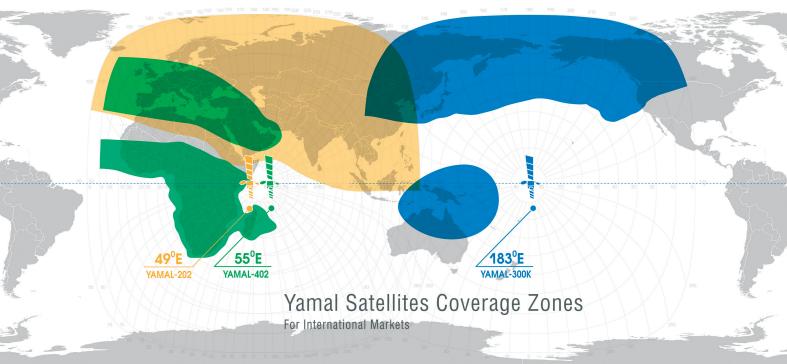






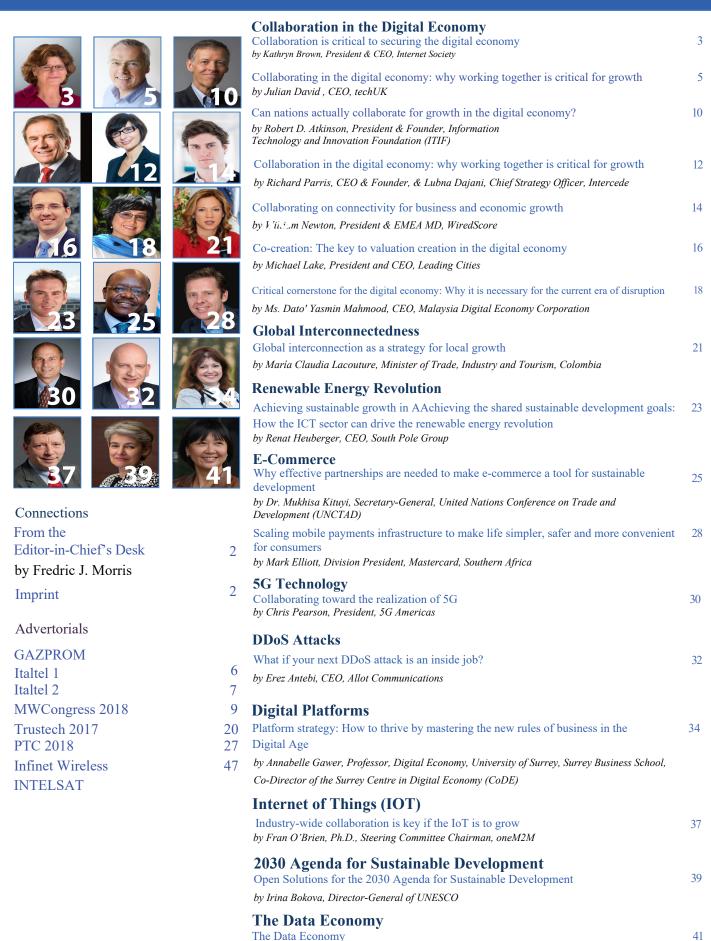
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CONTENTS

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by Prof. Irene Ng, Director, International Institute for Product and Service Innovation,

WMG Warwick University, Chairman and Founder of the Hub of All Things

CONNECTIONS

Connections



Rapid technological developments, societal changes and radical new business models are enriching and enlarging the ICT ecosystem. Never before has connectivity offered so much potential for economic growth and social development in the digital economy. And never before have the challenges of extending that connectivity to all been so pressing – raising issues such as universal access, meaningful local content, security, fair and open competition, fit-for-purpose regulation, joined-up policy, quality of service and scaling ICT start-ups and smaller businesses to maximum impact.

In a digital ecosystem made up of ever more stakeholders, from governments driving policy and regulation to established, major ICT companies, disruptive new OTT players and innovative SMEs, those challenges can only be met by working together. New markets call for new partnerships, new approaches and new ways of thinking. Why is it so important to work together and hear each other out? How much can we do alone, and what happens if we don't collaborate at all?

Fredric J. Morris Editor-in-Chief, Connect-World



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Collaboration is critical to securing the digital economy

by Kathryn Brown, President & CEO, Internet Society

The truth is that economies can only function within a secure and trusted environment. A critical tool in ensuring a secure and trusted online environment is encryption. It is a technical building block for securing infrastructure, communications and information and should be recognized as the way to secure our online transactions and our conversations.

It allows us to do our banking, conduct local and global business, run our power grids, operate, communications networks, and do almost everything else. All users (whether government, business or individual) should use encryption to protect infrastructure, communications and the privacy and integrity of their data. Encryption is an important technical foundation for trust in the digital economy and should be the norm.



Kathryn C. Brown, President and CEO, Internet Society

Kathryn C. Brown joined the Internet Society as President and CEO in January 2014. A veteran of Internet policy development and initiatives that have aided in the Internet's global expansion, Ms. Brown leads the Internet Society in its mission to keep the Internet open, thriving and benefitting all people throughout the world.

The Internet Society is at the center of the largest global network of people and organizations focused on ensuring the Internet continues to evolve as a platform for innovation, collaboration, economic development and social progress. As the Internet faces escalating challenges in the areas of privacy, security and governance, the Internet Society serves as a powerful voice for the Internet community as an internationally respected expert on Internet technical, development and policy issues.

Ms. Brown's career spans the public and private sector, including serving in the United States National Telecommunications Information Administration (NTIA) and the Federal Communications Commission (FCC), and leading policy and global corporate social responsibility initiatives for telecom provider Verizon.

