



# Les Echos The Innovator

#10—February 2019  
Special Edition for Mobile World Congress and 4FYN

**FUTURE OF PAYMENTS**  
Q & A WITH MASTERCARD  
VICE-CHAIRMAN ANN  
CAIRNS

**A MAGICAL LEAP**  
HOW AR MIGHT  
BOOST PRODUCTIVITY AND  
CHANGE HEALTHCARE

**AI FOR PUBLIC GOOD**  
A SPOTLIGHT ON PROJECTS  
IN DAKAR, BOGOTA AND  
TEL AVIV



## INTELLIGENT CONNECTIVITY AND THE NEED FOR A NEW DATA DEAL



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## LETTER FROM THE EDITOR

● The bread crumbs we leave behind when using our mobile phones—who somebody calls, for how long, and from where—contain unprecedented insights about people and society. Researchers compare the recent availability of large-scale behavioral data sets, such as the ones generated by mobile phones, to the invention of the microscope, giving rise to the new field of computational social science, notes a December article about the use of mobile phone data in a publication called Scientific Data. We are under a microscope. Intelligent connectivity, the theme of this year's Mobile World Congress, gives us the ability to track people's every move and even predict what they will do next. Those superpowers are mainly being used to sell ads. We could be using them to do so much more. Articles in this publication shine a light on projects that are using artificial intelligence and data to solve some of the world's biggest problems while safeguarding privacy. And Internet 3.0 technology – such as that being incorporated into the EXODUS phone that is scheduled to be unveiled at the Barcelona trade show -promises to give us freedom from snooping and exploitation. But, as our cover story points out, technology alone is not enough. Building trust in data privacy and security along with « good digital IDs » will require a new social contract. « Policies coming out of one industry or one government department are not enough...we need to establish high level goals and frameworks, and learn from real life examples, » says Derek O'Halloran, the Forum's Head, Future of Digital Economy and Society. The Forum is working with international organizations and governments on the best ways to handle digital identity and data privacy. Both are fundamental to creating intelligent connectivity that people trust. At a time when it is becoming possible to mix atoms and photons, blurring the lines between the physical and real worlds, (see our story about Magic Leap) it is more important than ever that we define boundaries. As work on Internet 3.0 by some of the brightest minds in tech demonstrates, baking ethics and privacy by default into the technology does not have to limit the potential of intelligent connectivity. It can unleash it.



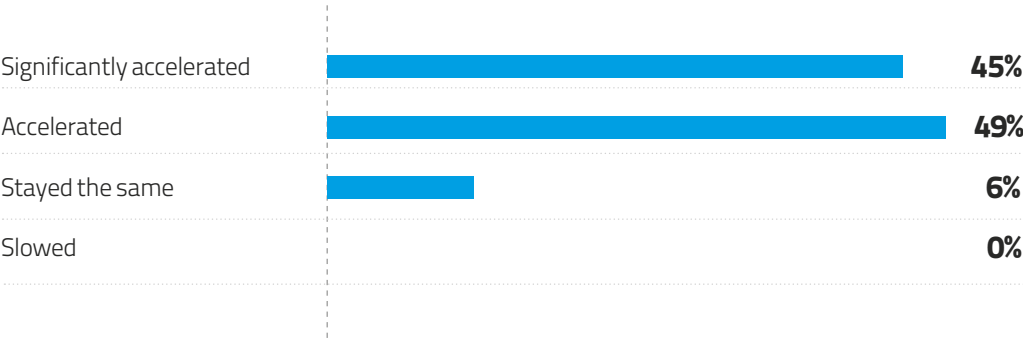
**By Jennifer L. Schenker**  
Editor-in-Chief, *The Innovator*



PREPARING FOR CHANGE

● According to Accenture’s Technology Vision 2019 survey of 6,672 business and IT executives, 45% report the pace of innovation in their organizations has significantly accelerated over the past three years due to emerging technologies.

THE PACE OF INNOVATION IS ACCELERATING

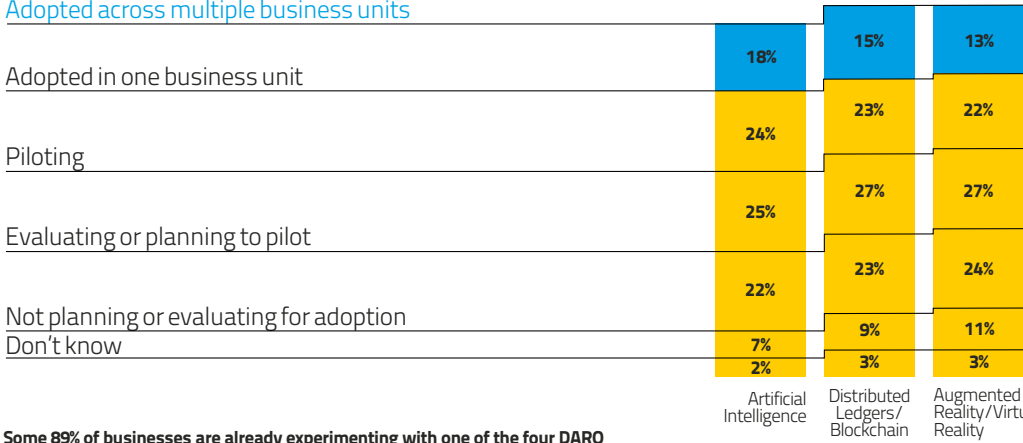


A DARQ FUTURE?

● In a new report consulting firm Accenture has identified the four technologies it believes every enterprise should embrace: Distributed Ledger (ie. blockchain); Artificial Intelligence (AI); Reality (AR/VR); and Quantum computing (next generation computing done on a molecular level) or DARQ for short. The report notes that investments in VR and AR rose 12% from 2016 to 2017, hitting \$3 billion. Money is also flowing into distributed ledger technologies: blockchain and cryptocurrency-based companies raising almost \$3.9 billion in the first nine months of 2018, or triple the entire previous year. And while quantum remains the least mature of the four, the report also notes that at least 89% of all companies surveyed were working with one or more of the DARQ technologies. But in highlighting these four categories, the report stresses the

MANY BUSINESSES ARE EXPERIMENTING WITH THREE NEW EMERGING TECHNOLOGIES

Adopted across multiple business units



Some 89% of businesses are already experimenting with one of the four DARQ technologies, expecting them to be key differentiators, according to Accenture’s Technology Vision 2019 survey. Accenture asked the companies to indicate their organizations’ stage of adoption of each of the technologies.

need to begin thinking about how they will eventually intersect to create even more powerful disruptive effects. “All four DARQ technologies are, or will be, powerful on their own,” the authors write. “But as they advance, they will push each other forward further. Already, early pairings reveal game-changing combinatorial effects.”

For instance, AI is already being used to improve image quality in VR applications by LG Display. Companies like IBM and Google are exploring how quantum computing can be used to make even more complex AI-driven applications. And Microsoft has partnered with Adents to see how AI and blockchain can be used in

supply tracking. “The one certainty is that all four of these technologies will offer powerful new capabilities to enterprise — and will amplify the impact of the others,” the report says. “Leaders in the DARQ-driven future will be prepared to combine and exploit those competencies as the technologies reach enterprise-level maturity.” ●



LET’S GET IT STARTED

● Google and Amazon have created a lot of buzz with their voice-activated services but will.i.am, the successful composer, producer, and recording artist says he has a feeling that he can beat them at their own game. The leader of Black Eyed Peas launched his own voice-centric platform through a new LA-based company called I.AM+ after selling Beats, a company he co-founded, to Apple for \$3 billion. I.AM+ is developing plans to sell a smart speaker to consumers and is developing B2B offerings for the retail, travel, customer care, automotive and insurance industries, to name a few, as well as a concierge/assistant for businesses and brands wanting to enhance their offerings. Tinka, a voice assistant launched by T-Mobile Austria is based on its technology. I.AM+ says it can help enterprises stay relevant and compete against monopolies being created by the likes of Amazon and Google. I.Am+ made headlines when it announced a deal in January with Majid Al Futtaim, a conglomerate which owns shopping malls, and

retail and leisure properies across 20 countries in the Middle East, Africa and Asia, to provide voice-based AI powered assistance to shoppers via a device that resembles Amazon’s Alexa. As part of the partnership with Majid Al Futtaim, I.AM+ announced the A.R.C., a coalition of retailers, brands and service providers who will offer a neutral voice AI platform that is private by design. The coalition says it intends to « embrace the opportunity of voice technologies and address the challenges, collectively, to deliver a world-class AI experience for customers. » If there were any doubts about the coalition’s ambitions will.i.am quelled them with a Tweet hosted on MAF’s account that said, “If you thought MAF was not a tech company the size of Amazon, think again. Let’s go.” ●



HUAWEI’S WOES

● For Chinese telecommunications giant Huawei the bad news appears to just keep getting worse. In December Meng Wanzhou, Huawei’s CFO and daughter of its founder, was arrested in Cananda. Since then a company employee was charged with espionage in Poland. U.S. prosecutors subsequently in late January filed 23 charges of trade theft against Huawei, accusing Wanzhou and the company of stealing intellectual property from T-Mobile and other companies, and hinting that her father, CEO Ren Zhengfei, could faces charges as well. The company is still an industry heavyweight but since last year’s Mobile World Congress trade show in Barcelona, Huawei’s relations with the industry have grown more complex amid mounting pressure by the U.S. on its allies to avoid using the company’s equipment. Australia and New Zealand have banned use of Huawei equipment, as has Taiwan, over concerns that Huawei could build backdoors into its products on behalf of the Chinese government. And now a number of European companies are considering doing the same. “There is growing concern but we have yet to see any evidence to substantiate these claims,” Mats Granryd, Director General of the GSMA, the mobile industry trade association that organizes Mobile World Congress said in the run-up to the show. (see the Q & A with Granryd on page 14.) With the U.S. market closed off, Europe has become critical to Huawei’s global ambitions and the company has become one of the largest sellers of smartphones since it expanded into Europe just a few years ago. Last March, Huawei staged a spectacular launch event for its latest flagship smartphones in Paris that included a video of partners from several major European carriers praising the company for its innovation. But in mid-February, Germany’s government said it was continuing discussion with telecom companies about whether it will allow Huawei to bid for 5G mobile network projects. And the U.K. government is reportedly close to introducing legislation that would prohibit use of Huawei equipment in sensitive network projects. ●

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# INTELLIGENT CONNECTIVITY AND THE NEED FOR A NEW DATA DEAL

— Ensuring data privacy and ‘good’ digital identity are key to reaping the full benefits of intelligent connectivity. Getting there will require new technology and a new social contract.

By Jennifer L. Schenker

● **At Mobile World Congress, an annual industry conference taking place in Barcelona Feb. 25-28, a new handset will be unveiled that promises to give its users control over their personal data.** Taiwan’s HTC, a manufacturer of both Windows and Android-based’ smart phones, will announce that it is teaming with several startups and Opera, a European browser company with 320 million users worldwide, to make an entirely different kind of handset, one that separates personal data from the phone’s operating system, encrypts it, gives the phone’s user total control over their own data, and eventually will allow them to use blockchain and cryptocurrency to slice and dice their data, choose who they want to release it to, and give them the ability to be compensated via micro cryptocurrency transactions. The phone, aptly named EXODUS, promises freedom from snooping and what some see as exploitation. “We are giving away our data and digital identity for likes and cheap endorphins, surrendering all of our power to the big data monolithic tech giants that mine that data for artificial intelligence agents, advertising revenue and even more nefarious means,” says veteran venture capitalist Phil Chen, HTC’s Chief Decentralized Officer. “EXODUS is about the future of data and getting the right architecture for the Internet, one that includes

security, privacy and transfer of ownership of data back to the person generating it,” he says. “This is a great opportunity for enterprise, entrepreneurs and anyone who isn’t one of the big seven Internet companies.” The launch of EXODUS is just one example of efforts underway as part of Internet 3.0, the next iteration of the Web, to wrest power over personal data away from Internet giants. Sir Tim Berners-Lee, the inventor of the World Wide Web, announced last September that he is building on current web standards by extending them to provide a distributed data service that would permit individuals and organizations to keep their data in Personal Online Data stores known as PODS. Another initiative, led by MIT professor and serial entrepreneur Alexander “Sandy” Pentland, a co-founder of MIT’s Media Lab and one of the world’s most cited computer scientists, seeks to use an open source AI algorithm to give individuals collective bargaining power and control over their own data with the help of credit unions and trade unions, which together represent hundreds of millions of workers. “We need a new deal on data,” says Pentland, who has spent the last 12 years working on ways to ethically extract insights from data without endangering privacy or security through an initiative called The MIT



Trust Consortium. The current business model of the Internet relies primarily on users – willingly or unwittingly - giving over their personal data in exchange for free services. Every digital move is tracked and traded. A simple app can - without a user’s knowledge – download photos, record a user’s voice and transfer personal data such as phone numbers, emails and texts to build a profile. That profile can, in turn be used as a tool to control populations by authoritarian states and/or for what Harvard emeritus professor Shoshanna Zuboff calls surveillance capitalism, a term defined as “a new economic order which claims human experience as free raw material for extraction, prediction and sales.” “Although some of these data are applied to service improvement, the rest are declared as a proprietary behavioral surplus, fed into advanced manufacturing processes known as ‘machine intelligence,’ and fabricated into prediction products that anticipate what you will do now, soon, and later,” Zuboff writes in her new book The Age of Surveillance Capitalism: The Fight For a Human Future At The New Frontier of Power. “Finally, these prediction products are traded in a new kind of marketplace that I call behavioral futures markets. Surveillance capitalists have grown immensely wealthy from these trading operations, for many companies

are willing to lay bets on our future behavior.” Things have gotten so out of whack that due to a lack of coherent policies and government oversight Internet giants have – until recently - been allowed to Hoover up data with few if any constraints while academics and health researchers have been refused access to data that could help society, such as curbing the outbreak of a disease like Ebola, out of fear the information could be mis-used. A backlash - fueled by a series of scandals last year that raised questions about how Facebook collects and handles personal information – is starting to change this. In the United States, the Federal Trade Commission is investigating whether Facebook’s data-sharing practices violated a 2011 consent agreement prohibiting it from deceiving users on privacy. Laws like Europe’s new General Data Protection Regulation (GDPR) that sets stringent privacy standards for any company with business in the European Union are curbing what companies can do with data. And business leaders are starting to call for privacy to be considered a human right. But some industry experts say investigations, new rules – or attempts to break up







Internet companies – are not enough to shift the balance of power in a world in which Internet companies make moves without first asking for permission, can afford to pay huge fines, and put forward arguments that some regard as disingenuous. Facebook, for example, announced in February that it is going to combine data from its social network with WhatsApp and Instagram, a move opposed by the German competition authority on the grounds that combining these sources substantially contributes to the social networking giant’s ability to build a unique database for each individual user and thus gain even more market power. Facebook disagreed in a blog post, arguing that it needs to collect all of that user data in order, among other things, to ensure “public safety.” Pentland disputes that claim. The open source algorithm developed by MIT’s Data Trust Consortium has developed a system that proves it is possible to ethically extract information for the public good from data without moving or owning the data, he says. And that same system could be used to upset the current balance of power.

