Businesses will need to Increase their investment in R&D and data centres as well as tap into the components market. The country's recent success in demonetization shows its ongoing, exciting digital potential. The Fintech sector is booming; more innovative start-up M&A activity is imminent.

4 Japan has been making an important effort to be more international, more diverse, more welcoming to foreign direct investment (FDI). Balancing many economic challenges, including

the level of national debt and the aging economy, Japan has secured free trade pacts with 10 Pacific Rim countries and with the European Union, in the quest to reposition itself more strongly and firmly into the global value chain.

- What it means: Newly unlocked business and funding opportunities are up for grabs. Importing is getting easier. In addition, companies need to watch what deals Japan will get from its talks with Russia. Japan desperately needs to open more export markets, and attract highly skilled foreign labour along the lines of Singapore or Hong Kong: There are significant labour mobility/ expat opportunities. Also, the level of skills in advanced IT (esp. Artificial Intelligence) capability provides a strategic opportunity to investors.

5 Indonesia, Malaysia and Vietnam: Indonesia is the largest of the ASEAN economies, yet red tape which hampers investment needs to be reduced further. On the positive side, Indonesia has digitalised some of its business –focused administration (e.g. company name registration) which was well received by investors. In Malaysia, capacity building and market readiness will pay off. Both countries are amongst the top APEC countries for increasing FDI, together with Vietnam (which hosted the APEC meeting in 2017). In Vietnam, international trade prospects have been strengthened by the introduction of protections for minority investors and an electronic customs clearance system. Vietnam skilfully looks after its interests (and those of the region) by balancing those of APEC co-members China and USA.

- What it means: There is recognition in all three countries of the need to increase their attractiveness for inclusion in global value chains, while there is continuing industrial capacity building. Both infrastructure investment and resources investment are welcomed. Watch out: first come, first served!

6 The overall region's role in global value chains: The region's interdependence leads to more high value participation domestically and regionally, and greater inclusion of peripheral economies in trade relationships.

- 2018 trends will include increased automation, AI, and upskilling. Regionalised business leaders will emerge (as opposed to either local or global active players). The establishment of the APEC Global Value Chain (GVC) Partnership Platform has been proposed by China and Indonesia to boost agenda-setting on policy dynamics, business development and academic frontier researches, and to customise capacity-building programs to move up GVC.

7 Integration- Amongst the many new Free Trade Agreements (FTA) in the region, 7 are intra-APEC, while another 14 were also signed in the region that involve at least one APEC economy. In 2000, there were only 5 pluri-lateral FTAs notified to the WTO, but in 2017 there were 38. Where bilateral agreements across and with non-Asian countries are concerned, the number increased from 9 to 97 FTAs in the same time period. Despite obvious political and cultural tensions, trade & investment links flourish. The golden triangle of China, Japan and South Korea now has much improved trade and investment connections, accounting for a quarter of the world's output of goods and services. For example, Japanese investment in China has been rising rapidly (compared to a decline in 2016). APEC has strengthened its engagement with the private sector and promotes joint policy and regulatory approaches for industry, e.g., common standards addressing the safety of e-vehicles through design and performance requirements. At the same time, ASEAN's 2017 trade figures between China and ASEAN's Big Five of Indonesia, Malaysia, Philippines, Singapore, and Thailand have increased by 500%.

- What this means: Considerably improved cross-border trade

and investment conditions, which will allow for greater choice in business location and high values of commitment and investment satisfaction as measured by the Investment Model Scale.

8 Life after the TPP: Despite the US Government's withdrawal from the Trans-Pacific Partnership (TPP), the other countries in the proposed trade agreement have kept on negotiating and are using the opportunity to press their own trade agendas. In addition, the US's new military engagement strategy and changed diplomatic rhetoric with the east have led to a rapid realignment of power in the region.

- What this means: In this context of increasing market integration, businesses have been quick to use partnerships for cross-border activity, and Joint Ventures and M&A as entry and investment modes; this provides greater financial investment and labour mobility.