She received her J.D., summa cum laude, from Syracuse University College of Law and her B.A., magna cum laude, from Marist College. Ms. Brown has served on the advisory boards of the Public Interest Registry (.ORG), the

mPowering Development Initiative of the ITU, and the USC Annenberg Innovation Lab.

This year marks the 25th year of the Internet Society's advocacy for an open, secure and trusted Internet that benefits everyone, everywhere. Our founders, Vint Cerf and Bob Kahn, believed a society would emerge from the idea that is the Internet. The Internet today is part of our social fabric and essential to how we communicate, create and collaborate.

Many economies around the world are now digital and interconnected. Digital services have opened up new avenues for sustainable economic growth. Currently, there are 360 million people that take part in cross-border e-commerce. 28% of output in mature economies is digital. The Internet is set to contribute US\$6.6 trillion a year, or 7.1% of the total GDP in the G20 countries. And, by 2020, it's estimated that more than 1 billion users will be added and there will be 30-50 billion additional connected devices.

This level of interconnection will only continue to grow as more people come online. However, the digital economy will only continue to thrive and generate opportunities if the Internet is strong,

secure, and trusted. Without this foundation, the global digital economy is at risk.

The truth is that economies can only function within a secure and trusted environment. A critical tool in ensuring a secure and trusted online environment is encryption. It is a technical building block for securing infrastructure, communications and information and should be recognized as the way to secure our online transactions and our conversations.

It allows us to do our banking, conduct local and global business, run our power grids, operate, communications networks, and do almost everything else. All users (whether government, business or individual) should use encryption to protect infrastructure, communications and the privacy and integrity of their data. Encryption is an important technical foundation for trust in the digital economy and should be the norm.

However, ensuring that encryption becomes the norm cannot happen without a serious commitment by all parties to security and privacy. Given that the Internet is a global network of networks without any centralized control, there is no single solution that can be prescribed by governments or just implemented by network operators.

Today we face a choice between an Internet that is open and that encourages innovation and one that is more tightly controlled which may have the opposite effect of stifling progress.

We are concerned that the growing anxiety of users around security and privacy issues may encourage governments to close and fragment the Internet for more control and are worried that this could undermine individuals' ability to use the Internet to improve their lives and the lives of others.

Trust is the key issue that will define the future value of the Internet. Each month we seem to hear of another massive data breach. A recent survey conducted by the Internet Society in Asia Pacific found that over 70% of respondents felt that their personal information was not sufficiently protected online, and 60% felt that they did not have sufficient knowledge or the tools to protect their privacy online.

We urgently need to build greater trust in the Internet to open up the growth and prosperity promised by the digital economy. However, a trusted Internet is not achieved by a single treaty or piece of legislation; it is not solved by a single technical fix, nor can it come about because one company, government or individual decides security is important.

Given that the Internet is a global network of networks without any centralized control, there is no magic answer. There are no single solutions that can be prescribed by governments or just implemented by network operators.

The reality is that comprehensive Internet security only comes through the efforts of many different people collaborating together to take action to help ensure the security, resilience and stability of the global Internet. Central to this notion is that when you are on the network you are also part of the network.

Everyone has a collective responsibility for the security of the Internet: from securing core aspects of the infrastructure to protecting the confidentiality and integrity of the data that flows over it, to ensuring the right policies are in place to support the technologies, networks and actors that make the Internet work.

People are what ultimately hold the Internet together. The Internet's development has been based on voluntary cooperation and collaboration — which remain the essential factors for the Internet's prosperity and potential.

This forms the basis of what we call Collaborative Security, an approach that is characterized by five key elements:

- 1. Fostering confidence and protecting opportunities: The objective of security is to foster confidence in the Internet and to ensure the continued success of the Internet as a driver for economic and social innovation.
- **2.** Collective responsibility: All Internet users share a responsibility towards the system as a whole.

3. Fundamental properties and

values: Security solutions should be fully integrated with the objectives of preserving the fundamental properties of the Internet (open standards, voluntary collaboration, permission-free innovation and global reach and fundamental human rights, values and expectations (e.g. privacy, freedom of expression).

4. Evolution and consensus: Security solutions need to be flexible enough to

gy is going to change and threats will adapt to take advantage of new platforms and protocols. Therefore, solutions need to be responsive to new challenges.

5. Think globally, act locally: Creating security and trust in the Internet requires different players (within their different responsibilities and roles) to take action, closest to where the issues are occurring.

The effectiveness of Collaborative Security depends on working together relationships – between nations, between citizens and their government, between operators, and service providers.

As the digital economy continues to grow around the world, we must keep in mind that security is a shared responsibility that needs the expertise and experience of all stakeholders, across border and across disciplines. It is an urgent need that will require open, inclusive collaboration.

Collaborating in the digital economy: why working together is critical for growth

by Julian David, CEO, techUK

Despite the crucial importance of connectivity underpinning digital advancement, communications service and infrastructure providers are often faced with a potential business contradiction. They face pressures to find new business models and incentives to invest in new generations of communications technology to meet the escalating demands before existing investments have generated a return. The significant cost of implementing such infrastructure (most of that cost being civil works) with stagnant consumer prices (despite increases in data consumption) are key factors. The solution is collaboration.



Julian David is the CEO of techUK. He was appointed as the director general of Intellect in March 2012 and led its transformation to techUK in November 2013. Julian leads techUK's 60 strong team in representing more than 900 member companies, including multi-nationals and more than 500 SMEs to ensure that the digital tech industry is at the heart of a modern society and economy in Britain. He is also a trustee of the Tech Partnership which works to promote careers and skills development in the Digital Technology Industry.