Hardwiring Security And Privacy Into The Technology

When the global economy was first transformed by industrialization and then by consumer banking, powerful players emerged that concentrated power in the hands of a few. Citizens joined together to form trade unions and cooperative banking institutions, which were federally chartered to represent their members’ interests. The same collective organizations could be used to shift the balance of power away from giant Internet players and place it in the hands of workers, says Pentland. In the U.S. alone almost 100 million people are members of credit unions, not-for-profit institutions owned by their members and already chartered to securely manage their members’ digital data and provide a wide variety of financial transactions, including insurance, investments and benefits. “The question then is, could we apply the same push for citizen power to the area of data rights in the ever-growing digital economy,” asks a white paper authored by MIT Connection Science professors and signed by a global trade union and the MIT Federal Credit Union. Advanced computing technologies make it possible to automatically record and organize all the data that workers knowingly or unknowingly give to companies and the government and to store these data in credit union vaults. The MIT Trust Data Consortium has already built and demonstrated pilot versions of such systems. And, almost all credit unions already manage their accounts through regional associations that use common software, so widespread deployment of data cooperative capabilities could

- at least theoretically - be both quick and easy, says Pentland. “By leveraging cooperative worker and citizen organizations that are already chartered in law virtually everywhere in the world, along with technology that has already been demonstrated, we can...change this situation and create a sustainable digital economy that serves the many and not just the few,” says the white paper. If credit unions and trade unions managed their members’ data it would give individuals control over their own data and the power of collective bargaining, says Pentland. “It would also benefit traditional enterprises by giving them data that today are only available to large Internet giants.” That said, it would be counter-productive to realizing a more enlightened data-governance ecosystem to “encourage unions to simply surveil their members as Big Tech does, which will of course be a temptation,” says Jonnie Penn, an affiliate of the Berman Klein Center at Harvard University who is collaborating with the MIT Trust Data Consortium on the project. “In collaboration with trade unions and my colleagues Mary Gray and Nathan Freitas at the Berkman Klein Center at Harvard, I’ve recently co-developed an actionable ‘lightweight’ data-collection approach built around consent and data-minimization rather than the current ‘collect-all’ approach.” While it is early days for the program – coding is set to begin in about six weeks – Penn envisions ways trade unions could not only control data collection but use it to improve working conditions. “We want to create an alternative paradigm in terms of data governance,” he says. “It has to be the workers themselves that lead.” Relatively simple changes in how data are collected and processed, such as having credit unions also manage members’ data, and moving from an economy of data sharing to one where questions are shared but data stays under user control, could go a long way toward fixing the current situation, says Pentland. “Estonia did this switch two decades ago in order to survive a cyber attack by Russia, so why not us? If not now, when?” During the World Economic Forum’s annual meeting Forum executives met with Berners-Lee, the creator of the World Wide Web, to discuss his technology approach to data privacy - Personal Online Data stores known as PODS that are designed to be secure, and allow the owner, whether an individual or company, to provide access to portions of their data, as well as revoke access as needed. “People want apps that help them do what they want and need to do - without spying on them,” Berners-Lee said in a blog post announcing the launch. “Apps that don’t have an ulterior motive of distracting them with propositions to buy this or that. People will pay for this kind of quality and assurance.” HTC’s Chen says he believes blockchain is the technology that is the best



HTC’s new EXODUS handset aims to challenge the big data business models of tech titans. It bills itself as the first Web 3.0 mobile phone.

the co-founder of Ethereum, a decentralized software platform that enables smart contracts and distributed applications.

The Need For A New Social Contract

But technology alone is not enough. Building trust in data privacy and security along with “good digital IDs” will require a new social contract, argue some. “Digitalization is transforming and disrupting every area of our lives so institutions and frameworks and ways of thinking are now being re-evaluated and questioned,” says Derek O’Halloran, the Forum’s Head, Future of Digital Economy and Society, and Member of The Executive Committee. “Policies coming out of one industry or one government department are not enough....we need to establish high level goals and frameworks, and learn from real life examples.” The Forum is trying to do just that, through a number of initiatives involving data privacy and digital identity. Both topics were on the agenda at the annual meeting in Davos in January. Government officials such as Japanese





Prime Minister Shinzo Abe called for a new system for the oversight of data use, as did business leaders. During the annual meeting in Davos the GSMA, the industry association that represents the world’s mobile operators, launched a ‘Digital Declaration’ that is meant to serve as a guide to acting ethically in the digital era. It has so far been signed by CEOs representing 40 companies. The Digital Declaration principles call on businesses to respect the privacy of digital citizens; handle personal data securely and transparently; take meaningful steps to mitigate cyber threats; and ensure everyone can participate in the digital economy as it develops while combatting online harassment. “Trust is the new collateral,” says GSMA Director General Mats Granryd, a board member of the World Economic Forum’s stewardship initiative on Digital Economy and Society (See the interview on page 14.) Without consumer trust and ethical guidelines a wealth of new services that take advantage of intellectual connectivity are likely to be delayed or never rolled out. For example, one service being envisioned - with participants’ buy-in, could serve as an early warning system for health issues by running diagnostic tests on discarded tooth brushes, dirty diapers or used kitty litter (see the story on page 20) but the information could potentially be misused if it got in the wrong hands and will not be launched unless the right framework can be put in place.

Data For Good

The new social contract also has to take into account the needs of researchers working for the public good. With mobile phone penetration rates reaching 90% - and under-resourced national statistical agencies - the data generated by our phones, including traditional Call Detail Records (CDR) but also high-frequency x-Detail Records, have the potential to become a primary data source to tackle crucial humanitarian questions in low- and middle-income countries, says a recent paper in Scientific Data co-authored by MIT’s Pentland. For instance, such data has already been used to monitor population displacement after disasters, to provide real-time traffic information, and to improve understanding of the dynamics of infectious diseases. At the same time our digital breadcrumbs contain intimate details of our lives: rich information about our whereabouts, social life, preferences and potentially even finances. Historically and legally, the balance between the societal value of statistical data in aggregate and the protection of privacy of individuals has been achieved through data anonymization. The trouble is that recent studies show that pseudo-anonymization and standard de-identification are not



“If credit unions and trade unions managed their members’ data it would give individuals control over their own data and the power of collective bargaining. It would also benefit traditional enterprises by giving them data that today are only available to large Internet giants.”

MIT professor and serial entrepreneur **Alexander “Sandy” Pentland**, a co-founder of MIT’s Media Lab and one of the world’s most cited computer scientists

sufficient to prevent users from being re-identified in mobile phone data. Four data points — approximate places and times where an individual was present — are enough to uniquely re-identify people 95% of the time in a mobile phone dataset of 1.5 million people. The limits of the historical de-identification framework to adequately balance risks and benefits in the use of mobile phone data are a major hindrance to their use by researchers, development practitioners, humanitarian workers and companies. “This became particularly clear at the height of the Ebola crisis, when qualified researchers (including some of us) were prevented from accessing relevant mobile phone data on time despite efforts by mobile phone operators, the GSMA, and UN agencies, with



“People want apps that help them do what they want and need to do — without spying on them. Apps that don’t have an ulterior motive of distracting them with propositions to buy this or that. People will pay for this kind of quality and assurance.”

**Sir Tim Berners-Lee**, inventor of the World Wide Web, a member of the Stewardship Board for the World Economic Forum’s System Initiative on (the Future of) Digital Economy and Society and co-founder of Inrupt

privacy being cited as one of the main concerns,” says the white paper. Governing Mobile Phone Data. Another problem is the lack of an agreed upon policy framework for the privacy-conscious use of mobile phone data by third parties. Such frameworks have been developed for the anonymous use of other sensitive information such as census, household survey and tax data, making it possible to use data in aggregate for the benefit of society. Such thinking and an agreed upon set of models has been missing so far for mobile phone data. “This has left data protection authorities, mobile phone operators, and data users with little guidance on technically sound yet reasonable models for the privacy-conscious use of mobile phone data,” says the white paper. In their paper, Pentland and the other



“EXODUS is about the future of data and getting the right architecture for the Internet, one that includes security, privacy and transfer of ownership of data back to the person generating it. It is a great opportunity for enterprise, entrepreneurs and anyone who isn’t one of the big seven Internet companies.”

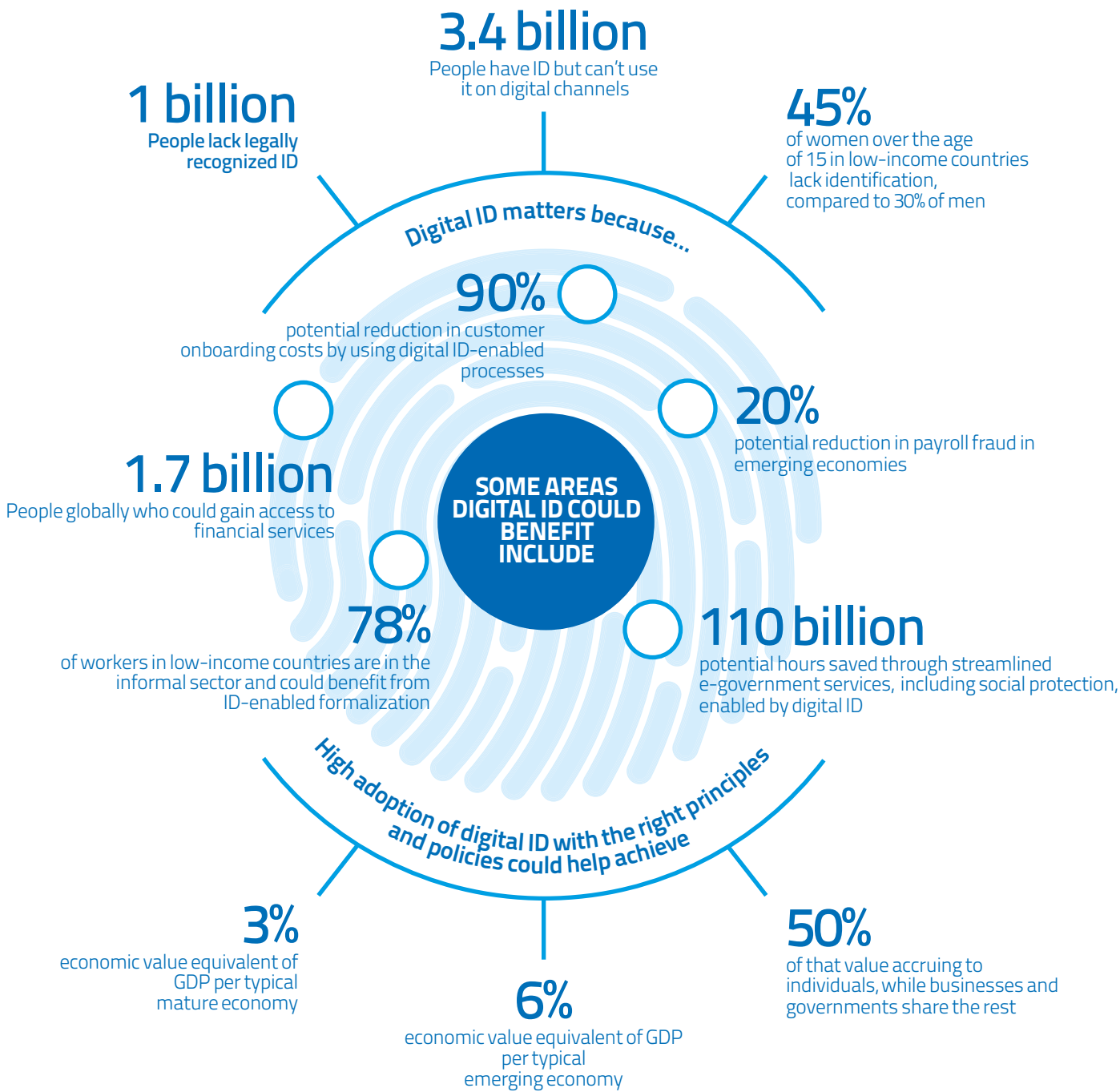
Veteran venture capitalist **Phil Chen**, HTC’s Chief Decentralized Officer

authors propose four models for privacy-conscious use of mobile phone data for the public good in areas such as disaster management. Cases in which individual-level identifiable information is needed, such as targeted advertising or loans based on behavioral data, are excluded. One of the recommended approaches is a system in which the data stays within the premises of the operator and third parties only access it through a question-and-answer system. The questions are validated in advance by a board of advisors. Such a system has been devised, using an open-source algorithm, by the MIT Data Trust Consortium and is already being piloted in Senegal



THE BENEFITS OF GOOD DIGITAL ID,  
A KEY COMPONENT TO INTELLIGENT CONNECTIVITY

The World Economic Forum defines good digital ID as unique, high-assurance, consent-based, digitally verifiable identification that can be based on a variety of possible credentials such as biometrics, passwords and smart devices



Sources: World Bank ID4D; World Bank ID4D-Findex; We are Social; International Labour Organization; McKinsey Global Institute analysis



and Colombia as part of a program called OPAL (see the story on page 24) which seeks to use anonymized data to save lives during periods of crisis, and improve education and city services. It is also being applied in another project in Colombia that uses data to establish fairer distribution of government cash transfer payments to the poor (See the story on page 31.)

Digital Identity: A Key Building Block

Digital identity services – which promise to unlock enormous economic and social value – are a key building block for intelligent connectivity because they are increasingly pivotal in a wide range of interactions among individuals, enterprises and governments. What the Forum calls good digital ID – unique, high-assurance, consent-based digitally verifiable identification – could help the approximately 1 billion people who have no legally recognized ID, preventing them from being able to vote, go to school or receive government services. And it could unlock economic value equivalent to up to 6% in emerging economies and 3% in more mature economies, according to a new report compiled by the Forum and McKinsey. The benefits for businesses and government of adopting digital identification include: an up to 90% cost saving in onboarding customers; a reduction in fraud; an increase in sales of goods and services; streamlining employee verification; and making contracting with contract workers easier, according to the report. The United Nations has set a goal of ensuring that the entire global population has digital IDs by 2030. Examples of digital ID systems already in place can be found in Argentina, Canada, Estonia, India, Sweden and the U.K. The issue is that digital ID systems today vary in terms of their policies and practices – from technology choices to levels of security and privacy – and often do not communicate with each other, making it

cumbersome for users and leaving them vulnerable to risks. Shared understanding and collaboration between governments, businesses and civil society can address some of these challenges and advance appropriate innovations and policies, says Manju George, the Forum’s Head of Platform Services, Digital Economy and Society.

To that end the Forum has launched a shared Platform for Good Digital Identity to bring together existing and new digital identity solutions. The Omidyar Network committed a three-year grant to support the platform. “Good digital identity is the foundation for innovation and value creation across digital services,” says George. “Our shared challenge is to build frameworks that encourage adoption and realize the value while ensuring trust is not eroded.”

Time For An EXODUS

HTC’s Chen, who previously worked as a venture capitalist for Horizon Ventures, says the monopoly that the world’s seven biggest Internet companies have on data is not just undermining trust, it is curbing innovation. HTC’s new handset will, for example, enable its users to direct micropayments to content websites, which has the potential to “reshape the face of journalism and create a new, content-centered revenue stream away from the hands of controlling tech giants and click-chasing advertising models,” says the company. There is an opportunity for startups, academics, developers and big traditional companies to re-architect the Internet and create a variety of new services that could benefit consumers and society as whole, says Chen. It is why, he says, it is high time – in more ways than one – for an EXODUS.

J.L.S.

STARTUPS  
WORKING WITH  
EXODUS

BITMARK  
CAYMAN ISLANDS

**WHAT IT DOES:** Its technology establishes ownership and property rights over digital assets of value such as health data, art, digital collectibles, song rights, and medical records and makes them divisible. Backers include Alibaba.