9 Prosperous Asian east, uncertainty in Asia's west.

- Political and economic stability influence investment choices, especially when they are cross border. The type of vehicle chosen will depend on the circumstances in the country chosen. For example, expanding into Vietnam implies most often acquisition; joint ventures are most common in Singapore; wholly owned ventures are usual in Russia; Foreign Trade Zone investments are used in Malaysia. Further South into the Asia Pacific, Australia and New Zealand have engaged further into FTA activity and Australia specifically is transitioning from a principally resources and agriculture based economy into a well-networked knowledge economy providing significant opportunity, especially in services.

10 Threats and opportunities: unrest, famine, natural disasters: Despite the many opportunities for business investment in the region, huge challenges remain in much of Asia.

- These challenges also provide many opportunities for those with a longer-term view, from Disaster Resilience Capacity Building to climate change-focused solutions. Major investments are needed in energy efficiency, and innovative solutions are required in innovative waste reduction, water management and other environmental solutions. Responsible business practices will pay large dividends. Willingness to engage in trade & investment across a diversity of economic conditions will lead to reverse innovation strategies, where innovation seen or used first in the less developed markets and proven there will be applied in developed markets.

DR GABRIELE SUDER

Dr Gabriele Suder is Internationalisation Consultant, Government Advisor and a sought-after International Keynote Speaker, www.gabrielesuder.com, contact here, and Professorial Fellow at the University of Melbourne, Australia, contact here. She is specialised in bringing Business to and across Asia and Europe, and is Author of 'Doing Business in Europe'; Doing Business in Asia (forthcoming) and the International Business Companion Handbook. Parts of this text are also published via LinkedIn.

ARTIFICIAL INTELLIGENCE COULD HARDWIRE SEXISM INTO OUR FUTURE. UNLESS WE STOP IT.

Alison Kay, Global Vice Chair of Industry, EY

In five years' time, we might travel to the office in driverless cars, let our fridges order groceries for us and have robots in the classroom. Yet, according to the World Economic Forum's Global Gender Gap Report 2017, it will take another 100 years before women and men achieve equality in health, education, economics and politics. What's more, it's getting worse for economic parity: it will take a staggering 217 years to close the gender gap in the workplace [1].

How can it be that the world is making great leaps forward in so many areas, especially technology, yet it's falling backwards when it comes to gender equality?

THE PICTURE ACROSS INDUSTRIES

Let's start with the facts. The chart shows how the numbers for men and women vary across sectors – and from talent pipeline to leadership.

There are a few things that strike me as I look at this chart.

First, I started my career in one of the industries at the bottom of the chart. I was part of the 26% in energy and mining. I chose a career in utilities and enjoyed it hugely until I reached a ceiling at the ripe old age of 26.

The Operations Director I worked for gave me some brilliant advice. He said my next job should be his, but as this opportunity wasn't likely to happen any time soon, I should branch out into consulting and gain international experience.

Along the way, I met many talented, ambitious women who didn't get promoted into leadership positions. We need to challenge why that is happening, and why it is getting worse.