The digital sector has transformed how we live and how we do business at an incredible pace of innovation and development – a pace that has far outpaced the wider economy. By stimulating new business models, improving the functioning of markets, reducing transaction costs and enabling better management of data, digital tools are now the most effective drivers for productivity, economic growth with a variety of social benefits.

Better use of digital solutions could unlock a further US\$1.36 trillion of GDP for the world's top ten economies by 2020 and in the UK that could mean an extra US\$57 billion to our economy.

Digitalisation is changing the nature of how we business on all levels – from work functions within organisations, to supply chains and markets. In the case of communications infrastructure, this means that investment in one part of the ecosystem can spread benefits across all. This can create confusion around how investment is made and where benefits are felt. A collaborative approach across ecosystems and public policy makers is needed to maximise the overall benefits of the sector.

This paper explores some of the issues around collaboration needed to promote the right level of digital (broadband) connectivity for the fast developing digital sector.

Why connectivity?

Telecommunications networks underpin our economic and social fabric by providing the connectivity for the digital technologies and services on which we rely. A World Bank Study across 86 countries suggests that a 10% increase in broadband coverage generates a 1.35% and 1.19% increase in per capita GDP for developing countries and developed countries, respectively.

Collaborating for connectivity

Despite the crucial importance of connectivity underpinning digital advancement, communications service and infrastructure providers are often faced with a potential business contradiction. They face pressures to find new business models and incentives to invest in new generations of communications technology to meet the escalating demands before existing investments have generated a return. The significant cost of implementing such infrastructure (most of that cost being civil works) with stagnant consumer prices (despite increases in data consumption) are key factors. The solution is collaboration. Outlined below are some examples of collaboration can work for connectivity:

• Paving the way for future 5G and fibre infrastructure

Over the coming years, there will be increased momentum on implementing fibre

infrastructure and 5G mobile networks, as well as in promoting the various applications for it. 5G needs a large number of small cells in urban environments, often on street furniture such as such as lamp. For London, estimates suggest the number of small cells needed range from 250,000 to 500,000 million. Many of these base stations will require fibre backhaul too.

These vast numbers will require a streamlined approach to handling local regulations such as planning permissions to ensure economic viability and speed. Collaborating with Local Authorities will be essential. By taking a facilitative approach, local authorities will gain improved coverage for their communities and businesses and could receive revenues for access to infrastructure.

· Enabling digital rail connectivity

Rail usage has been steadily increasing. In 2015, there were 1.7 billion passenger journeys in the UK - the highest in Europe – and an increase of 48.9 % since 2006. A recurring theme for passengers is the intermittent mobile coverage on trains. If rail journeys could be made more productive for business passengers by the availability of fit for purpose broadband connectivity, the economic benefits for the nation would be significant.

Many factors undermine the motivation to invest in such mobile / broadband infrastructure. The UK rail sector is a fragmented one

Viva virtualization! The growing trend of SDN in enterprises

By Tullia Zanni, Head of Solution Marketing, Management and Offering at Italtel

From data centers to network infrastructure, the flexibility that virtualization can guarantee is now so well-known that shifting towards a software approach is becoming a widespread phenomenon. Cloud computing, Network **Functions** Virtualization (NFV) and Software Defined Networking are all changing telco infrastructures, leveraging the concept of virtualization and software typically found in traditional IT environments. This is also true for communication services providers' and large enterprises' networks. In particular, SDN is increasingly being deployed in large enterprises, especially in specific applications that provide a proven benefit in the short term. This comes from the need for companies to be more efficient and flexible; new services adoption could represent a business accelerator.

Previously many have been held back from launching these new services due to budget constraints but SDN adoption brings agility to traditional networks, improving services as a result of the mutual awareness between applications and underlying networks. The communication between the network and upper-layer applications becomes bidirectional, resource usage is always under control and infrastructure management becomes easy and cost-effective.

A use case for the enterprise: how to manage Quality of Experience

Unified Communications and Collaboration (UC&C) services are strategic applications for every company, enabling a smarter way to work and collaborate. The adoption of video UC&C applications is also crucial for the business development of enterprises with offices across the world.

Being able to apply suitable policies to shape the consumption of network resources, not only according to their availability but also to users' needs, is today a pressing requirement for enterprises. An SDN approach enables centralized and more flexible control of the IP network and provides IT managers a feasible way to dynamically manage high Quality of Experience (QoE) services, particularly in a multi-vendor environment, via a controller-based infrastructure, improving service adoption and usage.

Multiple UC&C services, together with other high priority applications, often share the same network resources, with each application being unaware of traffic generated by other applications, mixing on the same IP network real time communications traffic with internet traffic or other data.

As a result, traditional approaches for managing QoS and traffic prioritization are no longer adequate for delivering a high QoE. Bandwidth consumption has a great variability, static network engineering is difficult and applications have policy rules that don't take real time network usage into account as they do not have visibility on real network state.

To address QoE challenges, Italtel's approach leverages the concept of SDN with the related possibility to mesh up network level with application level.



The DAC approach

Bridging the gap between application needs and network resource availability, Italtel has developed a Dynamic Admission Control (DAC) solution. This enables dynamic tuning of Call Admission Control (CAC) rules and application prioritization, taking into account business needs and real-time network status at the same time. The result is the best QoE for multi-technology UC&C applications in a multi-site enterprise context, enabling smart usage of connectivity services.

Most UC&C applications already include a CAC feature that stops users from placing sessions when there is insufficient network bandwidth within the corresponding Class of Service to support these sessions (typically voice and video applications). Admission control rules typically rely on an application-level static accounting model of the network which is unable to respond to real time business needs or dynamic network changes.