<https://bitmark.com>

NUMBERS PROTOCOL  
HONG KONG

**WHAT IT DOES:** With user consent identifies all the sensors on your phone tracking things like walking, sleeping and driving to package the data for third parties. Allows data owners to sell or trade data, repackaging it and sell or trade it again. In stealth mode.

<http://numbersprotocol.io>





● Mats Granryd is Director General of the GSMA, the mobile industry trade association that organizes Mobile World Congress, an annual industry event in Barcelona that attracts over 100,000 participants. Prior to joining the GSMA in 2016, Granryd was President and CEO of Tele2, one of Europe's fastest-growing telecom operators with more than 16 million customers across nine countries. During his career he spent 15 years in a variety of roles at telecommunications equipment manufacturer Ericsson, serving as head of Northern Europe and Central Asia, North West Europe, India, CDMA and the North Africa units, as well as global customer accounts for Vodafone and Bharti. Under Granryd's leadership the mobile industry became the first sector to broadly commit to the United Nations Sustainable Development Goals (SDGs) in 2016. He is now spearheading initiatives to accelerate the mobile industry's impact on all 17 of the SDGs, across both developed and developing markets. He recently spoke to The Innovator about the evolving

# Trust Is The New Collateral

## An Interview With Mats GRANRYD, Director General of the GSMA

role of the mobile operator, the industry's role in establishing digital identity and ensuring data privacy, the importance of trust and the rollout of 5G.

**How is the role of mobile operator evolving?**

—M.G.: We are living in extraordinary times. Social, political and technological disruption is shifting the role mobile operators play and what will be

fundamental to their long-term success. Great leaps forward in technology – as we enter the era of intelligent connectivity – will transform our society. ‘Trust’ is the new collateral in this digital world. It's something that every business leader has to build if they are going to be sustainable. This requires a collective commitment to innovate with foresight and care, and to work closely with regulators, other businesses, digital pioneers,

governments, and of course, consumers. These changes aren't just affecting the role of mobile operators but all businesses. An increasing percentage of CEO's are shifting perspectives to allow people and the planet to take precedence over short-term financial targets. Our launch of the Digital Declaration at Davos recognizes this shift.

**The Digital Declaration that the GSMA launched during the World Economic Forum in Davos has so far been signed by CEOs representing 40 companies including Bharti Airtel, China Mobile, China Telecom, Deutsche Telekom, Ericsson, IBM, KDDI, KT, LG Electronics, Mobile World Capital Barcelona, Nokia, NTT DOCOMO, Orange, Samsung Electronics, Sharp, SK Telecom, Sony Corporation, STC Group, Telefónica, Turkcell, Verizon, Vodafone and Xiaomi. What is the declaration's purpose?**

—M.G.: The declaration is meant to serve as a guide to acting ethically in the digital era.. It is expected that by 2022, 60% of GDP will be digitized. The arrival of 5G networks will further

accelerate this change. At the same time consumers are rightfully expecting more from digital services, while their trust in businesses is being tested. I strongly believe a new form of responsible leadership is needed to successfully navigate this era. The Digital Declaration principles call on businesses to respect the privacy of digital citizens; handle personal data securely and transparently; take meaningful steps to mitigate cyber threats; and ensure everyone can participate in the digital economy as it develops while combatting online harassment. It's about us delivering what matters most to consumers, industry and governments – building trust, inclusive growth and innovation.

**What is the role of the GSMA in helping the industry figure this out?**

—M.G.: We are unifying CEOs behind common ethical principles to guide their journey and helping support dialogue between industry, government and regulators. To help business leaders accelerate their own progress in designing a better future we are also sharing best practice that inspires others to join this global movement that's been ignited by the mobile industry.

**Establishing a secure digital identity will be key to the success of the Internet of Things. GSMA has launched Mobile Connect, an approach to digital identity that allows people to use their mobile phones to log into websites and applications with a single login without the need to remember multiple passwords. What is the goal of the program?**

—M.G.: Through Mobile Connect, mobile operators are fulfilling an important role in the digital identity space. It has already been deployed by 71 operators in 31 markets, with over 484 million active users globally.

Where it's really making a difference is bringing secure and convenient services to people living in poverty and displaced people who couldn't access essential banking, health and e-government services before.

**How is the mobile industry impacting SDGs?**

—M.G.: The lives of over five billion people have been radically impacted by the advent of mobile technology. Yet we've only just scratched the surface. Between now and 2030, the mobile industry will link billions more people and things online. Our expanding connected network is directly contributing to addressing the UN Sustainable Development Goals in many ways from giving vital access to clean water, sanitation and education to reducing inequalities and building sustainable cities and communities. I am proud to say that in 2016 the mobile sector became the first sector to commit to all 17 SDGs. We have already enabled more than 1.2 billion people to improve their or their children's education through mobile and our industry has provided essential humanitarian assistance to more than 30 million people during epidemics and natural disasters. We have increased mobile penetration to the poorest populations living in developing countries and also empowered more than 16 million women by giving them access to mobile money. This is just a few examples of where we are making an impact. Our 'Mobile Industry Impact Report' shows that we have increased impact across all 17 SDGs.

**There is growing industry concern about the potential use of Huawei's telecom equipment as a back door to spy on the West. The issue is making headlines nearly everyday. How is the GSMA handling this and what – if any impact – will there be**

"I strongly believe a new form of responsible leadership is needed to successfully navigate this era."

**on MWC this year ?**

—M.G.: There is growing concern but we have yet to see any evidence to substantiate these claims. We will continue to follow this issue and are closely monitoring any impact on the global mobile ecosystem. We do not anticipate that this will have any impact on MWC. A great number of Chinese organizations including Huawei are planning to join us in Barcelona and their executives are speaking at keynotes and seminars throughout the week.

**5G has been a topic for the last several years. What is the best estimate on global roll-out of the technology?**

—M.G.: We are going to see the first commercial 5G services launching this year. This will be the precursor for lots more 5G activity, as we see ultra-fast networks light up exciting new possibilities in health, education, manufacturing and much more around the world. We hope the early launches in the United States, South Korea, the UAE and China will inspire more countries to do what needs to be done to make 5G a reality. Creating the

right policy environment for operators including timely access to the right spectrum under the right conditions will be key to being a frontrunner in 5G deployments. According to GSMA Intelligence, getting this right will mean that there will be more than 1.4 billion 5G connections globally by 2025 – or about 15% of the total market.

**Is it fair to say that the emphasis is moving away from the infrastructure to what can be done with intelligent connectivity?**

—M.G.: I'd say the two go hand in hand. Intelligent Connectivity describes the combination of endless connectivity enabled through 5G and the Internet of Things, with the powerful intelligence delivered by big data and artificial intelligence. It will transform how consumers live their everyday lives, how entire industries innovate and operate, and how economies flourish. All of this isn't possible without the development of infrastructure. Intelligent Connectivity is driving innovation and will be an important theme at Mobile World Congress in Barcelona this month. ●



# Leaping Into The Future

— Augmented reality, also known as spatial computing, could change everything from brain surgery to car manufacturing and sneaker design.

● **Removing brain tumors is a difficult,** intricate task but soon surgeons’ skills will be augmented by the ability to operate while simultaneously seeing an image - magically floating in the air – of the inside of the patient’s head. Adding this new dimension to surgical procedures and medical imaging is the objective of a partnership between U.S.-based Magic Leap, which makes augmented reality (AR) technology that allows digital objects to be interspersed with the real world, and Germany’s Brainlab, a medical technology company that already powers treatments in radiosurgery as well as numerous surgical fields including neurosurgery, orthopedic, spine and trauma in thousands of hospitals worldwide. This futuristic operating system will combine Brainlab’s data management, cloud computing, visualization and data pre-processing software with Magic Leap’s spatial computing and experiential platforms. The first release of the product promises to enable surgical planning and simulation in an office setting. The companies say this will be expanded upon quickly to include a next-generation mix of virtual and physical worlds for the operating room, radiotherapy treatment room, intensive care unit and radiology suite. The partnership with Brainlab represents a pivot for Magic Leap, which has raised an eye popping \$2.3 billion in funding. It initially targeted consumers and entertainment applications such as gaming and launched its first AR headsets, which sell for \$2,295, last August. While consumer applications will continue to make up part of the mix the company is now additionally looking at how the technology can be used as a productivity tool for business, says Rio Caraeff, Magic Leap’s chief content officer. “We are looking at the industries that are already working in 3D to do things like plotting a surgical map of the brain or designing a hospital or the newest sneaker,” he says. “There are already many industries and customers that speak the lingua franca of the medium because this is

already in their work flow but they have to go through the awkward process of working on a 2D screen, taking it to 3D and then going back into 2D. The workflow is suboptimal, we have a receptive audience in all of these industries. This is the lowest hanging fruit but we are in the dawn of something new right now.” The something new is using light to render digital in such a way that the brain believes it to be real. The Magic Leap One device also uses sensing to see the physical world so that digital content can respect, recognize or interact with physical surfaces and objects, preventing, for example, a digital persona from walking through a real-world desk. (See the Q & A about spatial computing on page 18.)

## Merging The Physical And The Digital

“Any physical objects that you use in your home or at work are a collection of atoms. What happens if the atoms go away and the bits are freed and can mix with the photons surrounding us in the real world?”, asks Caraeff. “This requires a leap in imagination for people who don’t come from the world of AR but Magic Leap has found a large arena of customers who see real opportunities and are trying to solve real problems with spatial computing today. We will still carry the flame for consumers but we need to go where we have customers and opportunities.” The sectors Magic Leap is targeting include architecture, design, manufacturing and medical imaging and healthcare. “We are starting to talk to CIOs of Fortune 500 companies and people who have tremendous expertise but are limited by legacy computing paradigms,” he says. This new field of spatial computing will allow people to work in new ways, using telepresence and teamwork. It will, for example, permit an experience that equates to having many people in different physical locations use the same computer and applications at the same time to collaboratively work on a 3D design or some other type of business problem.

## A Potentially Powerful Diagnostics Platform

The medical field is a natural way for Magic Leap to start branching out into business applications, says Caraeff. Rony Abovitz, Magic Leap’s CEO, previously founded Mako Surgical Corp., a company that manufactures surgical robotic arm assistance platforms for operating rooms. “He has a high degree of comfort and reference for how careful you have to be,” says Caraeff. “It is not something you blindly rush into.” Magic Leap partnered with Munich-based Brainlab because “we think it is one of the most progressive and innovative companies in that space and can move quickly,” he says. The partners have not yet announced customers or a launch date for their operating room technology. “We are still dealing with the kind of heavy lifting you have to do before you ship,” says Caraeff. In this case that includes how to safely deal with ambient radio waves in an operating room and ensuring the technology confirms with HIPAA rules that govern



**AR applications are redefining how surgeons and other medical clinicians visualize and access medical imaging data.**

the protection of individuals’ medical records and other personal health information. If customers opt in, Magic Leap says it is separately looking at how it could become a powerful diagnostic platform, says Caraeff. “Our vision is to have an SDK (a collection of software used for developing applications for a specific device or operating system) for health and wellness so that qualified developers can work on our platform.”

## Tackling New Types Of Privacy Issues

Magic Leap’s technology illustrates the benefits that intelligent connectivity will enable but, like other innovations, also underscores the need to address how such services should be governed. “We are amplifying the human condition: am I still I, and are you still you if I am perceptively present among the people, places, and things that surround you,” asks Caraeff.

“Magic Leap is amplifying you and giving you superpowers such as telepresence and X-Ray vision,” he says. “It is a way of being more connected to people and holds lots of promise and potential. But when you are on a platform that is so intimate in nature we have to be closely attuned to the privacy issues associated with live streaming everything you do and empower users to be in control of all of their information.” Magic Leap says it regards privacy as one of its core values and vows to “bake it” into its operating system, SDK and terms of use. “Privacy is fundamental when you are amplifying humans with sensors and unlocking the magic with a biometric scan of the retina,” Caraeff says. “People need to know who will have access to that information. It will not be stored anywhere and will not be uploaded to the cloud. Everything you do with Magic Leap will be based on privacy by design. Our business model is not selling your data, it is making sure you have great experiences while allowing you to control your data every step of the way.”

## Future Portals

Today the experience of spatial computing – and the ability to do things that are cooperative and coordinated – requires that anyone using the technology wear clunky, expensive AR headsets. But that is set to change. “The world is not going to be a homogenous place,” says Caraeff. “We tend to have different models of phones and people will want their devices to be interoperable with our platform so it may be that you will have mobile AR on your phone and somebody else will have it on a wearable and they will be able to communicate, collaborate or see the dragon that lives in the park. Ensuring the future operability of shared experience is key to us,” he says. “We don’t live in that world yet but we are building it.” ●

**J.L.S.**

# Through The Looking Glass

An Interview With  
Jared Ficklin,  
a futurist working on a new model for spatial computing



● **Jared Ficklin, an innovator, futurist and product designer,** is Chief Creative Technologist at argodesign. He is leading argo’s strategic design partnership with Magic Leap to help create a new model for spatial computing. Magic Leap is developing proprietary technology, including augmented reality (AR) glasses that allow digital content to move beyond the confines of the 2D screens and computers of today, allowing digital objects and personas to be interspersed with the real world. Ficklin, who is also a frog design fellow and worked on touch screens with HP and on voice and gesture-based computing with Microsoft during his career, is a scheduled speaker at the 4YFN conference in Barcelona February 25–27. He recently spoke to The Innovator about spatial computing and how enterprises might use it.

**What is spatial computing?**  
—**J.F.:** It is a merging of digital and physical spaces, for the purpose of computing. The things we do on our devices join us in the physical world. A good real-world example of this is in a doctor’s office. Spatial computing allows you to mark up the physical

world so if you are standing before a patient, key data about the patient can be overlaid. The Magic Leap One device is capable of using light to render the digital in such a way that the brain believes it to be real. The device also uses sensing to see the physical world so that digital content can respect, recognize or interact with the physical surfaces and objects in our space.  
**What are you trying to achieve with your partnership with Magic Leap?**  
—**J.F.:** For 60 years, computers existed but were complicated enough to be used only by specialists in labs. Then Windows came along, and the interaction and software model was simple enough that the population at large and especially businesses were able to use them as a widely deployed productivity tool. Similarly, feature phones existed for almost 10 years before the iPhone was deployed, and the IOS operating system galvanized everything to move onto mobile and increase productivity. We have not yet developed this model for spatial computing, but I firmly believe that Magic Leap and their device and technology is poised to

help us understand, from a productivity standpoint, what it means to have multimodal input and integrate digital into reality.  
**What is the timeline?**  
—**J.F.:** Magic Leap One is available for creators now. For business, first movers can begin on solutions now. We will see higher saturation building over the next few years. Some do have trouble identifying where to use mixed reality today, but most can see where they are feeling trapped by their screens or seeing them interfere with physical tasks. We as users don’t have the vernacular or the convention to tell us how we can make our work more digitally cooperative, but we understand where the edges are. Currently, our dominant pattern is use of personal computers. One person, one piece of software, one input and output system on one computer using a screen. That gets in the way of collaboration and communication, and verges on unsafe when dealing with the physical. Now, we are about to add another layer called spatial computing, where a person uses the environment as a screen, and then a cooperative model of computing, where two or more

people are using the same input and output on the same piece of software at the same time. This new layer represents an evolution for humanity and for business because it will allow computers to augment humans in new ways. We are not going to turn our eyes into screens. We are going to keep our eyes, and give them the ability to see the physical and digital together.  
**What are some of the enterprise applications?**  
—**J.F.:** You need a portal into spatial computing so you can do things that are cooperative and coordinated. For now, you need a device - but there is a long tail to this. In the future, there might be other ways to join if you don’t have a headset or some other kind of device. There are multiple applications for this in operating rooms, conference rooms, trading desks or war rooms. Imagine telepresence where not only can you be ported into the room, but where you can use your finger to write on a wall like it’s a whiteboard. Someone else who is physically present in the room can be adding to that white board, and both of those actions can be integrated. People can be using the same computer and the same interface at the same time to create something together, and telepresence turns into teamwork. With Magic Leap you can still see the real world but you can also see digital objects within it. We are not just augmenting reality, we are augmenting ourselves. Augmented reality will help us break free from flat screens. If you are in business, you need to ask yourself what applications require truly collaborative computing, either with others or the environment, and determine: would spatial computing improve this process? A lot of times, the answer will be yes. ●



Intelligent connectivity allows widely used drugs to be formulated so that they communicate when they have been ingested. A wearable patch detects medicines and captures physiologic responses while mobile applications support patient self-care and physician decision-making.