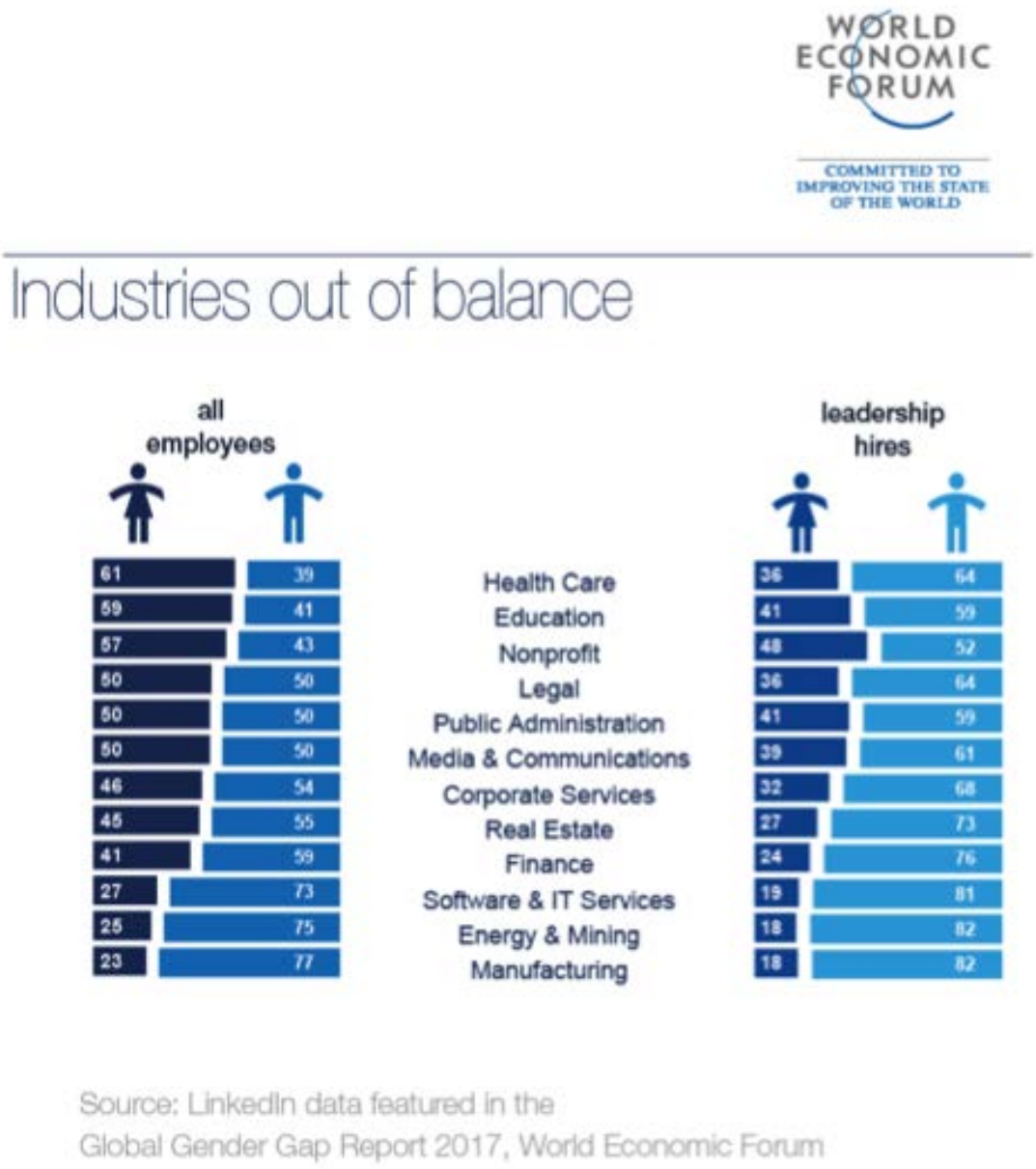
Second, as I think about the future that's coming, the low number of women in software and IT services and in finance does not bode well. We are on the cusp of the Transformative Age, which will fundamentally change how we live and work. Technology – and the financing for innovative ventures – will play key roles in how that future is shaped.

> In an age crying out for powerful and innovative solutions — which evidence shows are best generated by diverse teams— we need to take bigger strides forward on gender parity and diversity in all it its forms.

UNCONSCIOUS BIAS – COULD AI HARDWIRE IT INTO OUR FUTURE?

Unconscious bias has proven to be a big barrier to diversity in the workplace, particularly for women trying to break through the glass ceiling into leadership positions.

1 This article originally appeared on World Economic Forum Agenda. https://www.weforum.org/agenda/2017/12/sexist-bias-hardwired-by-artificial-intelligence



For real change to take hold, it has to come from the top.

There are many enlightened CEOs who are actively tackling unconscious bias and pursuing diversity, but more needs to be done. I've written before about minimizing unconscious bias with blind hiring, something EY has done with great success. These practices need to become more widespread before it's too late.