Italtel's expertise and long track record in the development and integration of large-scale telecommunications infrastructure

enables a solution like DAC to significantly increase the return on investment that many companies seek for their IP voice and video assets. Our DAC solution is based on an accurate and up-to-date view of the physical network topology which enables dynamic tuning of CAC rules and application prioritization according to real time network status.

Netwrapper

The engine of the DAC Solution is Netwrapper, a powerful SDN application that "wraps" network and services (applications) to enable a fruitful harmonization between them.

Built on top of Cisco Application Centric Infrastructure Controller Enterprise module (Cisco APIC-EM), Netwrapper is the outcome of the strong cooperation between Italtel and Cisco around Cisco's DNA architecture and automation concepts.

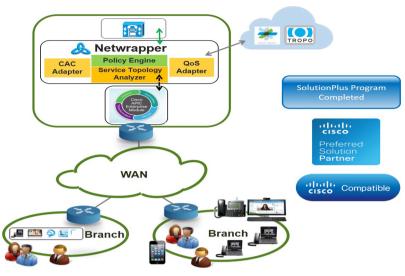
Netwrapper provides IT managers with a unique tool for mapping UC&C service topology with enterprise IP network topology. The bandwidth needs of UC&C applications are compared with actual bandwidth usage and service provider bandwidth Service Level Agreements (SLAs). Call admission bandwidth parameters and QoS marking can be dynamically changed to match the available network resources with application requirements.

To make this possible, Netwrapper interacts with:

- APIC-EM, in order to gather all the information from the IP infrastructure (topology, flow path trace, BW stats) and to rule dynamically QoS marking policies. The interaction is based on REST API.
- CUCM, in order to gather all the information about UC&C services (service topology, audio and video call admission control bandwidth parameters, real time service bandwidth usage) and to dynamically implement changes to bandwidth parameters inside the CAC configuration. This interaction is based on specific service API and provisioning interface.

After undergoing a technical certification process, Italtel completed Cisco's SolutionPlus program and is currently a "SolutionPlus" partner for the Netwrapper application, which is now available in the Cisco catalogue. This enables a one-stop ordering experience for Cisco's customers, channel partners and sales teams for selected third-party products and applications.





The "human interaction" of Italtel Netwrapper

The Netwrapper system offers an innovative interaction mode based on the concept of social communication, i.e. the use of chat systems and, in particular, Cisco Spark.

Italtel engineers taught Netwrapper to use human language through a chatbot – an Artificial Intelligence software that simulates a conversation between robots and human beings.

They then gave Netwrapper the ability to access Spark, a social collaboration platform developed by Cisco. ICT managers can therefore "chat" with Netwrapper through chatbots.

"Human Interaction" allows Netwrapper to interpret requests and – if necessary – ask questions to further clarify their context, perform the determined actions and finally provide answers in the chat.

This innovative feature of Netwrapper was first presented at Cisco Live! 2017 in Berlin.



involving Government (2 different Departments), Network Rail, train operators and train manufacturers. Mobile network operators are also presented with several ly. challenges to delivering coverage along rail corridors. These range from the technical ones such as the blocking effect to mobile signals represented by railway cuttings, metallic carriages and coated windows to the economic one of investing in expensive network infrastructure in sparsely populated areas for the short time the trains pass through.

Specialist communications service providers provide in-carriage Wi-Fi services using in-carriage routers, an external antenna and the nearest mobile mast to connect passengers to the internet.

This fragmentation in the ecosystem, combined with short train operating leases, is a stumbling block in ensuring mobile connectivity in the rail networks. Stipulating Wi-Fi on rail franchises is a useful stimulus but the Government can play a more significant leadership role in enabling collaboration, such as encouraging economic access to publicly owned infrastructure such as trackside land, masts and fibre.

• Spectrum

Given the explosion in wireless applications, the demand for adequate and appropriate spectrum is increasing. Not surprisingly this creates competition for spectrum between different sectors and players within sectors. In the UK, Ofcom is responsible for regulation and licensing of spectrum. Spectrum licensing approaches range from individual licences (sometimes awarded via auctions) to sharing of frequencies from a common pool of spectrum.

While there is a great deal of sharing of spectrum already, often there is a sometimes justifiable caricature of users being regarded as reluctant to share the spectrum they use while seeking access to spectrum used by other sectors. There needs to be greater degree of sharing of spectrum to reconcile the growing demand with the slower increase in spectrum availability. This can only be achieved with collaboration and goodwill between all users and with regulators to encourage the evolution of technologies, culture and business models for more effective use of spectrum, including sharing.

· Getting mobile coverage on the road

insurance costs. Yet, 17% and 47% of A and with industry to develop and share good B roads in the UK are in complete not spots for 2 G and 4 G mobile coverage respective-

As with rail corridors, mobile operators face similar challenges where roads run through sparsely populated areas with reduced user density to infrastructure costs ratio. Where the business case for investing in infrastructure is marginal we must find ways to reduce the cost of implementation and operation. Transport agencies, Network Rail for the railways and Highways England, could play an important role in opening up economic access to their road and trackside land and fibre to enable communications providers to implement the necessary masts and backhaul. In turn, the increased connectivity could enable the public sector transport agencies to obtain significant savings on maintenance costs through remote monitoring and anticipating repairs.