# How Digital Medicine Is Changing Healthcare

● **For the first time cancer patients are using digital oncology medicines that allow doctors to track** – at a distance and in real time – when they take their medicine and how their body reacts. The system – which was introduced in January and involves ingestible sensors packed into pills - captures, records and shares information about the time, dose and type of oral chemotherapy medication taken. This information, as well as data on rest, activity and resting heart rate, can be shared with the patient’s consent with their physician, pharmacist or caretaker. Privacy, a top concern for patients, is an important component. The system, developed by Proteus Digital Health, a World Economic Forum Technology Pioneer, is designed so that information can only be seen by the patient and individuals they designate on a secure, mobile-friendly platform. Proteus developed the care model for oral digital oncology medicines with two U.S. partners: University of Minnesota Health and Minneapolis-based Fairview Health Services, a non-profit organization. Proteus Digital Health is a pioneer in a new category of pharmaceuticals known as digital medicines. Proteus’s pills work like this: widely used drugs are formulated so that they communicate when they have been ingested, a wearable patch detects medicines and captures physiologic responses, and mobile applications support patient self-care and physician decision-making. The company has more than 540 patents and regulatory clearances in the U.S., European Union and China. Its latest product is being billed as the first health system in the world to prescribe digital capecitabine, a

common chemotherapy drug equipped with the Proteus ingestible sensor. It is currently being used to help treat stage 3 and 4 colorectal cancer patients. “We believe this will enable oncology patients to stay on their therapy longer, avoid hospital admissions, and have better response to therapy overall,” says Andrew Thompson, Proteus’ CEO and co-founder.

**Digital Feedback**  
Already, the system is creating feedback for doctors that goes far beyond the digital data communicated. Doctors were astonished, for example, when they discovered via digital data that one cancer patient faithfully took her medicine every day except on Tuesdays and Wednesdays, recounts Thompson. When they asked her why they discovered that her daughter went to work on those days and the woman, who is additionally coping with multiple sclerosis, was unable to open the pill bottle on her own. After checking that there were no children in the house the doctors made sure she was given a pill container that was easier to open.  
“Oncologists are engaged in patients’ lives due to the critical nature of the disease but even if there is a strong bond and they see the patient every week in a clinic it is impossible to know what is going on at home,” says Olivia Ware, Proteus’ new senior vice president of US Markets and Franchise Development. “Patients do their best to remember what happened in the week since they last saw their doctor but it is really challenging because they are dealing with life threatening diseases and sometimes complex family and financial issues. It is hard to keep track of everything and remember to tell the doctor what is significant or even to know what is significant.”Being able to better understand patients’ behavior and how they respond to drugs is appealing to oncologists, says Thompson. Results with digital medicines for other diseases prove it can lead to better therapeutic outcomes, he says. Take the case of one set of cardiovascular patients who had been taking medicine for at least six months for high blood pressure but were not responding well to treatment. Thompson says that when these patients started taking digital medicine 98% had a good response rate within 90 days. “That’s an incredible outcome for patients failing drug therapy,” he says. “What person would not want premium health care for a loved one or themselves? This is one of the most compelling apps for mobile health.” ●

J.L.S.



# Adding Diagnostics To The Loop

— A U.S. recycling company plans – with consumer buy-in – to run diagnostics tests on discarded toothbrushes, dirty diapers and used kitty litter to spot dietary imbalances or health issues.

● When 25 global businesses announced in January that they would work with TerraCycle, a recycling specialist, to launch the Loop Alliance Initiative, a scheme that enables consumers to buy a variety of products in customized, brand-specific durable packaging that is collected, cleaned, refilled and reused, they emphasized how it would reduce the massive amounts of single use plastic containers that are polluting the planet. “We’re going back to the milkman model of the 1950s,” says Tom Szaky, CEO of the Trenton, New Jersey-based international recycling company TerraCycle, which is behind Loop. “You buy the milk but the milk company owns the bottle, which you leave in the milk box to be picked up when you’re done with it.” Operating nationally across 21 countries, TerraCycle regularly partners with leading consumer product companies, retailers, cities and facilities to recycle products



The Loop tote.



A number of big brands have adopted the Loop system for durable packaging.

and packages, from dirty diapers to cigarette butts, that would otherwise end up being landfilled or incinerated. The idea for Loop was founded at the World Economic Forum by TerraCycle and big name consumer product companies such as Procter & Gamble, Nestle, PepsiCo, Unilever and Coca-Cola. At the launch at this year’s annual meeting in Davos the consumer product makers showed off sleek new refillable containers for everything from olive oil to ice cream that will help reduce plastic waste (See the photos.) But the service aspires to be much more than that. “There is a big waste stream diagnostics opportunity,” says Szaky. If all goes as planned Loop will – with consumer buy-in - run diagnostics tests on discarded toothbrushes, dirty diapers and used kitty litter to spot dietary imbalances or health issues. The system could serve as as early warning system for people who rarely visit the doctor, but only if the right policy frameworks are in place. “The Loop engine is very powerful: we have a direct relationship with the products coming back and we know which consumer it is from,” says Szaky. “There is a whole waste trace from motor oil, cat litter or a child’s diaper. We can take diagnostic samples from these things without any extra work from the consumer to get us those samples and, if they opt in and pay whatever fee that we might charge, they could get a lot of interesting learning from that and potentially live a better life and avoid ending up in the hospital.” Loop will not launch the service unless strong privacy and security measures can be implemented, says Szaky. “The data would never be sold and would have to be held in a highly secure way,” he says. “Our paramount concern is that people using the service feel very comfortable, otherwise it will be bad for business, for the brand and for trust.”

“There is a big waste stream diagnostics opportunity.”

## Getting Started

Loop will begin as a service for replenishing products. Consumers will go to the Loop websites or partner retailer’s websites and shop for brands offering waste-free packaging. Consumers will receive their durable products in a Loop shipping tote that eliminates the need for single-use shipping materials like cardboard boxes or plastic bags. When consumers have depleted their supply of product, they place the empty package into one of their Loop totes. Loop picks the totes up directly from consumers’ homes. The alliance says its team of scientists have developed custom cleaning technologies so that empty containers may be safely reused. It also accepts used diapers, pads, razors or brush parts. Loop replenishes products as needed and returns the refilled shipping totes to the consumer. The service will be launched first in France in May by Carrefour, then be rolled out on the East Coast of the U.S., followed by London, Tokyo and the rest of world.



Toothpaste won’t come in a tube anymore. It will come in a jar in the form of tabs.

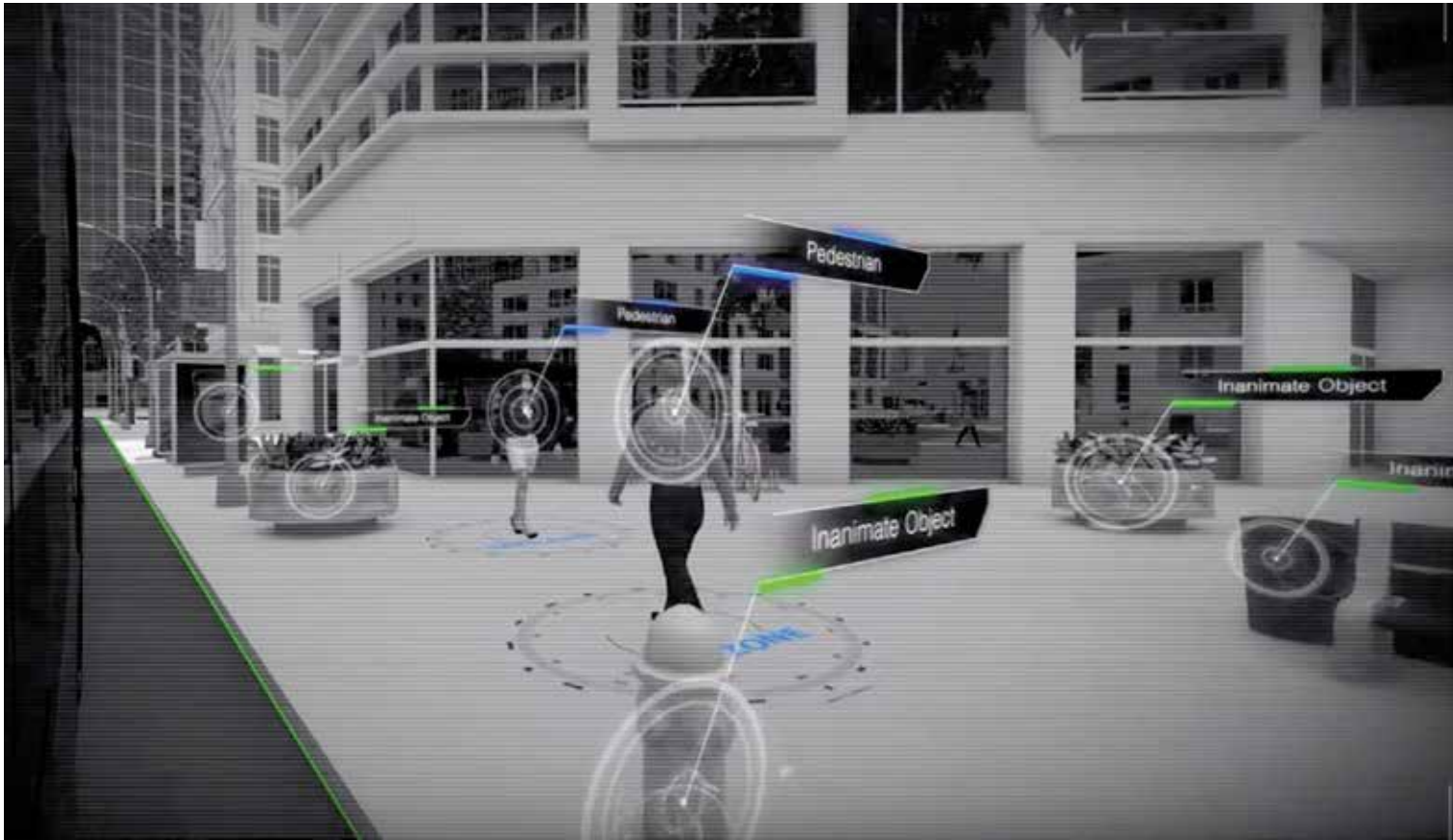


CoZie’ deodorant’s new durable packaging.

## The Diagnostics Opportunity

Loop plans to roll out the diagnostics service step by step, starting with non-biological products. “Used motor oil, which contains residual engine scrapings, can tell a lot about the health of the inside of a car engine that you could never figure out on your own unless you take it apart,” says

Szaky. “There is a whole range of these types of products.” Next Loop will look at running diagnostic tests on animal waste. “By testing urine on cat litter we can spot things like urinary tract infections and if the pet’s owner is willing to tell us a little bit about the age and species we could make appropriate recommendations, such as what type of food to give them or whether it is necessary to take them to see a vet,” says Szaky. “It can work as a preventative measure versus going to the vet when it is too late or having the poor animal suffer.” The step after that will be examining used toothbrushes, human fecal matter on a diaper, or blood on a feminine care product to determine general wellness. Checking these types of products would enable Loop to establish an individual’s baseline and warn them when something seems out of whack. It could be as simple as dietary recommendations or serve as a physician’s aid, spotting problems early on and urging people to go see their doctor. Dirty diapers could provide the type of information parent may find useful such as knowing if a breastfed baby is getting the right amount of food, how their gut is doing or whether they need vitamins, he says. There might be a way to tie the results into products and determine what kind of baby food or pet food is best, says Szaky. Consumers might also be interested in multiple options, such as testing both their toothbrush and hairs on a razor blade. “This might produce a third learning that we could not know without both pieces of information,” he says. So what is the timeline? “It could be 10 or 20 years away,” says Szaky. “It is a journey. The big insight is that by having a direct relationship with the waste of products a huge ecosystem opens up. We are going to go very slowly and test the boundaries of how far this process can go and what are the limits to ensure that it can only create benefits and no way do anything that does the opposite.” The world has taken ‘a make waste approach’ and given discarded items a negative value. Diagnostics could create a different relationship with products. “There is so much opportunity to change that in a way that we have not thought about before,” says Szaky. “This is an amazing area of innovation and discovery, one that could turn a negative problem into something phenomenal that can do a lot for people.” ● J.L.S.



“Our main goal is to change the way smart cities innovate in Israel and all around the world by providing the right platform for sharing data and promoting collaboration between the private and public sectors.”

**Smadar Itskovich,**  
Founder of the Israel Smart Mobility Living Lab

# Changing The Way Cities Innovate

— Teaming with a new non-profit and tech companies gives municipalities a way to fast track the development of technologies for the public good.

promoting collaboration between the private and public sectors,” says ISMLL founder Smadar Itskovich, who recently made the “40 over 40” list of Israeli tech entrepreneurs published by tech blog Geektime. “We are trying to understand what are the challenges and what kind of collaborations are needed to create new products for the public good. Only by thinking together can we come up with game-changing solutions.”

A group of international and Israeli technology companies including Microsoft and startups Argus Cyber Security, Waycare, Foresight, Mobi (Mobility Open Blockchain Initiative), NoTraffic, Gett Israel, Cognata, IPgallery, and Simplex Mapping, have already agreed to join. ISMLLs first initiative is focusing on ways to reduce traffic accidents and fatalities. “One of our major concerns is smart city safety issues,” she says. “The technologies already exist but they are not dedicated to the goals of public safety. Our NGO is trying to use the concept of a collaborative platform and smart mobility data to achieve goals regarding public safety and obtain new insights for the public good.”

Itskovich previously was in charge of innovation in the Israeli southern city of Ashdod. Under her direction the city and bus company Afikim teamed up with Mobileye, an Israeli startup acquired by Intel that develops vision-based advanced driver-assistance systems providing warnings for collision prevention and mitigation; Ituran, a provider of location-based services; and Simplex Mapping, a 3D mapping company. The technologies were deployed in an integrated manner to help the city reduce accidents involving public transportation.

Advanced sensors were installed on the public buses and, with the help of 3D heat maps, helped public officials identify high-risk areas and what

kind of dangers they present for drivers and bikers. “We could see in real time – visually very, very clearly – what kind of obstacles and what kind of risk areas there are, helping the city to take decisions on what it should be doing in order to prevent such risks in the future. This is how we use technology in order to improve the lives of residents.”

ISMLL is currently working on several different technology solutions to reduce risks, such as one that could automatically turn traffic lights green for ambulances to help them get to hospitals quicker and prevent accidents that happen when they speed through red lights.