With the rise of artificial Intelligence (AI) and machine learning, there is a real risk that we "bake in" prevalent biases into the future.

And I say too late because, with the rise of artificial Intelligence (AI) and machine learning, there is a real risk that we 'bake in' prevalent biases into the future.

AI and machine learning are fuelled by huge volumes of existing data. When image databases associate women with domestic chores and men with sports, studies have shown that image-recognition software not only replicates those

biases but amplifies them.

It's a lesson that was learned with voice-recognition software. Fifteen years ago, when the underlying technology for car systems was trained without diverse data sets, women struggled to get the systems to work. One woman who called customer service was told to give up and get her husband to set it up. Thankfully these systems have improved dramatically in recent years, but even now gender bias remains a problem.

Bias is also a risk highlighted in a recent blog, When machine learning goes wrong, by EY's Global Innovation Artificial Intelligence Leader, Nigel Duffy, who writes: "Training data is often collected in some biased way ... We use the data we have available, but is the data right or just cheap?"

TECH AS A POSITIVE FORCE

Disruptive technology is changing the nature of how we live and work. I believe this can be a positive force – and used properly, technology could help to close the gender gap. But only if we avoid hardwiring in our current biases and limitations.

So how do we balance the realities of our current world with our aspirations for more equality and fairness? Unlike humans, algorithms can't consciously counteract learned biases. And as AI permeates more aspects of our lives, the stakes will get higher.

In the same way that we are learning to tackle unconscious bias in the way we hire and promote people, we need to make sure we don't allow bias to permeate the tech that will build our shared future. Only then can we create a better working world for all of us.

ALISON KAY

As EY Global Vice Chair of Industry, Alison Kay works with world-leading companies across 16 sectors, helping them to harness the potential of disruption. As we are experiencing a pace of change and innovation that the world hasn't seen since the Industrial Revolution, innovative solutions are needed to today's most pressing challenges — and to position ourselves for the future. Alison explores questions like: What does it take to lead in the Digital Age? How can businesses of all sizes become more entrepreneurial? Why is diversity of thought so important? How can you prepare the next generation for an uncertain future?

TECHNOLOGY AND COMMITMENT CAN SOLVE MANY OF TODAY'S CHALLENGES

Maria Pia Rossignaud, Director Media Duemila, Italy

So, what are the main challenges of today? I believe they can be summarised as:

- Global and regional conflicts, such as terrorism and the threat of nuclear war
- Environmental and economic impacts of human habitation such as global warming and marine pollution
- Poverty and economic disparity between rich and poor resulting from globalisation
- Food and water insecurity linked to natural and man-made disasters
- Threats to individual expression and political scrutiny fundamental to democracy and human rights
- The continuing spread of disease and human suffering
- Rapid population growth and the ageing of western populations.
- Threats to individual identity through the misuse of social media.

Considering this long list of challenges, we could easily conclude that everyone will be condemned to live in a climate of incertitude and fear, fueled by a combination of conflict and the impact of disruptive technologies. Media reports focus equally on global conflicts such as terrorism and the threat of nuclear war, as well as the insidious effect on all aspects of the economy and society of seriously disruptive technologies. These include the impact of misinformation on social media, the combination of AI and robotics threatening people's jobs, Bitcoin toying with global finances. Big Data algorithms are edging governments towards what we could term "datacracy".

But what are the solutions? They are just as complex as the problems. They are mobile technologies, Big Data, Sentiment and other Data Analysis, A.I., Robotics, Algorithms, that is, the very technologies that are also challenging us. In other words, in order to address these challenges, it is up to the industry leaders of today to increase the level of social responsibility in their business activity. This may require a radical change of ethical approach, which may eventually prove to provide the main solution. For example, while we are focusing on using technology to improve the infrastructure of "smart" cities, which is a positive development, shouldn't we also use new approaches such as Sentiment Analysis to gauge the mood and happiness of the occupants of these cities?