Achieving Great Infrastructure for the UK

As we forge new trading relationships with our neighbours in Europe and across the world, it is a priority that the UK remains one of the top locations for developing and using digital technology. To achieve this, we must set ourselves an ambition to have great connectivity, not only in comparison with our European counterparts but across the

Implementing and operating the associated digital communications networks is a high investment activity alongside increasing pressure on margins. Given its wide ranging economic and social benefits, a significant proportion of the return on the investment on such networks is spread right across the public and private sector ecosystem. To ensure these benefits are felt, there needs to be a greater emphasis on collaboration from the key players:

- There needs to be greater co-ordination and leadership between Government Departments to make sure that departmental policies (e.g. on transport) dovetail to promote digital connectivity. For example, by aggregating public sector demand and enabling access to public sector properties such as land, rooftops, lamp posts, fibre and ducting, cost of digital infrastructure could be minimised.
- · Local authorities and agencies, such as Connected and autonomous vehicles and transport-related ones, hold the key to intelligent transport systems have huge making it easier for communications service potential for social and economic benefits; providers to implement and operate more productive journeys, reduced journey communications infrastructure such as times; less accidents and more informed fibre, cable and wireless networks. Working

practice on local digital strategies will maximise benefits for their local economies, communities and public services. Furthermore, adopting a facilitative outlook and standardised processes across local authorities for local regulations such as planning permissions will assist development.

· While competition will remain a crucial driver for innovation in industrial ecosystems, the increasing interdependencies from intelligent transport and autonomous vehicles to the numerous digital applications in health and social care - mean that a more collaborative approach on everything from user requirements, standards, and regulation and business models is now a



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Can nations actually collaborate for growth in the digital economy?

by Robert D. Atkinson, President & Founder, Information Technology and Innovation Foundation

As the Information Technology and Innovation Foundation has documented, at least 34 nations have erected barriers to cross border data flows. In many cases, these barriers are designed to force companies to host their data in the nation to create jobs and protect domestic cloud computing providers from competition. Some nations, like Russia and China, turn a blind eye to cybercrime, including hacking and content piracy, because it brings economic benefits. Some nations or regions, including South Korea, Germany, and the EU, employ aggressive enforcement of competition policy against foreign IT companies to shelter domestic competitors. Some nations throw a monkey wrench into the business models of new Internet companies to protect incumbents, whether they are book stores competing with Amazon, taxis with Uber, or telecom companies with over-the-top video and VOIP providers.



As founder and president of the Information Technology and Innovation Foundation (ITIF), Robert D. Atkinson leads a prolific team of policy analysts and fellows that is successfully shaping the debate and setting the agenda on a host of critical issues at the intersection of technological innovation and public policy.

He is an internationally recognized scholar and a widely published author whom The New Republic has named one of the "three most important thinkers about innovation," Washingtonian Magazine has called a "tech titan," and Government Technology Magazine has judged to be one of the 25 top "doers, dreamers and drivers of information

technology."
President Clinton appointed Atkinson to the Commission on Workers, Communities, and Economic Change in the New Economy; the Bush administration appointed him chair of the congressionally created National Surface Transportation Infrastructure Financing Commission; and the Obama administration appointed him to the National Innovation and Competitiveness Strategy Advisory Board. He also has served as co-chair of the White House Office of Science and Technology Policy's China-U.S. Innovation Policy Experts Group Policy; as a member of the U.S. Department of Commerce's National Advisory Council on Innovation and Entrepreneurship; and on the U.S. State Department's Advisory Committee on International Communications and Information.

Atkinson is a member of the Markle Foundation Task Force on National Security in the Information Age and serves on the boards or advisory councils of the Internet Education Foundation, the NetChoice Coalition, the University of Oregon's Institute for Policy Research and Innovation, and the State Science and Technology Institute. Additionally, Atkinson is on the editorial boards of the Journal of Electronic Government and the Journal of Internet Policy; a member of the Global Innovation Forum Brain Trust; a nonresident senior fellow at the Brookings Institution; a fellow at the Columbia University Institute of Tele-Information; and a fellow of Glocom, a Tokyo-based research institute. Atkinson was previously vice president of the Progressive Policy Institute, where he directed the Technology & New Economy Project. He wrote

numerous research reports on technology and innovation policy, covering issues such as broadband telecommunications, e-commerce, e-government, privacy, copyright, R&D tax policy, offshoring, and innovation economics.

Previously, Atkinson served as the first executive director of the Rhode Island Economic Policy Council (RIEPC), a public-private partnership whose members included the state's governor, legislative leaders, and both corporate and labor leaders. As head of RIEPC, Atkinson was responsible for drafting a comprehensive economic development strategy for the state and working with the legislature and executive branch of government to successfully implement each element of a 10-point action agenda.

Prior to his service in Rhode Island, Atkinson was a project director at the Congressional Office of Technology Assessment, where, among other projects, he spearheaded The Technological Reshaping of Metropolitan America, a seminal report examining the impact of the information technology revolution on America's urban areas.

As a respected policy expert and commentator, Atkinson has testified numerous times before the U.S. Senate and House of Representatives, and he appears frequently on news and public affairs programs. Among others, these appearances have included interviews on BBC, CNBC, CNN, Fox News, MSNBC, NPR, and NBC Nightly News.

Atkinson holds a Ph.D. in city and regional planning from the University of North Carolina, Chapel Hill, where he was awarded the prestigious Joseph E. Pogue Fellowship. He earned his master's degree in urban and regional planning from the University of Oregon, which named him a distinguished alumnus in 2014.

he developed the protocols to access information on remote computers, Lee termed this system "The World Wide Web." And it wasn't very long after that that cyber-libertarians like Electronic Freedom Foundation founder John Perry Barlow predicted a new utopian world "cyberspace."

It hasn't quite worked out that way, to say the least. Sovereign governments, whose job is to represent the interests of their There are two reasons why some nations citizens, not the world's, rightly assert that are working to create a National Narrow

least to the extent it plays out within their borders.