“When you take software, AI and IoT (Internet of Things) and fuse them together you can really create something extraordinary for the public good,” she says. “All this technology exists but we still suffer from congestion, from accessibility, from air pollution and the problems are getting worse

and worse in Israel and other regions in the world. All the data and tech are in the hands of private companies so if a city wants to be smart we have to cooperate together.”

Itskovich says she is in discussions with cities in France and Germany about the launch of other collaborative projects on the platform.

“Every city wants to adopt technologies to become more efficient and improve the life of people in areas such as safety and health,” she says. “Normally if a city wants to do a use case it has to publish a tender and negotiate with five or 10 different companies. The process can take years. We are an NGO that is giving them a platform with many stakeholders that they can leverage for the public good, and they can do it tomorrow morning without bureaucratic barriers.”

**J.L.S.**

● **The Israel Smart Mobility Living Lab (ISMLL),** a new non-profit organization, is building a shared data initiative to help smart cities create technology for public good. ISMLL has partnered with the Massachusetts Institute of Technology (MIT) to establish the Smart Mobility Data Trust, a concept first developed by Professor Alexander “Sandy” Pentland, which aims to provide a new universally-accessible model for global data sharing and provide open source solutions that are free for the taking.

“Our main goal is to change the way smart cities innovate in Israel and all around the world by providing the right platform for sharing data and

## STARTUPS WORKING WITH ISMLL

### FORESIGHT AUTOMOTIVE ISRAEL

**WHAT IT DOES:** Designs, develops and commercializes 3D, multi-camera-based advanced driver assistance systems.

[www.foresightauto.com](http://www.foresightauto.com)

### WAYCARE ISRAEL

**WHAT IT DOES:** Technology that optimizes city traffic management by harnessing in-vehicle information for predictive insights.

<https://waycaretech.com>

### NOTRAFFIC UNITED STATES

**WHAT IT DOES:** A turnkey traffic management platform powered by real-time AI optimization of signalized intersections.

[www.traffic.tech](http://www.traffic.tech)



<p>RETAIL</p> <p><b>* 3DLOOK</b></p> <p>UNITED STATES</p> <p><b>WHAT IT DOES:</b> Developed advanced mobile body scanning that can be used for personalization by apparel retailers and other industries.</p> <p><a href="https://www.3dlook.me/">https://www.3dlook.me/</a></p>	<p>FUTURE OF WORK</p> <p><b>* FACTORIAL</b></p> <p>SPAIN</p> <p><b>WHAT IT DOES:</b> Developed a data-driven platform that allows companies to bring greater automation to such tasks as payroll and human resources.</p> <p><a href="https://factorialhr.com">https://factorialhr.com</a></p>	<p>SECURITY</p> <p><b>* NANOLOCK SECURITY</b></p> <p>UNITED STATES</p> <p><b>WHAT IT DOES:</b> The company's security platform, which works with IoT devices and connected automobiles, protects both the firmware of devices as well as data stored on them.</p> <p><a href="https://www.nanolocksecurity.com/">https://www.nanolocksecurity.com/</a></p>	<p>ARTIFICIAL INTELLIGENCE</p> <p><b>* CARFIT</b></p> <p>UNITED STATES</p> <p><b>WHAT IT DOES:</b> The company's self-diagnostic and predictive maintenance platform uses machine learning and artificial intelligence to monitor and analyze data from connected cars.</p> <p><a href="https://car.fit/">https://car.fit/</a></p>	<p>LOGISTICS</p> <p><b>ICONCONTAINERS</b></p> <p>SPAIN</p> <p><b>WHAT IT DOES:</b> Simplifies the process of arranging overseas shipping by digitizing tasks like getting quotes, booking, and managing shipments as goods are being transported.</p> <p><a href="https://www.iconcontainers.com/">https://www.iconcontainers.com/</a></p>	<p>LOGISTICS</p> <p><b>JOONAAK</b></p> <p>CAMBODIA</p> <p><b>WHAT IT DOES:</b> Runs a network of warehouses and delivery vehicles that provide last-mile logistics services to small and medium businesses.</p> <p><a href="https://www.joonaak.com/">https://www.joonaak.com/</a></p>
<p>FINTECH</p> <p><b>CLEAR BLOCKCHAIN TECHNOLOGIES</b></p> <p>SINGAPORE</p> <p><b>WHAT IT DOES:</b> Developing digital ledger and other technologies to help mobile operators establish a payment system for 5G.</p> <p><a href="https://clearx.io">https://clearx.io</a></p>	<p>FINTECH</p> <p><b>KONSENTUS</b></p> <p>UNITED KINGDOM</p> <p><b>WHAT IT DOES:</b> Helps financial institutions comply with Europe's new open banking PSD2 regulations.</p> <p><a href="https://www.konsentus.com">https://www.konsentus.com</a></p>	<p>MOBILITY</p> <p><b>MAPBOX</b></p> <p>UNITED STATES</p> <p><b>WHAT IT DOES:</b> Provides location features like maps, search, and navigation for clients such as Lonely Planet, The Weather Channel and Snapchat.</p> <p><a href="https://www.mapbox.com/">https://www.mapbox.com/</a></p>	<p>FINTECH</p> <p><b>HOVER</b></p> <p>UNITED STATES</p> <p><b>WHAT IT DOES:</b> Developed a technology that allows in-app mobile payments even for customers without data plans as it enables mobile developers to turn an existing communications protocol, known as 'unstructured supplementary service data (USSD)' into an invisible transport layer.</p> <p><a href="https://www.usehover.com/">https://www.usehover.com/</a></p>	<p>ROBOTICS</p> <p><b>PAL ROBOTICS</b></p> <p>SPAIN</p> <p><b>WHAT IT DOES:</b> A platform that allows companies and researchers to more easily experiment with humanoid robots as they develop products and services.</p> <p><a href="http://www.pal-robotics.com">http://www.pal-robotics.com</a></p>	<p>BLOCKCHAIN</p> <p><b>PUNDI X</b></p> <p>INDONESIA</p> <p><b>WHAT IT DOES:</b> A system that makes it easier for physical merchants to accept cryptocurrencies as payment.</p> <p><a href="http://pundix.com">http://pundix.com</a></p>
<p>QUANTUM COMPUTING</p> <p><b>STRANGEWORKS</b></p> <p>UNITED STATES</p> <p><b>WHAT IT DOES:</b> Building tools for software developers to work with quantum computers, a next-generation computing architecture that allows processing to occur on a molecular level.</p> <p><a href="http://www.strangeworks.com">www.strangeworks.com</a></p>	<div> <div> <div>THE TOP 25 STARTUPS TO MEET AT 4YFN IN BARCELONA</div> <div> <p>Each year 4YFN gathers hundreds of startups from around the world to pitch to investors and corporates. The Innovator selected 25 startups we think would be most interesting to big business.</p> <p>* Finalists in 4YFN's startup competition</p> </div> </div> </div>				
<p>FINTECH</p> <p><b>TOKEN</b></p> <p>UNITED STATES</p> <p><b>WHAT IT DOES:</b> An open banking platform aimed at making it easier for people, businesses and financial institutions to move money around. Using digital identity and smart tokens it offers a way for people to give third parties access to their account details in a secure and simple way.</p> <p><a href="https://token.io">https://token.io</a></p>	<p>ROBOTICS</p> <p><b>LIPS</b></p> <p>TAIWAN</p> <p><b>WHAT IT DOES:</b> Makes 3D-depth cameras that enable robots to pick, place, and scan objects.</p> <p><a href="https://www.lips-hci.com/">https://www.lips-hci.com/</a></p>	<p>ROBOTICS</p> <p><b>LUCID</b></p> <p>UNITED STATES</p> <p><b>WHAT IT DOES:</b> Makes 3D cameras that are being used in a wide range of devices, including drones, robots, mobile phones, and security cameras.</p> <p><a href="https://lucidinside.com/">https://lucidinside.com/</a></p>	<p>MOBILITY</p> <p><b>* SCOOT</b></p> <p>UNITED STATES</p> <p><b>WHAT IT DOES:</b> Public electric scooter and electric bicycle sharing systems for urban areas. It was chosen to part of San Francisco's pilot mobility programs.</p> <p><a href="https://scoot.co">https://scoot.co</a></p>	<p>FINTECH</p> <p><b>TREZEO</b></p> <p>IRELAND</p> <p><b>WHAT IT DOES:</b> Uses technology to help gig economy workers and other self-employed people better manage irregular income streams.</p> <p><a href="https://www.trezeo.com/">https://www.trezeo.com/</a></p>	<p>FINTECH</p> <p><b>VITALITE</b></p> <p>ZAMBIA</p> <p><b>WHAT IT DOES:</b> A pay-as-you-go financing system that makes products ranging from household goods to solar panels affordable in emerging economies.</p> <p><a href="https://www.vitalitegroup.com/">https://www.vitalitegroup.com/</a></p>
<p>SECURITY</p> <p><b>KETS QUANTUM SECURITY</b></p> <p>UNITED KINGDOM</p> <p><b>WHAT IT DOES:</b> Developed quantum encryption technologies designed to protect systems in the coming era of quantum computing, which could render current security obsolete.</p> <p><a href="https://kets-quantum.com/">https://kets-quantum.com/</a></p>	<p>ROBOTICS</p> <p><b>NEO</b></p> <p>SPAIN</p> <p><b>WHAT IT DOES:</b> A multi-currency cash management platform designed to help medium-to-large corporates manage their currency risk and streamline their currency collections and foreign payments.</p> <p><a href="https://www.getneo.com">https://www.getneo.com</a></p>	<p>SECURITY</p> <p><b>CYBERUS LABS</b></p> <p>POLAND</p> <p><b>WHAT IT DOES:</b> A password-free authentication technology that aims to create better security for mobile, desktop, and IoT devices.</p> <p><a href="https://cyberuslabs.com">https://cyberuslabs.com</a></p>	<p>COMMUNICATIONS</p> <p><b>AGORA.IO</b></p> <p>UNITED STATES</p> <p><b>WHAT IT DOES:</b> The company's APIs allow developers and brands to embed real-time voice, video, and interactive broadcasting functionality into their services to increase engagement with customers.</p> <p><a href="http://www.agora.io/">http://www.agora.io/</a></p>	<p>ROBOTICS</p> <p><b>DEEP LEARNING ROBOTICS</b></p> <p>ISRAEL</p> <p><b>WHAT IT DOES:</b> Makes a vision-based robotic controller that uses computer vision and machine learning algorithms to allow robots to learn tasks by observing.</p> <p><a href="https://www.dlrob.com">https://www.dlrob.com</a></p>	<p>Compiled and written by Chris O'Brien.</p> <p>O'Brien is a regulator contributor to The Innovator. Before moving to France in 2014, O'Brien spent 15 years covering Silicon Valley for the San Jose Mercury News and Los Angeles Times.</p>

● Ann Cairns, vice-chairman of Mastercard, is a scheduled speaker at Mobile World Congress in Barcelona, February 25-28. The company will have a big presence at MWC this year and its main message will be trust. Cairns, who has a mathematics degree and a M.Sc. with research into medical statistics, has over over 20 years’ experience in senior management positions across different industries. In addition to an early career as an award-winning research engineer which culminated in a position as head of offshore engineer planning for British Gas, Cairns worked as head of the financial services group at Alvarez & Marsal, CEO of transaction banking at ABN-AMRO, and held several senior positions at Citigroup. She recently spoke to The Innovator about the global payment technology company’s interactions with fintechs, the evolution of payments and the use of data for good.

**How does Mastercard work with fintechs?**  
—**A.C.:** In addition to banks we are working very actively with lots of other players in the ecosystem and with the startup community because we recognize that the world is changing quickly and innovation is increasing. We bring our expertise and support [fintechs] with our global programs like Startpath or Accelerate, with our Labs. We are a big network so we can’t just put something out into our core systems and immediately roll it out to 200 countries. We have to make sure our network is secure. People trust us. But we want to be able to experiment so we have set up a process that allows us to work with startups around the world through our Start Path program. Through that program we are working with startups in retail, security, Big Data and AI and helping to accelerate them into the market. We are also

# The Future Of Payments

**An Interview With Mobile World Congress speaker Ann Cairns,**  
Vice-Chairman of Mastercard

connecting to the global developer community by holding hackathons in places like Australia and Israel. And when we see companies out there that are core to our business we invest in them and sometimes buy them. Brighterion, an AI company which specializes in real-time fraud prevention, is an example of a company we acquired. It does behaviorial biometric authentication. This is great because it gives us an additional way of securing a payment or transaction it works by using technology to understand your behaviour, so if you took my phone and tried to make a payment it would know by the way you struck the keys that it was not me and enable our network to decline the transaction. **All big corporates are trying to bring innovation in from outside but few have mastered the best way to do it. What are some of Mastercard’s key learnings?**  
—**A.C.:** Mastercard has multiple ways of looking at this. For example, when we buy companies we bring the CEO and internal talent along with it, it’s not enough to just buy a piece of



“In addition to banks we are working very actively with lots of other players in the ecosystem and with the startup community because we recognize that the world is changing quickly.”

technology, you need the talent too. The other thing I feel is equally important is taking the core part of Mastercard into that company so that you get the benefit of the synergies of one culture as quickly as possible. That has been very important. If you don’t do that you end up with little islands that hook to your network and in the long term that doesn’t drive benefit. If you get cross pollination of people that will be reflected in the inherent thinking and design of new products. The other important thing is that technology must be embraced and understood by the people at the top of the company. With the addition of technologies like cloud computing, blockchain, machine learning and AI, the pace of change becomes exponential. I am not an expert in AI but I was trained in mathematics and to develop computer models and at that stage I could code. The truth is even today I understand enough to see how to apply things. It is really helpful to have that kind of background and to have the interest. It makes me want

me get out of bed in the morning to know how blockchain really works and what can we use it for, to know what are the use cases for AI. Right now we are all at the start of the journey into unlocking the potential of these technologies we already understand how it could increase efficiency by replacing call centers with chatbots, for example. We also understand how to use algorithms and AI to detect fraud much better than we ever did before. At the same time we have to be careful: we can’t use technologies like AI in a black box environment. We need to be able to understand and explain how the algorithms work to ensure there is nothing inherent that could be detrimental to the people we seek to serve, the businesses we partner with or our own brand. **In addition to ethical questions around AI lots of questions are being raised about the use of personal data. What is your take on that?**  
—**A.C.:** It’s a tough nut to crack. Ethics are different in different parts of the

world. What you find acceptable in China is not acceptable in the U.S. At Mastercard we are applying GDPR [Global Data Protection Rules adopted in Europe] on a global basis. We think consent is the right way to go and it also creates business opportunities. Mastercard and IBM have founded Truata, an independent trust to conduct analytics. It takes data from companies, it cleanses personal information and allows analytics to run and answers questions without infringing GDPR. It is a great example of how some people say ‘oh no, more regulations’ when in fact regulation can create business opportunities. **Mastercard is branching out into some new businesses, like data analytics. For example, the company just signed a new deal with France’s Credit Agricole, which includes a subscription to Mastercard’s data analytics services, which are based on technology that Mastercard acquired when it bought Applied Predictive Technologies for \$600 million in 2015. How do these services fit into Mastercard’s overall strategy?**  
—**A.C.:** We live in a world where people can move from physical to digital and back again, where commerce is enabled through phones, websites, fitness bands, smart mirrors, cars, shoppable windows, and any other environment you can think of. In this context, Mastercard is applying technology in ways that add real value for partners, banks, retailers and digital companies, who in turn, are helping to create new solutions that address and adapt to today’s digital lifestyle. Mastercard is also deeply engaged to propose frictionless shopping and new payment flows to smart cities and added value solutions beyond the payment. This includes the artificial intelligence and device based insights

of our Brighterion and NuData businesses, as well as test and learn capabilities of APT [Applied Predictive Technologies, which was acquired by Mastercard in 2015]. We combine offerings with payments expertise to provide financial institutions and retailers with actionable insights and solutions that lead to improved value and experiences for consumers. **How does Mastercard see payments evolving?**  
—**A.C.:** On a cryptocurrency side, we opened in 2017 access to our blockchain technology via our API published on the Mastercard developers’ platform to create new digital commerce experiences. And in 2018, we have expanded our ability to do this in multiple ways, one of which is hiring 175 new employees in Dublin focused on driving innovation and creating the future of payments. **During the World Economic Forum’s annual meeting in Davos the Mastercard Center for Inclusive Growth and The Rockefeller Foundation announced a projected Data Science for Social Impact with an initial commitment of \$50 million and an invitation to other companies and philanthropies to join. What do you hope to achieve with this initiative?**  
—**A.C.:** The idea behind the collaborative is to identify key priorities and investment opportunities to accelerate data for good, whether that be through research, skill-building or the development of new technology platforms. By growing the data science capabilities of non-profit, civic and government organizations, the collaborative can help local leaders uncover new insights and trends from their data and build more impactful programs for the communities they serve, and give us all a chance of solving some of the greatest challenges of our time. ●



# Fintech For The Underserved

— Faster and smarter networks have triggered a wave of startups targeting people in emerging economies who have traditionally lacked access to basic financial services.