We should not forget that there are now vast undercurrents that are at play globally in society. Transparency, which is sometimes the beneficial effect of digital media and especially mobile telephony, is fostering the early stages of a new type of ethics. This can be summed up by the buzzword "Reputational Capital", which is the perception of the trust that customers and users have in products, services, websites or your personal or industrial brand. Reputations built over decades are falling fast. For example, the #metoo movement is finally catching up with men's hitherto unquestioned abuse of workplace power. And figures long considered as embodying standards of social behavior, even the Queen of England, have been caught up in the tax haven scandal known as the Paradise Papers. While this new level of transparency may be welcomed, the downside of this trend is that popular opinion is taking the place of proper judicial

process, often ruining reputations before the facts of the case have been tested in court and proven.

In response to these global trends, many are beginning to question whether we are building the type of global society that we want. Some of the most powerful people behind the largest tech companies in the world are beginning to reflect on these issues. Mark Zuckerberg released an open letter in early 2017 questioning Facebook's future direction in light of these growing social concerns, and recognizing that:

"Facebook stands for bringing us closer together and building a global community...Every year, the world got more connected and this was seen as a positive trend. Yet now, across the world there are people left behind by globalization, and movements for withdrawing from global connection. There are questions about whether we can make a global community that works for everyone, and whether the path ahead is to connect more or reverse course."

We are also experiencing a faster transformation of society than we were expecting due to the impact of digital technology. But the sad fact is that the future is always created on an uneven foundation, which was first characterised 25 years ago by. American speculative fiction author Bill Gibson: "The future is already here; it's just not very evenly distributed". In order to understand how we can create futures that do not exclude, isolate or exploit we first have to understand how the future is written in the present. European Commissioner for the Digital Economy and Society, Mariya Gabriel, has highlighted this digital divide in the context of the forthcoming Diversity in Tech conference, which will be held in Brussels in June 2018. [1]

"The digital skills gap is real. While 90% of future jobs require some level of digital literacy, 44% of Europeans lack basic digital skills. The Digital Education Action Plan we propose today will help Europeans, educational institutions and education systems to better adapt to life and work in increasingly digital societies."

If inequality in the digital economy and society is already a significant problem in Europe, what can we say about less fortunate countries and regions? How then to connect the unconnected? The first answer is obvious. Increasingly developing countries have access to mobile phones, but what they need is adequate bandwidth at affordable prices. But that of itself will not solve the problem. What is also needed is to provide an education about the use of those phones. Civic education about the use of digital technology is in many countries, even the most advanced, either basic or non-existent.

It has been obvious for decades that technology alone, left to its own devices, so to speak, cannot bring lasting solutions to the social challenges they are partly responsible for creating. For example, teachers in schools are not given enough professional support to understand how digital technologies can be used effectively in the classroom, and ICT classes are often irrelevant to the students. Another challenge teachers face is that the resources and indeed the technology they are provided with

1 http://eu-ems.com/summary.asp?event_id=4347&page_id=9331

often become rapidly outdated as the technology evolves, and the curriculum changes. A fact that is demonstrated by many desk top computers sitting unused in schools across the globe today.

There is a new tool available that, if properly used, could help our understanding of the issues confronting society and their possible solutions. This new method, as mentioned above, is Sentiment Analysis, which is the use and analysis of data from social media traffic such as Twitter, Snapchat or Facebook, to work out the mood of groups of people. Open source software tools deploy machine learning, statistics, and natural language processing techniques to automate sentiment analysis on large collections of texts, including web pages, online news, internet discussion groups, online reviews, web blogs, and social media. It is hoped that by analysing this type of data, public institutions can have a better understanding of community concerns, while also developing timely and innovative solutions to specific issues.