The problem is that this proper rejection of the cyber-libertarian fantasy has turned into digital balkanization, with an increasing number of nations not just erecting barriers to the global operation of the without borders and states, at least in Internet, including restricting data cross border flows, but actively seeking to impose their Internet policy rules on other nations.

Tim Berners-Lee didn't think small. When they have jurisdiction over cyberspace, at Net (NNN), rather than a World Wide Web (WWW). The first is economic. As the Information Technology and Innovation Foundation has documented, at least 34 nations have erected barriers to cross border data flows. In many cases, these barriers are designed to force companies to host their data in the nation to create jobs and protect domestic cloud computing providers from competition. Some nations, like Russia and China, turn a blind eye to cybercrime, including hacking and content piracy, because it brings economic benefits. Some nations or regions,

including South Korea, Germany, and the EU, employ aggressive enforcement of competition policy against foreign IT companies to shelter domestic competitors. Some nations throw a monkey wrench into the business models of new Internet companies to protect incumbents, whether they are book stores competing with Amazon, taxis with Uber, or telecom companies with over-the-top video and VOIP providers.

But economic protectionism is not the only reason for these growing barriers. The second motivation stems from values. Despite the growth of deep globalization, nations hold different values about free speech, privacy, and a host of other issues, and these play themselves out in IT and Internet policy. By and large, these differences can be dealt with. The problem occurs when nations try to impose their values on other nations, such as when France attempts to impose its so-called "right to be forgotten" regime on web sites located outside France, requiring search engines to block content outside of France. So how can we make more progress in resolving these cross-border Internet policy conflicts? There are two dominant approaches today, neither of which provide meaningful solutions.

The first can be termed "universalism," or "why can't we all just agree?" For Tim Berners-Lee's "Magna Carta" for the Internet would create universal rights for privacy and free speech online. The notion is that if we all bought into the same rules and norms, there would be little conflict. But whose rules and norms should prevail? The Chinese, who want to limit online freedom and Internet openness? The American's, who privilege free speech, Internet freedom for all, and enforcement of IP rules. The European's, who see privacy as a fundamental human right as opposed to just one value to be considered among many (e.g., innovation and economic growth). Berners-Lee's?

To be sure, universal rules make sense in certain situations (e.g., rules on responding to denial of service attacks, frameworks on core Internet architecture, agreements regarding digital trade, etc.), but in many cases universal rules are inappropriate for Internet policy because countries differ too much in their values and priorities. Attempting to reconcile these conflicting laws to create universal rules for regulating speech on the Internet is futile and doomed from the start.

The second approach is to take the opposite perspective advocate for each country to have near complete freedom to do what it wants. In many ways, this is the dominant approach or limit universal "goods" and support to Internet policy today where countries sometimes engage in conflict over a policy but ultimately each country goes its own way. There are three main drawbacks to this approach. The first is that it leads to balkanization of the Internet-instead of a single, global Internet, each country pursues its own "national internet" with its own set of rules. The second is that it can lead to one nation's values and laws being imposed upon others without the other nations affirmatively choosing those values or laws for themselves. The third is that these policies can be used as cover for anti-competitive, trade-distorting actions that hurt the global economy.

So, if universalism and balkanism cannot be the answer, what is? The path forward involves combining both frameworks in a way that captures the best of each approach while sidestepping their pitfalls.

The first step is to recognize that when it comes to the Internet's technical architecture, a universalist approach to promulgate global, commonly shared standards is necessary. Countries that wish to participate in the Internet must agree on a common technical architecture (e.g., domain names, networking protocols, etc.), otherwise it would degenerate into a series of national-level networks. A multi-stakeholder approach to maintaining this goal is desirable since debates and disagreements over the technical architecture of the Internet can only be resolved if stakeholders reach consensus. And the Internet, which is a network of networks, has vastly more stakeholders than previous telecommunications systems, such as the telephone system, where in most nations the state was the owner. Although countries have not signed binding international agreements committing to the multi-stakeholder approach for the continued development of the Internet, doing so would be a useful way to codify this model, particularly in light of the transition away from U.S. oversight of the Internet Corporation for Assigned Names and Numbers (ICANN).

The second step is to recognize that when it comes to policies about the how the Internet is used, as opposed to policies about how the Internet is constructed or how it operates (e.g., Internet architecture), there can be differences between nations. Ideally, international agreements would allow nations to achieve and formalize consensus on various policy goals, particularly those with an effect on individuals outside the country. These agreements would allow nations to specify goals that are both desirable (universal "goods") and undesirable (universal "bads") from a global perspective. In general, nations should oppose policies that interfere with

policies that interfere with or limit universal "bads." For example, the existence of the World Trade Organization (WTO) is evidence of broad international consensus on the benefits of free trade (a universal 'good"). Thus, WTO members should support Internet policies that promote free trade in digital goods and services and actively oppose those that conflict with it. Some WTO members have tried to do this by pursuing a strong digital and e-commerce chapter as part of a Trade in Services Agreement (TiSA). Another way is for more nations to join the Information Technology Agreement. Similarly, as there is broad international agreement on the need to combat child pornography (a universal "bad"), including a United Nations human rights treaty, signatory nations should support Internet policies designed to reduce this criminal activity.

In cases where there is no consensus or agreements on goals, nations should limit their policymaking activities to proposals that do not impact those outside their borders. If a nation wants to require ISPs to block pornography or hate speech, they should be allowed to do it, as long as it is not used as a hidden trade barrier, and they do not try to require ISPs outside their nation to follow the same rules. Thus, if a country blocks access to certain sites deemed offensive domestically, such that the blocking does not affect users outside of its borders, other nations should not interfere, unless such reasons are in fact a pretense for limiting a universal good (e.g., international trade).