By Chris O’Brien

● **After a friend’s accident on the roads of Delhi, Rohan Malhotra recalls spending several frustrating hours trying to file a claim with an insurance company.** He could summon an Uber in 10 minutes and get a pizza delivered in half an hour. But making an urgent connection with an insurance agent remained frustratingly elusive. With India experiencing falling mobile data tariffs and a rapid adoption of smartphones, Malhotra decided the time was right to launch a mobile-first insurance product that leverages connectivity as well as artificial intelligence (AI). “In India, less than 2% of the population has some kind of insurance,” says Malhotra. “To introduce people here to insurance, we are building micro-insurance products that they can use on their phones. The best way to introduce them to a new service is to do it in a system they are already adopting.” Roadzen is just one example of a new generation of fintechs in emerging markets. These companies are riding a wave of faster and smarter mobile networks and combining tools such as drones, Internet of Things (IoT) technologies, AI, and smartphones to capture and analyze data in new ways in order to offer loans, insurance, payments and savings to populations that have traditionally lacked access to such financial services. Singapore-based Grab, a mobile-first ride-hailing service, for instance, has started using its platform to deliver financial services such as payments, loans and savings accounts to residents in eight Southeast Asian countries. And in January its announced a joint venture with Chinese online insurance group ZhongAn that will additionally allow south-east Asian users to purchase insurance through the the ride-hailing app. In a region where almost 40% of people don’t have bank accounts, Grab is becoming a de facto bank, acting as a place to store money and spend it, allowing its users to join the digital economy. “Many parts of the population are coming online for the first time,” says Theo Vassilakis, Grab’s chief technology officer. “We saw the opportunity to give them the things they need for their everyday lives in one place that they trust, and that just works.” Perhaps no one has a better perspective on the multiple types of fintech innovations in emerging markets than Michael

Schlein, the CEO of non-profit impact investor Accion, which got its start in the early 1960s as a community development project in South America, eventually became a pioneer of concepts like micro-lending in the 1970s, and then created a for-profit bank in the 1980s that targets developing economies. Those models proved successful for the communities, but also for Accion, which reported strong returns on investments, allowing it to keep expanding its reach. Eventually, the organization turned its attention to what Accion calls “fintech for the underserved.” In 2012, it created Accion Venture Lab to focus on seed investing, and then in 2017, the Accion Inclusion Frontier Fund with \$141 million to make larger investments to help young companies in emerging markets ready to scale up. “It really fits with our mission, because ... we’re willing to take chances that others aren’t,” Schlein says. “We work directly with them and support them so that bigger institutions eventually will invest and bring them to greater scale. Around the world there are about 3 billion people for whom the global financial system is invisible, and they are invisible to it.” While Accion has been operating for more than four decades, Schlein said that due to faster networks and new technologies there has been a dramatic acceleration of fintech innovation that wouldn’t have been possible even a few years ago.

## A Dramatic Acceleration In Innovation

In Kenya, for instance, Schlein points to Apollo Agriculture which is using satellite imagery to analyze land to extend loans to farms, while another Accion Venture Lab portfolio company Pula uses similar technology for insurance. Another portfolio company in Mexico, Konfio, helps small businesses digitize their operations for free and then uses the data to establish their creditworthiness and eligibility for loans. In South Africa, startup Lumkani extends home insurance to informal settlements in part by providing IoT-connected heat detectors that sound in connected homes, because when a fire breaks out it typically spreads rapidly. “There is huge infrastructure that is being laid by mobile network operators and government,” Schlein says. “And a lot of these innovators are going to bring higher level financial services and ride on the rails that are being laid.” James Saruchera, CEO and co-founder of Kuvacash, is hoping to do exactly that in Zimbabwe. Growing up there, he watched his parents’ pensions get wiped out by hyperinflation. Currency volatility continues to make it difficult



Photo provided by Accion Venture Lab

for residents to save, and to attract outside investment to the country. To address that, Kuvacash is creating a mobile wallet system using blockchain technology. Residents can upload their money to the wallet where it is stored as a stable coin cryptocurrency created by Kuvacash that is pegged to the U.S. dollar. “The infrastructure allows them to have it in digital currency where they can move it at low cost, peer-to-peer around the world or send to any bank account,” Saruchera says. The Kuvacash wallet is also laying the foundation for something that Saruchera believes will have a far greater impact. By creating a less volatile payment system, he thinks Kuvacash can help attract more outside investment into the country’s infrastructure. Right now, an international investor might be reluctant to back construction of a toll road because of the likelihood currency devaluation will make it hard to recoup their money, he says. But if the funding for a project and the fees paid by users are done through Kuvacash, that stability would create greater transparency and confidence. Indeed, Kuvacash is already involved in the development of plans to build an aerial cable car system in the capital city of Harare to relieve traffic congestion.

As part of the plan, passengers would be able to pay with their Kuvacash wallet, and network providers would allocate more connectivity along the cable car lines. “What we see as a great opportunity is not just transforming how money moves in and out of developing countries like Zimbabwe,” he says. “But we also see the potential for an exponential acceleration in the quality of life for people.”

## Trickle-Up Innovation

Benefits are not limited to people in emerging markets. Some of the innovations being rolled out in emerging markets are now being applied in developed countries. Since launching in India Roadzen has partnered with 30-plus insurers globally, is present in the U.S. and China and looking to expand into Europe. “Insurers recognize that they need to change but they are completely hamstrung by legacy,” says CEO Malhotra. “Our platform allows insurers to be more technologically-centric and embrace data-driven decision making,” he says. “We are using AI to solve some of the hardest problems that insurance companies face in underwriting and in claims.” ●

## EMERGING MARKET FINTECH STARTUPS TO WATCH

### APOLLO AGRICULTURE KENYA

**WHAT IT DOES:** Uses advanced satellite imagery to analyze a farmer’s land in order to evaluate creditworthiness for loans.

<https://apolloagriculture.com>

### PULA KENYA

**WHAT IT DOES:** Uses satellite imagery to establish insurance policies for farmers.

<https://www.pula-advisors.com>

### ALLLIFE SOUTH AFRICA

**WHAT IT DOES:** Uses algorithmic pricing and an automated assessment to extend insurance to populations with HIV and other diseases who previously could not obtain policies.

<https://alllife.co.za>

### KONFIO MEXICO

**WHAT IT DOES:** : Helps small businesses digitize their internal systems for billing and payroll for free, and then uses the data to establish creditworthiness and eligibility for loans.

<https://konfio.mx/>

### ROADZEN INDIA

**WHAT IT DOES:** Mobile-first micro-insurance policies for people in emerging markets and on-demand insurance, roadside assistance and claims management software for the global insurance industry.

[www.roadzen.io](http://www.roadzen.io)

Mission Driven Tech

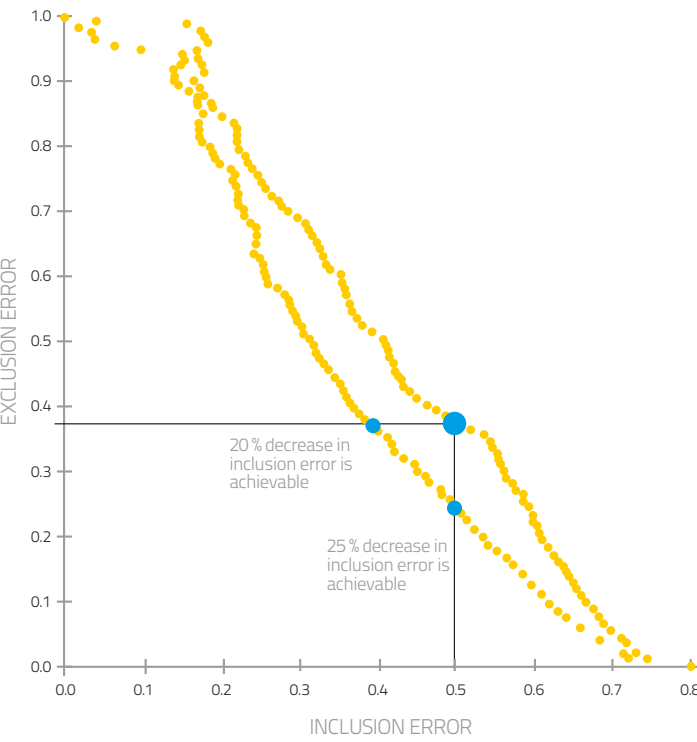
— Already considered one of Latin America’s tech hubs, Colombia is testing how AI and blockchain could improve the life of citizens.

Colombia is pioneering the application of cutting-edge technologies for the public good. It is testing the use of artificial intelligence (AI) for fair and efficient targeting of candidates for government social programs and the ethical extraction of data from private enterprise for the public good. And, it is examining how it could use blockchain to fight corruption.

The government is testing the use of data collected by AI to more fairly access who is eligible for government cash transfer payments to the poor. Across Latin America 35% of the people in the program don’t belong there and more than 35% of the people who need the stipends aren’t receiving them. They just don’t know which 35%, says Alejandro Noriega, a PhD candidate at the MIT Media Lab whose research focuses on the use of human and artificial intelligence in social decision systems. His research lies at the intersection of decision sciences, artificial intelligence, causal inference, policy and economics. In the past few years he has conducted applied research projects with the United Nations’ Big Data initiative (Global Pulse), the national governments of Colombia, Mexico, Andorra and Saudi Arabia. Initial results in Colombia are promising (see the graphic), says Noriega, who recently returned to the U.S. after organizing a four-day workshop for government officials on the use of AI for targeting social policies. If successful, the same technology – developed at the MIT Media Lab – could be applied to the 115 national

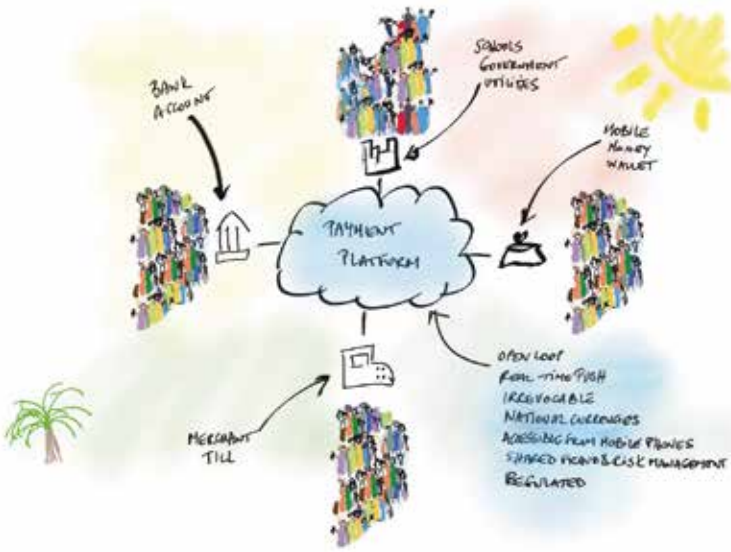
cash transfer programs operating worldwide. In Latin Amercia alone some 80 million households receive \$8.5 billion in government cash transfer payments each year, representing 0.3% of the region’s GDP, says Noriega. These payments cover targeted programs such as education scholarships or money to buy food. Ensuring that the right people receive

the money can have a big impact. “Improving large-scale social programs in developing countries is one of the paramount near-term oportunities of the AI revolution, which can swiftly benefit a hundred million lives, and save billions,” he says. Separately, the Colombian government is working with MIT Media Lab on another program: OPAL,



Modern statistical methods from AI can substantially improve selecting candidates for government social programs in countries like Colombia, cutting exclusion errors (false negatives) by up to 25%, and inclusion errors (false positives) by up to 20%. The upper curve shows targeting systems based on traditional models; the lower curve models based on AI.

Illustration by Kosta Peric, Deputy Director, Financial Services for the Poor at the Gates Foundation



Banking On The Unbanked

— Mobile operators, the Bill & Melinda Gates Foundation and startups have teamed up to extend interoperability of mobile money services in a way that specifically meets the needs of Africa’s poor. Could the same model be used to transform the Internet ?

M-Pesa is a mobile phone-based money transfer, financing and microfinancing service. Launched in 2007 by Vodafone for Safaricom and Vodacom, the largest mobile network operators in Kenya and Tanzania, it famously pioneered mobile money services. Trouble is today there are more than 200 such services in Africa and they don’t interoperate. That’s changing thanks to a joint venture called Mowali formed late last year between two of Africa’s largest mobile operators and mobile money providers, Orange Group and MTN Group, which together account for over 100 million mobile money accounts and mobile money operations in 22 of sub-Saharan Africa’s 46 markets. Mowali plans to operate as an industry utility, open to any mobile money provider in Africa, including banks, money transfer operators and other financial service providers, to support the existing 338 million mobile

money accounts in Africa. Mowali was built using Mojaloop (building off the Swahili word “moja,” which means “one”) created by the Bill & Melinda Gates Foundation in partnership with fintechs, including Ripple, Dwolla, ModusBox, Crosslake Technologies and Software Group. Mojaloop uses technology such as the Interledger Protocol, a solution for settling funds among multiple providers across their individual systems. It claims to be the first model that can eventually help extend interoperability from mobile money providers to any bank, merchant or government institution that customers do business with in a way that specifically meets the needs of the poor.