So how can the members and colleagues of the GTWN help, as a group of powerful women in technology with a commitment to using technology to benefit society? There is no doubt that each member of the GTWN is doing a lot already in their own particular field. But each of us can all always do more. One way we could all contribute to the solution, for example, would be by opening a discussion with educational institutions about the socially responsible use of smartphones and tablets, and how they can best be used to enhance educational prospects, especially in less fortunate communities. This would obviously also be beneficial to the mobile industry in terms of growing business and market recognition, but crucially it would also be very beneficial to society at large.

We can all use our influence to push social responsibility and attract other women influencers, not connected to mobile telephony, to support their social projects. Just an example (not to be taken for more than an example), Oprah Winfrey is in the news thanks to her spectacular defense of women at the Golden Globe event. She, as well as many GTWN members, could rouse public opinion to curb the insatiable greed of big players (and that of their shareholders) that is bringing us on the brink.

Mobile technology can provide the solution to many of today's challenges, but only if it is combined with and guided by resolute moral and social principles. Who better than the members and friends of the GWTN to take a leadership position in doing so?

MARIA PIA ROSSIGNAUD

Maria Pia Rossignaud is the Director of Media Duemila, Italy.

Since 2008, editor of Media Duemila, Italian magazine about digital culture, business and government, now in its 33th year. Part time professor at the university La Sapienza in Rome; consultant and promoter of research, Maria Pia Rossignaud has successfully anticipated several niche that would become digital businesses not only concerning the use and development of technologies such as for example the proliferation of Qr codes, but also social change such as the appearance of the digital persona.

Maria Pia Rossignaud organizes every year "Nostalgia di Futuro", a prize given to excellence in digital practices and research, seminars and international conventions on the impact that new technologies have on peoples' lives. She is presently compiling a chronology of digital evoltion over the last thirty years culled from the issues of Media Duemila. Member of Union Italian Scienti c Journalists (UGIS), part of Wisters (Women for smart territories) and Stati Generali dell'Innovazione an association which promote culture innovation in the institutional environment. Digital Champion of her native village nearby Naples .
She is Vice president of Osservatorio TuttiMedia a rare association 207 which brings together protagonists of modern business also in media world to shape a possible future. She organize several meetings on topics which are essential for the modern economical environment.

ELISABETH SLAPIO

Elisabeth Slapio, Director Innovation and Environment Section of the Cologne Chamber of Commerce and Industry, Germany

After studying to become a full-time lawyer and working at the University of Cologne, Elisabeth worked as a lawyer in various law firms. In the Cologne Chamber of Commerce and Industry, she is currently focusing on the IT and Telecommunications Industries as well as digitizing value-added processes in small and medium-sized companies. Other topics include advising retail companies and assisting the administration in the reorganization and digitization of specialized procedures in electronic government.

01 How have you deployed your passion and innovation as a leader or entrepreneur? What is your secret sauce or pixie dust?

Complexity has become the norm in today's globalized, connected and increasingly digitized world. If only a few decades ago we were doing well with this, we were looking for solutions to the problems of our immediate environment. In our organization, our entrepreneurial decisions and our actions today increasingly have side effects and side effects that are difficult to anticipate. So it's important to focus on complexity as a regular part of our time and to welcome it. Simplification is one possible way to optimize complicated issues. However, she alone will not be the royal road to assert herself in a complex environment.

Time and again, I experience networking and sharing experience and knowledge as a strong foundation for career success and personal satisfaction. To practice this in everyday life is still a challenge and an incentive for me.

02 Give an example of a project or business that you're really proud of?

Our most important investment in the future should be to guide young people on their way to the new digital world. For some years, I have been developing models and ideas for digital administration in workshops with students from the University of Applied Sciences of Cologne. We learn together and from each other how changes in society affect the understanding of modern politics and administration.

03 What tips or lessons would you pass on to the younger women networked into the GTWN?.

Networking with national and international women, as practised by GTWN, is a great way to share experiences. Young women should actively use these networks. It should become a matter of course to ask for help and support and to use the good contacts. Here women still have a lot of potential.