This is not to say that countries need to endorse the policies of other countries, or even that they cannot try to dissuade them from pursuing a course they disagree with. Rather it is to say that ultimately these are issues where different countries should be allowed to "agree to disagree." For example, Western democratic nations may not like the fact that the Chinese government blocks access to online political content it deems threatening, but fundamentally that is its right as a sovereign government. In contrast, as a signatory of the WTO, China likely does not have the right to keep foreign competitors from selling products and services online to its residents.

While nations will not always agree unanimously on specific policy proposals, appropriate solutions, or even the relevant evidence, a common framework of understanding cross-border Internet policy issues will allow for healthier Internet policy debates, better cooperation and coordination between nations, and fewer policy conflicts.

Collaboration in the digital economy: why working together is critical for growth

by Richard Parris, CEO & Founder, & Lubna Dajani, Chief Strategy Officer, Intercede

IoT services are beginning to deliver benefits to consumers and societies, as well as creating new markets and driving revenues across many sectors; from healthcare, education and agriculture, to manufacturing, transport and retail. The success or failure of the IoT will have a major impact on the growth of the digital economy on a global scale. However, the more dependent we are on our connected lifestyles, the more damaging cyber-attacks can be. Securing this ecosystem should therefore be an immediate priority and it's critical for all players to collaborate, at every touch point and each layer, to enable the IoT to deliver on its potential. This article discusses the security challenges and illustrates solutions and initiatives which will promote better collaboration throughout the market.



Richard Parris, CEO and Founder

Richard Parris is an Anglo-American technology entrepreneur with extensive experience in the cyber security and identity management industry. He founded Intercede in 1992 and has led the Group through all stages of its growth, including an IPO in 2001.

Richard regularly engages with governments and major corporations to promote the importance of identity assurance in cyber security, physical access control and the digital delivery of public services. He is a Chartered Engineer with an MBA from the University of Warwick Business School.

Richard is a member of Catalyst UK, a global network of influencers helping UK Trade & Investment, and the British government, to promote UK excellence internationally. He is also a member of the UK government's Cyber Growth Partnership.



Lubna Dajani is the Chief Strategy Officer at British digital identity and credentials management company, Intercede. She has over 25 years' experience in the digital and mobile technology industries, working with a variety of organisations from large corporations such as Microsoft, T-Mobile and Viacom to non-profit organisations and NGOs. Lubna has coined the term Allternet and regularly presents at industry events world wide on a range of issues including identity, authentication, mobility, data science and other leading edge technologies.

Lubna's keen area of focus is currently on securing the future of the IoT. She is a visiting scholar at NYU, the secretary of OTPA and the Co-Chair Marketing Council of the prpl Foundation, an organization focused on enabling the security and interoperability of embedded devices for the IoT and smart society of the future.

The recent WannaCry ransomware attacks affected more than 200,000 computers in over 150 countries across the globe, with victims including the NHS, FedEx and Telefonica, as well as police departments and banks. Ransomware attacks have been growing in recent years: there were an estimated 638 million such attacks last year, up from 3.8 million in 2015, according to SonicWall. The costs of WannaCry have yet to be fully calculated, but according to the same report, in the first three months of 2016, cybercriminals extorted \$209 million from businesses and institutions using ransomware.

Attacks such as these should serve as a general wake-up call to everyone with computing platforms, including governments, corporates and consumers, to imple-

ment reliable security protocols, platforms, infrastructure and strategies to mitigate risk and shift our current culture.

A thriving digital economy - but highly insecure

The adoption of connected devices and development of connectivity technologies have helped to kick-start the now thriving digital economy. Smart devices are flooding the market, with 3G and 4G networks now available in a growing number of regions. The future roll-out of 5G will also play a vital role in powering new digital services and enabling the rapid growth of connected IoT devices. One report estimated that the value of the IoT to the UK economy alone will reach £62 billion by 2020. This is transforming life and work at scale, in both public and enterprise arenas.

While the proliferation of connected devices is continuing at a rapid rate, securing these connected devices remains a challenge. Furthermore, the lifecycle of a connected device and associated services is complex, involving multiple stakeholders and technologies. Weak or no security at any point can expose a device, user or industry to cyber-attack – highlighting why collaboration is now a must.

Threats to IoT

Many IoT device manufacturers, keen to get their products to market quickly, will often build devices with no, or poor, inherent security features, leaving them susceptible to attack. To date, implementing security at the device level is complex and expensive. While many of these gadgets, such as smart

lighting, remote home access control and the importance of such collaborations. drones, appear harmless, many consumers fail to understand how such devices can be exploited by hackers if not properly protected. AT&T recorded a 3,198% increase in IoT vulnerability scans over the past three years.

The damaging fallout from connected device hacks has already been painfully demonstrated with a string of DDoS (Distributed Denial of Service) attacks in recent months. Hackers have repeatedly taken advantage of unsecured IoT devices, using these as entry points to flood servers with traffic, overwhelming resources, causing servers to crash, taking out services and creating losses for companies. The DDoS incident against Dyn in October 2016, which targeted connected printers and cameras, caused frustration for internet users and significant damage to the domain name service provider. DDoS attacks are estimated to cost up to US\$40,000 per hour, on top of the reputational damage, disruption to users' lives and the potential loss of customer data.

If unsecured devices like those targeted in the Dyn attack can be hacked today, then what's to say that the autonomous cars. healthcare devices and critical infrastructure of tomorrow will not also be at risk? Whilst device manufacturers certainly have a role to play in securing these edge-of-network devices and applications, the success of the entire IoT-powered digital economy will only be guaranteed through the close collaboration and active participation of all parties involved.