A New Wave of Innovation

“This is proof that there is now in Africa a realization that having real time payments is possible and that it enables financial inclusion and helps operators adopt a new business model to earn revenue,” says Kosta Peric, deputy director, Financial Services for the Poor, at the Gates Foundation. He says he sees the initiative as a signal that a new wave of innovation, which can help alleviate poverty, is coming. The GSMA, the mobile industry trade organization, said it supports the Mowali initiative. “Mobile money services have become an essential, life-changing tool across Africa, providing access to safe and secure financial services but also to energy, health, education and employment opportunities,” Mats Granryd, director general, GSMA, said in a statement. The creation of Mowali will help to further transform mobile financial services throughout the African region, he said. Interoperability of digital payments has been the toughest hurdle for the financial services industry to overcome, says Peric. Mowali’s new offering means that money can eventually be sent and received by anyone, exactly like you can call anyone from any telephone. This will allow people to rely less on cash and receive their salary on their mobile wallet, send money to family, pay bills and make purchases with merchants. “It is a proven poverty alleviation measure,” he says. And, he says, it is beneficial to operators, who use different methods to charge for the service: some demand a small percentage of transactions, others allow money to be sent and received for free, but ask for a percentage when a user cashes out. The fees are usually a fraction of a percent or one percent at most, far cheaper than the rates charged by credit card companies or the 12% to 15% charged by traditional money transfer services such as Western Union. “But if you have hundreds of millions of these transactions, you can build profitable services,” says Peric. “Operators know how to serve poor customers. The more volume there is the better the returns are.”

Mojaloop and Mowali are likely to have an impact beyond Africa. “Africa is acting like a cradle for the next generation of services, we will see innovation leapfrogging,” says Peric. “If you look further into the future African mobile money services could serve as a model for micro-payments. The Internet today is advertising-powered because there is no way to make micropayments. Now imagine a payment platform that can accept massive micro payments and allow you to pay for news articles or many other things there is no way to pay for today. There is nowhere except in Africa where you can do that efficiently.”

J.L.S.





# A New Take On Privacy By Design

— A project launched in Senegal and Colombia aims to prove it’s possible to securely and ethically extract private sector data for the public good.

● **During the 2014** Ebola outbreak in West Africa qualified researchers were prevented from accessing relevant mobile phone data that could have helped curb the epidemic despite the fact that mobile phone operators, mobile industry association GSMA, and United Nations agencies pushed for its release. At issue were privacy concerns. Data sources collected by private companies, such as call detail records by telecom operators, alongside traditional survey data and official statistics, combined with artificial intelligence, have the potential to unveil socio-economic information at levels of granularity and complexity never seen before. Such data could be used to inform decision-making on epidemics, poverty, inequality, crime, traffic, waste and more. But, without proper safeguards the same data could recoup sensitive personal information and tie it back to individuals. That explains the concerns and why no process is in place to allow such data to be used. Enter OPAL, short for Open Algorithms, a not-for-profit socio-technological innovation developed by a consortium that includes the MIT Media Lab, mobile operator Orange, the World Economic Forum, Imperial College London and the Data-Pop Alliance, a group backed by MIT Media Lab and the Harvard Humanitarian Initiative, in close partnership with Telefónica and the governments of Senegal and Colombia. Building on years of work conducted by this group and others, it aims to crack what it sees as one of the single biggest conundrums of the age of intelligent connectivity: How to ethically unlock the potential of private sector data

for the public good. “OPAL is trying to to get at the causes of the world’s greatest ills and see what role data could play in solving them,” says Emmanuel Letouze, director and co-founder of the Data Pop Alliance. “We as a society have to find systems and standards that people will trust so that data can be used for good.” With the help of its team of engineers and social scientists, OPAL says it has found a way to ethically extract relevant information for the public good from an array of private companies, including mobile phone operators, banks, retailers, energy companies and logistic providers. The hope is that OPAL’s platform can serve as a model and eventually be adopted across the globe, says Nicolas de Cordes, Orange’s vice president, Marketing Anticipation, who has played a key role in the project from the start. OPAL is based on an open source platform developed by the MIT Data Trust Consortium and Imperial College London. The data stays within the premises of the private company and third parties only access it through Open Algorithms that provide a safe question-and-answer system. The questions are validated in advance by a board of advisors comprised of experts and local members of the community. Real-world deployment of OPAL started in mid-2017 in Colombia and Senegal with pilots leading to minimum viable products (mvps) in two phases. These pilots are being run in partnership with Senegal’s national statistics office (ANSO), Colombia’s national statistics office (DANE) and national planning department (DNP), as well as two other major telecom operators, Senegal’s

**Dakar, Senegal and Bogotá, Colombia, are capital cities of the two countries currently piloting OPAL, a non-for-profit project that has found a novel way to extract private sector data for the public good. The project includes the participation of mobile operators Orange, the MIT Media Lab and the World Economic Forum, among others, in close cooperation with the governments of Colombia and Senegal.**

Orange-Sonatel and Telefónica Colombia. Core funding for the MVP phase of €1.5 million was provided by the French development agency (AFD), with additional support from the World Bank, the Global Partnership for Sustainable Development Data and the Sustainable Solutions Development Network. There are plans to launch pilots in two more countries and one more industry by 2022. Getting to this point has been anything but easy. “Allowing you to use data while truly preserving privacy is a hard problem,” explains OPAL team member Yves-Alexandre de Montjoye, an assistant professor at Imperial College London and a special advisor to EC Commissioner Margrethe Vestager. One of the reasons call records have not been used for public good until now is that recent studies show that pseudonymization and standard de-identification techniques are not sufficient to prevent users from being re-identified in mobile phone data. Four data points — approximate places and times where an individual was present — are enough to uniquely re-identify a unique digital trace 95% of the time in a mobile phone dataset of 1.5 million people. This unique trace might sometimes be a key to then reidentify a single person. Opal turns the problem on its head, he says.

## A Big Task

Setting up the contractual and institutional architecture of the project has also been a big task. “It has involved MOUs with telcos, an agreement with statistical offices, signing agreements with friendly user testers and launching an initial version of the platform in Senegal, plus setting up governance in the form of local councils to oversee ethical development, discuss legitimate use cases, and advise on use cases that are too sensitive or risky. “Now we are at the stage where we want to move into the beta phase and apply the data to things like poverty monitoring and education,” says de Montjoye. “That is going to be our focus in 2019 and 2020, as well as opening one additional country and expanding into the use of data from the electricity and/or banking sectors.” The French mobile operator joined OPAL because it believes anonymized telco data – along with data from enterprises in other sectors - can be used to help achieve the U.N.’s sustainable development goals, save lives during periods of crisis, and improve education and city services, says de Cordes. Orange already has a commercial business that packages and sells telecom data. The business, called Flux Vision, analyzes population flows in real-time using data from Orange’s mobile network. It converts data from the mobile network into statistical indicators to analyze how often different geographical areas are visited and how people move around. In addition to location indicators such as density, provided by the mobile network, the service offers anonymous socio-demographic data such as age, gender and socio-professional category, with the aim of giving local authorities and businesses greater insight into the profiles of their customers and users. Some of this type of information – and a broader set of data from other



players - is badly needed by governments and NGOs from a not-for-profit source. When it comes to population density “the census is done every 10 years and in between you don’t have any sense of where people are – at any given point in time during the day,” says Letouze. “There is often major flooding in Dakar, and in Colombia there are frequent landslides but when you need to send rescue teams you don’t know where to send them.” Distress messages posted on social media are what Letouze calls “a false positive.” If people are tweeting it means they have cellular service and are probably better off than the ones no one knows about, he says. “That is why knowing the population distribution 10 minutes before or while a crisis is happening is really powerful and can help you put rescue teams where people need it most.” Real-time population density information can also help determine where new hospitals or schools should be located. All these applications will lead to better decision making, provided you also manage the bias in your data and the fairness and transparency of your algorithms, say Letouze and de Cordes. The key is calibrating the models so that researchers and governments have the information they need without being too granular and breaching both privacy and trust. “It is amazing what open algorithms can do,” says Letouze. “We are really at the forefront of showing how data can be safely used for good.” ●

**J.L.S.**





Edge computing is designed to bring processing and analytical power closer to connected factories and warehouses to ensure applications such as autonomous robots and sensor-driven machines can operate at full potential.  
Source :Microsoft

# Why Edge Computing Is Key To A High-Speed Future

— Sure, 5G is a critical foundation. But making applications like autonomous vehicles and interactive video work will require powerful processing that’s close to users.

By Chris O’Brien

● **The accelerating rollout of lightning-fast 5G networks** by carriers around the world may be getting all the buzz but a concept known as “edge computing” could hold the key to the success of high-speed intelligent connectivity.Edge computing refers to the notion that gathering and processing data happens at the source of an application or device, or at least close to it. That’s a different architecture than today’s cloud-based world, where information is hoovered up and then sent to a distant data center to be crunched and spit back out. Even if 5G networks, short for fifth generational wireless broadband technology, are 10 or more times faster than current 4G wireless

networks, sending data across great distance creates what is known in industry parlance as latency – delays in data communication over a network. That’s a problem as 5G is positioned as a way of enabling real-time, mission-critical applications such as autonomous vehicles, smart grids, industrial automation, remote surgeries and the management of drones. Without more robust edge computing, the fear is that the promise of this potentially transformative age of high-speed wireless networks will go unrealized. And so the industry is investing billions to redesign the Internet’s cloud-based architecture, which relies on centralized data centers to handle the coming tsunami of data. “We’re generating too much data,” says Asha Keddy, Intel’s corporate vice president of Next Generation and Standards. The amount of data generated annually is projected to increase from 40 zettabytes this year to 175 zettabytes in 2022, according to a report by analyst firm IDC. To put that in perspective, one zettabyte is a trillion gigabytes, making 175 zettabytes the equivalent of about 5.4 billion years of YouTube videos.Data production is soaring due to the growing connectivity of Internet of Things (IoT) devices, which number about 26 billion now and are expected to grow to 75 billion by 2025. Connected devices include such things as drones, automobiles, robots, wearables and smart home gadgets. Each sensor-equipped endpoint churns out more and more data that is rendered more useful thanks to the speed of 4G networks and the development of machine learning and artificial intelligence to more effectively process it. With the arrival of 5G, which can also handle a far greater density of simultaneous connections than 4G, the data production and demands will expand exponentially. “If you keep putting everything back to the cloud, nothing would ever work,” says Keddy. “You don’t have enough time ....for it to go all the way to the core. “Fear of bottlenecks has motivated the tech industry to unleash a massive infrastructure campaign running in parallel to the 5G rollout to

ensure that a lot of computing will get closer to where it is being used. According to market research firm IDC, the edge computing market, which barely existed a couple of years ago, will be worth \$34 billion by 2023. This includes the hardware, software and components need to create a vast number of processing systems that compliment the larger data centers located far away. These edge computing systems must be able to filter out data, deciding what to keep locally and what to send up into the cloud, and analyze information in milliseconds to deliver the promise of true, real-time automation. Fortunately, a number of technologies are converging that will enable this transition from centralized data centers to distributed networks comprised of smaller, more specialized centers at the edge that rely on lower-power servers. Of course, 5G is one of those elements. Artificial intelligence (AI) is another, along with new methods of writing applications, and improved hardware that allows some of the most critical functions to be placed on a single processor.

## A Big Shift

This shift is expected to have a profound impact on companies that have thrived in the cloud computing era, and so they are now scrambling to prepare for yet another computing disruption. Chipmakers Intel and ARM, for example, have introduced a new line of edge computing chips. And last year Microsoft introduced a version of its cloud platform called Azure Sphere, which was designed specifically to process information closer to customers. “Enabling intelligent cloud and intelligent edge solutions requires a new class of distributed, connected applications and will ultimately deliver breakthrough business outcomes. At the edge, the application is contextually aware and can run in both connected and disconnected states,” Julia White, corporate vice president for Microsoft Azure, wrote in a blog post. Last fall chipmaker ARM announced

its own cloud to edge infrastructure brand and initiative called “ARM Neoverse.” The company believes it can use the lessons it learned from the mobile gadget era to become a leader in intelligent, connected devices, says Mohamed Awad, vice president of ARM’s Infrastructure Business. Already, customers are approaching the company, anxious to begin re-thinking their products and services to take advantage of the new connectivity and intelligence promised by 5G and edge computing, he says. Arpit Joshipura, general manager of The Linux Foundation, says edge computing has transformative potential in areas such as smart cities, government, energy, logistics and healthcare even before 5G is fully deployed. But to get there, the industry has to broadly assure that this coming wave of smaller, distributed computing gadgets or edge computing centers can work seamlessly together. The Linux Foundation announced in January that it had created a new open-source project called LF Edge, which counted 60 of the biggest names in tech as initial members. LF Edge has five projects aimed at standardizing open-source software around various aspects of edge computing While Arm can help to some extent, what makes standing on the threshold of the next wave of this computing and networking technology exciting, ARM’s Awad says, is not really knowing just how people and businesses will leverage the convergence of AI, IoT, 5G and edge computing. “The shift to 5G has the potential to have an oversized impact because of the freedom it allows developers,” he says. “This becomes about more than just innovating around your phone because that computing capability will spread to all these other IoT endpoints so this will certainly exceed where 4G has taken us in terms of overall impact on technology and economies. I think it would be disingenuous for anyone, myself included, to stand up and say, ‘Hey this [edge computing] is going to be the thing that is going to make it revolutionary.’ But I certainly believe we are embarking on a new era where we’ll look back in 10 years or maybe 15 years and just be completely blown away by how far we have come.” ●

## EDGE COMPUTING STARTUPS TO WATCH

### SWIM UNITED STATES

**WHAT IT DOES:** Edge computing software that uses artificial intelligence to give businesses more insight about their data.

<https://www.swim.ai>

### HAILO ISRAEL

**WHAT IT DOES:** Its AI-powered processor can be embedded in edge computing devices to deliver real-time analysis.

<https://www.hailotech.com/>

### VAPOR IO UNITED STATES

**WHAT IT DOES:** Building a nationwide network of edge computing centers designed to create geographical proximity for applications such as autonomous driving.

<https://www.vapor.io>



# Connecting At The Office Takes On A Whole New Meaning

— Workplaces are being radically transformed by faster networks and new technologies.

By Chris O’Brien

● **Intelligent connectivity is transforming every corner of the office as property owners and companies embrace benefits ranging from energy savings to more attractive work environments.** Thanks to technologies such as the Internet of Things, cloud computing and artificial intelligence, almost everything inside a building can be connected. “Data is the new currency, and [office buildings] need to be a lot more data driven,” says Akshay Thakur, director of the smart buildings program at JLL in EMEA, a commercial real estate and investment management firm. New technologies don’t just add efficiency. “People are realizing that experience is everything. It’s all very good to run a well-oiled machine, but you have to make sure people want to come and work in the environment.” JLL, a giant in real estate and property investment manage services, with 300 corporate offices in 80 countries, and 86,000 employees, has rejigged its own business in order to help clients reap the full benefits of connected offices. Rather than being a real estate firm that values technology, the company now considers itself a technology firm that targets the commercial real estate market. It is investing in developing digital products, and has

hired tech-savvy executives like Thakur, a former Cisco Systems executive. It also co-founded JLL Sparks, a technology division which has a \$100 million global venture fund to invest in a range of so-called “proptech” startups. “We want technology to be the core of our business,” Thakur says. The pivot has made JLL a go-to name for companies looking to reinvent their workspaces. JLL was hired, for example, to help McDonald’s with its concept for a new headquarters in Chicago. Built in Chicago’s West Loop neighborhood, the 500,000 square foot building covers a city block, but consolidates employees who were previously scattered across four buildings spread out over two miles. In the new headquarters, about 95% of the workspace is not assigned to anyone but is divided into sections for different departments called “neighborhoods.” Employees use an app built by JLL to connect and collaborate. An indoor mobility positioning system uses sensors to measure how spaces are being used. Employees can also use the app to adjust temperature and airflow, view floor plans, book conference rooms, and even navigate their way through the building. In a survey conducted four months after the building opened McDonald’s reported that 83% of employees surveyed said the environment encouraged more collaboration, 70% felt more connected to their teams, and 86% felt proud to show the building to friends and clients. The company also said the space had become a powerful recruiting tool. “It really shows how buildings can evolve and how design can be far friendlier to people,” Thakur says.