04 Name a challenge for women in the GTWN to achieve in the next 25 years as we step up to the complex world in this current "Mobile Century"

The biggest challenge for women will be not only to penetrate the complexity, but also to present solutions simply and clearly. Women are often said to be less pragmatic about many issues than men. One of the causes may be that women occasionally seem less risk-averse than men. The reasons for this are that they sometimes leave the impression of being too complicated when communicating about the weighing process. Here, self-confidence and perseverance are needed to prevail against prejudice.

SOMEONE TO WATCH OVER YOU: IS FACIAL RECOGNITION TECHNOLOGY A SOLUTION OR A GROWING PROBLEM?

Vicki MacLeod, Secretary-General, GTWN

Facial recognition technology is being deployed in an ever-expanding number of applications around the world – from passport screening at airports, to surveillance of employees in workplaces, to the police and court system, and even in behavioural research. But should we embrace this technology as a brilliant solution to security and identity verification requirements, or should we be more concerned about the impact on individual privacy and data security?

At its iEXPO2017 conference in Tokyo, NEC demonstrated the many benefits of its advanced, real-time facial recognition technology" which is widely acknowledged to be one of the most sophisticated and reliable systems that is available worldwide. But despite impressive advances in this technology, the response by some media focussed on the potential impact on the individual of being constantly watched over and monitored by unknown observers.

There is an increasing number of new applications of facial recognition technology in a surprising variety of industries and circumstances. For example, it is being used at Crown Casino in Melbourne to identify VIP gamblers as well as banned guests. Australian state and federal policing agencies are also deploying it, with South Australia Police using it to identify criminals and to search for missing persons. And it is reported that the Northern Territory Police, in the far north of Australia, is using the technology to identify unconscious people admitted to hospital and those who are suffering from Alzheimer's and may not be able to remember their own identity.

Perhaps of more concern to privacy advocates is that employers are beginning to deploy facial recognition, combined with artificial intelligence, to monitor and evaluate the mood and attitude of staff. One such example is Westpac bank, which has said it is using this approach, so that managers can intervene and counsel individuals if necessary.

Retail giant Westfield is using small cameras fixed atop advertising screens and using software developed by French company Quividi to detect individual faces to estimate the age, gender and mood of shoppers in its malls[1]. Westfield also tracks shoppers' movements by pinging their Wi-Fi enabled devices with routers littered across its centres. Westfield claim it can only detect faces at this stage, not identify individual shoppers. Westfield is now also deploying number plate recognition in some of its car parks, which in theory could at some future time be matched to individual shoppers, their home address and their demographic data. Privacy advocates are concerned that the trend for monitoring individual behaviour in public places will only increase, and have called for more transparency by companies about the purpose of the surveillance so that individuals are aware how and why they are being tracked and what the data is being used for.

Facial recognition is also being increasingly used in the sporting and entertainment context to monitor crowd behaviour and to verify individual identity. The Tokyo 2020 Olympics will use

1 http://www.news.com.au/finance/business/retail/westfield-is-using-facial-detection-software-to-watch-how-you-shop/news-story/7d0653eb21fe1b07be51d508bfe46262

facial recognition technology to streamline the entry of athletes, officials and journalists (but not ticket holders) to the games venues. In response to the increasing threat of terrorism, organisers are proposing to use facial recognition in order to prevent attendees from lending or borrowing ID cards. In October 2017 the Justice Ministry deployed facial recognition technology to screen passengers at Tokyo's Haneda airport.

The Australian federal government has established a National Facial Biometric Matching Capability, known as "The Capability", to enable law-enforcement agencies to share more easily the identity photographs they hold. Meanwhile, the Australian Department of Immigration and Border Protection, uses NEC's NeoFace technology in its departure SmartGates, which are located at all Australian international airports. NeoFace measures the distance between the eyes, the width of the nose, depth of the eye sockets, shape of the cheekbones, and length of the jawline in order to make a positive match. Similar software is already deployed at a number of other airports around the world, including at JFK and at Heathrow.