## Making The Old New

While McDonald’s new HQ is a new space, older buildings are also being reinvented. In Turin, Italy, international design and innovation firm Carlo Ratti Associati transformed the Agnelli Foundation’s landmark 20th-century building into what it terms “Office 3.0.” The renovated 32,000 square foot space – which was once Fiat founder Giovanni Agnelli’s villa, is packed with sensors that monitor occupants’ movements, temperature, CO2 levels, and space usage. Employees can set their personal preferences for things like temperature so that as they move about the building the sensors follow them and can adjust heating and cooling to create a kind of personal “environmental bubble.” To make the work environment more human-centric the building is surrounded by an orchard and green areas designed by Louis Benech – the French landscape architect who reshaped the Tuileries gardens in Paris and the Water Theatre Grove at the Palace of Versailles - offering occupants the chance to work outdoors, in close contact with nature. “As work has become increasingly digital, why should we bother to go into the office,” asks Carlo Ratti, director of the Senseable City Lab at the Massachusetts Institute of Technology (MIT) and founder of Carlo Ratti Associati, in a statement about the project. “The key answer to that question



**Office workers inside the Agnelli Foundation’s landmark 20th-century building in Turin, Italy. The renovated 32,000 square foot space is packed with sensors that monitor occupants’ movements, temperature, CO2 levels and space usage. Photo Credit: Beppe Giardino**

lies in human interaction. The central idea behind the Agnelli Foundation project is that by seamlessly integrating digital technologies within the physical space, we can forge better relationships between people and the building they inhabit, ultimately fostering interaction and creativity.” The Agnelli renovation was done in collaboration with Siemens, one example of how tech giants are entering this space. Cisco Systems, for instance, has developed its own smart building platform that uses IoT to optimize lighting, building automation, and property management. Some of these capabilities can be unlocked simply by connecting infrastructure such as heating and cooling that have not been digitized previously. French utility Engie has invested in IoT network provider Sigfox, in part because of the technology’s potential to drive smart buildings and better monitor energy use. Engie notes that in France alone buildings use 45% of all energy, and reducing that is critical toward achieving environmental

milestones. Engie is developing Novaldi, a broader platform to monitor energy usage in buildings. But the company also believes more buildings can be energy producers. To that end Engie is investing in blockchain projects that it hopes one day will allow buildings to directly sell excess power (See the story on page 40.) The push toward smart buildings is expected to accelerate in coming years as carriers roll out 5G - fifth generation wireless broadband - mobile networks and companies embrace “edge computing” which is designed to place more cloud-computing power closer to users and applications. This, in turn, is also expected to spur an even wider range of smart building applications, such as augmented and virtual reality tools, robotics, biometrics like facial recognition for security, and virtual assistants. Smartboards, smart conference rooms, virtual meeting walls, all have the potential to make on-site collaboration more fluid and make it easier to connect to remote colleagues. That said, smart buildings pose plenty of challenges, many of them cultural and organizational. For traditional tech purchases, decisions and plans are typically made by an IT department but designing a smart building requires participation from nearly every department, and the need to think not just about the technologies, but the very nature of the organization, its values and goals. “That’s what we tell clients,” Thakur says. “The building should very much be focused on outcomes and experiences, rather than someone saying, ‘I want this technology.’” The swell of interest in smart buildings has naturally attracted entrepreneurs and investors. Memoori, a smart building research firm, reports that 2018 was a record year for investment in the global smart buildings sector, with over \$2.4 billion invested in startups developing solutions in areas such as building IoT, energy, indoor mapping, and workplace management. Among them is View, a San-Francisco-based startup, that makes connected windows that use a dynamic glass to adjust natural light, with the aim of saving energy and improving the mental and physical health of people inside the building. Last November, the company raised \$1.1 billion from Japan’s SoftBank Vision fund. New York-based startup Knotel is developing what it calls an agile headquarters platform. Rather than relying on long-term leases, the company designs and builds custom spaces that afford tenants flexibility. The company uses a combination of technology, data, processes and customer service to achieve those goals, says Sanjiv Sanghavi, head of product for Knotel. The company has raised \$160 million in venture capital over three rounds since 2017 and designed over 2 million square feet of office space. It’s also recently acquired Ahoy!Berlin, a workspace operator, and Deskeo, a leading office space rental company in Paris, as part of its expansion into Europe. “We have tremendous data about how space is utilized and which design patterns work for which types of companies,” says Sanghavi. Knotel uses this data and technology to help make algorithm-driven decisions about the office layout. “Collecting data is simple,” he says, “the challenge is knowing how to interpret and utilize it.” ●

# Mobile Operators Are Starting To Embrace Blockchain

— The industry has been cautious about adopting digital ledger technology but a handful of blockchain startups are helping break down that resistance.

By Chris O’Brien

● **When your product is expected to work flawlessly almost 100% of time,** introducing any new technology into the system can be daunting, which explains why telecom carriers have approached blockchain technology with far more caution than many other industries. But telecom carriers seem to be coming around to the notion that blockchain’s potential to create transparency and trust offers potentially tantalizing cost savings and efficiencies, while also opening the way to new business models and revenue streams. “The telecom industry is really made up of a lot of transactions between a lot of operators and it’s not like there’s a lot of trust between those operators,” says Catherine Mulligan, a visiting researcher at Imperial College of London, who consults with a range of industry players. ”A lightweight version of blockchain would allow them to connect those networks together in a much more dynamic way and improve a lot of business processes.” A prime example is Clear, a Singapore-based blockchain startup that is targeting the telecom industry. Last year Clear began running some proof-of-concept projects with leading telecom carriers and operators. In one scenario, Clear’s distributed ledgers allowed telecoms to settle monthly international voice contracts far more quickly. Such agreements are a fundamental part of the industry, as companies have a wide range of contracts

that cover the cost and revenue to roam across networks. Contract management remains largely manual and can take weeks to settle because of the interconnected nature of the contracts and networks. Carriers are reluctant to share commercial data with third-party providers that would automate them. With blockchain, however, those deals can be handled with so-called smart contracts – self-enforcing sets of software rules - that are built into the network but keep the terms confidential. This allows the agreements to be settled automatically, within minutes rather than weeks, according to Eran Haggiag, Clear’s co-founder and executive chairman. “What blockchain allows you to do is to keep all your data and contracts private with just bilateral partners and still get the enforcement of the industry network,” he says. “So whatever you agree to in the contract would happen in an automated way without an option for one side to cancel and without giving up the privacy of the data and the contract,” he says. By automating such fundamental transactions, blockchain then makes it less daunting to consider adding new types of services that may require complex tracking and settlement. For instance, carriers are trying to figure out the business models as they rollout 5G, or fifth generation networks, and install “edge computing” centers that would bring processing of data physical closer to users and applications. Many clients may want such computing horsepower and speed, but to pay on a monthly basis could initially be extraordinarily expensive, particularly for a service needed occasionally. With blockchain, Clear is suggesting that such 5G and edging computing services could be sold in ‘chunks’ that vary by need or specific quality. That would allow carriers to sell a wider range of more targeted services at higher profits for shorter sessions. “Everything is commoditizing very fast,” in telecom, says Haggiag. “But the telcos have an opportunity with 5G and edge computing to rise up the value chain. They will be able to sell services for VR providers, connected cars, and smart cities. This is a big opportunity for telco, but to do this they will need very flexible contracts and commercial frameworks.” A recent report by consulting firm Deloitte outlines several other blockchain-based use cases for carriers, including faster fraud detection, “identity as a service” that allows customers to use their mobile accounts to verify their information for services such as e-commerce sites, and authentication services between IoT devices to ensure trust and security. In the U.S. T-Mobile is already working with Intel on a blockchain-based identity service for customers. And last year Verizon Wireless announced a new security service for enterprise customers using a blockchain platform created by Estonian startup Guardtime. London-based startup Colt Technology Services is running a proof-of-concept project with a larger number of carriers designed to reduce settlement costs. Last Fall, ITW Global Leaders’ Forum, an industry association that had helped conduct the project with members such as BT, Orange, Telefonica and Telstra, announced the trials had shown the platform could cut the time to settle



Chinese electric car maker Byton is poised to introduce one of the first autos to use 5G connectivity. Its MByte model, which is expected to go on sale in 2019, will include shared and private screens designed to display a wide-range of digital content, including navigation, music, videos, photos, files and contacts. Mobile operators could use blockchain to establish billing for such services.

“The telecom industry is finally coming around to using blockchain and it’s really ready for it.”

voice transactions from multiple carriers to minutes. U.K. startup Zeetta, a spinout project from the University of Bristol, is also partnering with Colt to develop blockchain-based services for carriers. Zeetta’s Director of Product Management Joan Garcia-Espín say he’s not surprised it’s taken time for the telecom industry to turn its attention to blockchain. “The telecom sector has a lot of new, shiny things like AI right now,” he says. “It really takes years to get their attention, especially if you are a small startup.” That said French telecom giant Orange has created Chainforce Initiative, to explore blockchain projects and its venture capital wing, Orange Digital Ventures has invested in startups such as Chain, which focuses on financial services. Swisscom also set up a blockchain subsidiary, though notably the list of industries it targets (finance, government, life sciences, energy, trade and manufacturing) doesn’t include telecom. Some telecom companies have started working with Hyperledger, an open-source blockchain project run by the Linux Foundation. Though it works across a wide range of industries, Marta Piekarska, Hyperledger’s director of ecosystem, says it will announce a new group focused on telecom at Mobile World Congress, February 25-28. The telecom industry is behind others when it comes to blockchain, she says. “But I think the telecom industry is finally coming around to using blockchain and it’s really ready for it.” ●



# How Engie Is Plugging Into A Connected World

— The French company is investing in a wide range of technologies as it transitions from being an energy producer and distributor to a service company.

By Chris O’Brien



● **French utility Engie, which has spent some €1.5 billion on its digital transformation since 2016,** plans to use intelligent connectivity to help it undergo a massive transition: morphing from a company that generates and delivers electricity, gas and various renewables, to one that gradually moves away from producing energy to focus on services. Getting there requires mastering a slew of disruptive technologies including blockchain, artificial intelligence, smart power grids, inspection drones and community energy cooperatives, to name just a few. What’s more, it has to excel at collecting, analyzing and leveraging the huge amounts of data that faster networks like 5G - fifth generation wireless broadband- will enable. “You can’t innovate today without thinking about the data,” says Etienne Gehain, digital innovation officer at Engie, one of the largest companies based in France, with more than 150,000 employees and more than €65 billion in revenue in 2017. While fully achieving its goals could take years, the wide range of disruptive technologies that are converging are starting to make the kind of personalized new services Engie envisions possible. People and companies are installing smart devices that collect rich data on energy consumption. IoT devices with sensors are constantly gathering and transmitting information from other environments, such as hospitals and airports. Network protocols like 5G can support an infinitely larger number of always-connected devices and artificial intelligence allows processing and analysis of enormous amounts of data. “All those technologies allow us to know more about our clients, better anticipate their needs, and tailor our service offering more specifically to each client,” says Gehain. “We are already radically different from what we were before.” In 2018, for example, Engie announced digital IoT (Internet of Things) and remote monitoring platforms that will provide real-time data reporting and insights on facilities such as hospitals, hotels or airports, to help improve energy efficiency. Its digital

initiatives also include an integrated building management system that provides real-time data on all equipment and conditions such as room temperature and air quality, and digitalization of facility management processes, through computerized management solutions. To help further its innovation agenda, Engie appointed a chief data officer in 2018 whose role is to ensure the company’s culture embraces its future as a data-driven organization. It’s part of a broader effort that involves bringing innovation in from the outside.

## Connecting With Startups

Engie is working with startups in a variety of ways. In 2014, the company established a venture capital wing called ENGIE New Ventures, which scouts and invests in startups that enable distributed energy, connected homes, smart cities, green power, and mobility. Over the past five years, the VC division has invested €65 million into 20 companies specializing in technologies such as robots, drones, blockchain, AI, virtual reality and cybersecurity. That includes San Francisco-based Streetlights Data, which received \$2 million from Engie. The company is providing on-demand software for transportation planning and urban mobility with an analytics platform powered by trillions of location-based services and GPS data points to create greater efficiencies and energy savings. The Streetlight platform delivers information about the travel patterns of cars, bikes and pedestrians which is enabling transportations planners to make more informed decisions. “The more data sets you are able to coalesce and index and make work together, the more powerful the insights,” says Martin Morzynski, Streetlight’s vice-president of marketing and product management. Engie is also forging partnerships with startups. It is collaborating with Amsterdam-based Quby to develop a smart thermostat called boxx for the Belgium market. The companies are also testing a version

of the technology for the U.K. market called Toon which serves as a “smart platform” for a variety connected devices. Another example is a partnership with Texas based Grid4C to leverage the startup’s artificial intelligence tools to enhance smart home services. The energy giant is also making acquisitions to enter new businesses. Its 2017 acquisition of Netherlands-based EVBox, for example, helped it expand into the business of charging electric cars: it now controls the Dutch startup’s network of 40,000 electric vehicle charging stations across 20 countries.

## Embracing Blockchain is A Critical Component

And Engie is innovating in-house. The company’s entrepreneurship program gave birth to TEO, which stands for The Energy Origin. Started by a handful of employees, TEO has created a web platform that allows for the tracking and verification of green energy use. With TEO Engie is targeting companies with renewable energy goals. In the past companies had to rely on incomplete or unreliable energy consumption data. Using blockchain, TEO can issue tracking certificates every day that verify the origin of energy being consumed. The next step is to extend these certificates so renewable producers can connect more directly with consumers who want such verification. In the future, TEO hopes to enable buying and selling of power within geographic communities, like when one neighbor’s solar panels generate excess power that can be sold to someone else down the street. But one of the major challenges is to insert trustworthy data into the blockchain. To that end Engie has partnered with Ledger, a French startup to develop what it claims is the energy sector’s first secured, autonomous and blockchain agnostic “oracle” (a hardware device that will be compatible with most blockchains). The so-called hardware oracle will measure data at the source of green energy production (such as wind turbines, solar

panels or hydropower) and safely record in the blockchain to be used for decentralized applications. Engie says it is aiming for the solution to become the cornerstone of all future energy services using blockchain, including energy traceability, peer-to-peer trading and crowdfunding. The device will be able to connect different blockchains and several decentralized applications at the same time. As security is key to having trustworthy data, the device will include a secure element and an anti-tampering solution. “Blockchain is an evolution of the cloud, but with trust in it,” Gehain says. “This is important because in energy, we can talk about the various use cases, but many involve a number of different entities that all need to agree on the same set of data. And blockchain is well suited for situations where the number of parties is large and they all have to agree on the same set of data.” Gehain has joined the board of the Energy Web Foundation, which is developing a common protocol for energy-related blockchain services. Engie co-founded Blockchain Studios, a spinoff that is creating tools to make it easier for companies to build services using distributed ledger technologies. And Engie has even experimented with creating its own cryptocurrency, Sungie, as a way to possibly create incentives around energy production and consumption. For Gehain, blockchain is a critical component in harnessing intelligent connectivity to reinvent Engie’s business. “Even if we don’t provide the energy ourselves, if we just manage the flow between two parties, the blockchain is very useful,” he says. “People don’t even have to trust us because they can verify this information themselves. And that’s fine for us. Fundamentally, we will care for the same part of the world. We will provide energy for the world but the way we will do it will certainly be different.”



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Accelerating Henkel's entrepreneurial transformation.

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