In October 2017, all Australian state and territory governments agreed to allow the federal government access to driver's licence photographs, allowing for much easier inter-agency sharing. In the Capability, these will be added to a searchable collection of passport and visa photographs. The database is to be used for looking back over CCTV to identify suspects, but privacy advocates are concerned that in future the system could be used for real-time tracking of anyone entering sports stadiums or malls

Bloomberg News reported[2] that Russia was adding facial-recognition technology to some of its network of 170,000 surveillance cameras in a move to identify criminals in real-time. China too has been working on a facial-recognition system since 2015 to identify any one of its 1.3 billion citizens in 3 seconds but has apparently been encountering some issues, including concern about whether there is a real need for some systems. For example, the Wall Street Journal has reported[3] that on Chongming Island near Shanghai, a new running course has been outfitted with a facial-recognition system to ensure runners don't take shortcuts through the foliage during timed competitions.

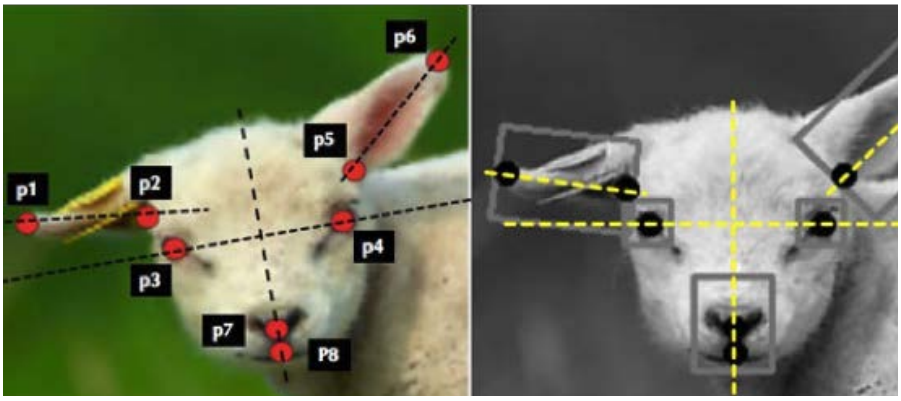
There may be other problems with the accuracy of facial-recognition technology, as it does not always work accurately. At London's Notting Hill Carnival in August 2017, human rights advocates group Liberty observed its use by London's Metropolitan Police. According to Liberty, it couldn't tell the difference between a young woman and a balding man and falsely matched 35 people, five of which were pursued with interventions, meaning innocent members of the public were stopped who had, police later discovered, been falsely identified. Liberty claims that this raises the real risks of unfettered use of facial recognition technology in a democracy.

But for every concern raised about facial recognition technology, there are other stories about the incredible insights it can provide into behaviour. It is even being used in research into animal behaviour, in order to improve animal welfare and our understanding.

A group of researchers at

2 https://www.bloomberg.com/news/articles/2017-09-28/moscow-deploys-facial-recognition-to-spy-on-citizens-in-streets

3 https://www.wsj.com/articles/the-all-seeing-surveillance-state-feared-in-the-west-is-a-reality-in-china-1498493020



Source: Estimating Sheep Pain Level Using Facial Action Unit Detection by Yiting Lu, Marwa Mahmoud and Peter Robinson Computer Laboratory, University of Cambridge, Cambridge, UK

Cambridge University[4] have been using facial recognition technology to assess pain levels in sheep, which is a crucial, but time-consuming process in maintaining their welfare.

In summary, there is no doubt that the growing use of facial recognition technology, especially in an unfettered and hidden way, does raise concerns about the potential impact on individual privacy and the sense of community that is fundamental to a free democratic system. On the other hand, its increasing number of applications demonstrates its value in providing insights into human, as well as animal, behaviour, and solutions to some very difficult challenges in modern society. The issue is one of transparency on the part of the users of this technology, and knowledge on the part of individuals and communities, so that the benefits of the technology are balanced with safeguards against unnecessary or reckless application.

4 www.cl.cam.ac.uk/~pr10/publications/fg17.pdf

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