Uniting for a trusted IoT

The good news is that collaborative work is now underway, as more parties recognise the need to impose stricter cyber security measures. This must now extend across the board from the early adopters to all regulators, policy makers, insurers and leading service providers as well as consumer advocates and educators.

Strong digital trust by design, from the silicon powering these devices, through all touchpoints and links in between, is needed to allow for the deployment and management of end-to-end trusted services. Open digital trust frameworks would allow individuals, organisations, devices and services to be identified, verified and authenticated from the point at which access is attempted.

The introduction of the General Data Protection Regulation (GDPR) which will come into force in May 2018 demonstrates GDPR is making collaboration and standardisation across industries, organisations and geographical borders not just a suggested goal but a legal requirement. This applies not just to EU member states, but also to those organisations located outside of the Union if they offer services or goods to, or monitor the behaviour of, EU data subjects, meaning the impact of the GDPR is global.

The prpl foundation is one organisation to champion the idea of uniting industry players, providing guidance to developers, manufacturers and service providers on APIs and frameworks needed to establish and deliver trusted services at all layers of

Efforts from a number of standards bodies and industry organisations have also marked a promising start to achieving the digital trust goal. These include the IoT Security Foundation, the Open Trust Protocol Alliance (OTPA), the Internet Engineering Task Force (IETF), and the Alliance for IoT Innovation (AIoTI). The aim of this European Commission incubated initiative is to strengthen links and build new relationships between the different players in the IoT from start-ups and SMEs to academics and research labs. These initiatives, and many others, are all promoting interoperability and convergence between standards by uniting often disparate parties.

Act now

We are without a doubt heading towards a digital age where people, products, and places will be more connected than ever before. Whilst this may enable an expansive new world of opportunities, it is also a double-edged sword. The IoT has the potential to encourage growth in the digital economy, but this will only be possible with the collaboration of all players involved. Working together to implement a chain of digital trust will mitigate the security risks which will otherwise stifle this growth, limiting the success of the digital economy of tomorrow.



Collaborating on connectivity for business and economic growth

by William Newton, President & EMEA MD, WiredScore

Further to the digitisation of traditional business, the rise of tech has created new business models as part of the digital economy. This is especially true in the UK, which in 2015 had the highest percentage (10%) in the G20 of the internet economy as a portion of its GDP.

As digital further underpins core business functions, good connectivity is no longer a luxury for tenants, but an essential component of their business. The impact of bad connectivity can be severe: whether that's not having the reliable bandwidth to use the cloud software needed for ongoing internal operations; or an outage interrupting a website and other customer-facing services.



William is President & EMEA MD at WiredScore.

He began his career at McKinsey & Co, before moving to work as a senior policy advisor in the Cabinet Office and then in the No 10 Policy Unit in 10 Downing Street. William joined WiredScore ahead of the company's London launch as the capital's official digital connectivity rating scheme in October 2015 in partnership with the Mayor of London. In 2017, William led WiredScore's European expansion with launches in France, Ireland and Germany. Having successfully repositioned the wider debate around connectivity in commercial real estate, William won both the Estates Gazette's Rising Stars award 2016 and the Property Week's Young Property Personality of the Year 2017 with his UK business partner, Tom Redmayne.

Over the past few years there has been exponential growth in the use of technology and cloud software in traditional business. Nearly half of CEOs have begun digital business transformation, according to Gartner, to bring technology to the core of the business to try to create competitive advantage.

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As digital further underpins core business functions, good connectivity is no longer a luxury for tenants, but an essential component of their business. The impact of bad connectivity can be severe: whether that's not having the reliable bandwidth to use the cloud software needed for ongoing internal operations; or an outage interrupting a website and other customer-facing services.

The price of such events should not be underestimated. Recent research from Ontrack explained how just one hour of interruption for an online bank could cost up to 6.5 million euros, 110,000 euros for a mail order company or 90,000 euros for a ticket booking office. That's why it's the threat of moving to a competitor's

essential tenants can feel confident when they move into an office space that it will meet their connectivity needs.

While essential, no single organisation or person is responsible for ensuring that businesses have access to good connectivity. Making sure that a business's office is supplied with the reliable, fast broadband it needs and at a good price, requires collaboration between the landlord or developer, Internet Service Providers (ISPs), the local authorities and government.

So how can these different organisations work together to provide the lifeblood of modern business?

Having access to service providers

Businesses should be able to choose the best possible broadband service available on their budget. Having access to multiple different ISPs in the building is a crucial component of achieving this, to guarantee that different and competitive services are being delivered. Without multiple providers, a single ISP will have a monopoly over the tenants within that property. As a result, they may find themselves cornered into expensive services; it's harder to negotiate without

It's important that the landlord or developer works with the ISPs to allow their tenants to choose the service they want. For example, tenants should have the choice between both fibre and copper services, the latter being a cheaper option. In existing properties, the landlord should engage with ISPs to ensure that different providers and solutions are ready to supply the building. For development and refurbishments, where the infrastructure has not yet been built, developers should ask for letters of intent from ISPs confirming that they are willing and able to bring service into the building should an order be placed.

Landlords should also collaborate with ISPs on providing and maintaining the physical infrastructure of the building needed to support the delivery of broadband and fixed-wireless connectivity. Making sure the cabling pathways remain tidy will not only enable new providers to install new cabling when necessary but also remove physical choke points sometimes caused by out of date cabling being left in place.

Enabling connections faster

When a new business moves into a building, one of the more immediate tasks is negotiating a wayleave document with the ISP and

the landlord to agree the legality of installing fibre. This process has a cost for all the associated parties of time, money and patience.

Landlords, ISPs and businesses alike often talk to us about how tedious and painful the process of wayleaves can be. In some cases, it can delay connections to the internet for months, leaving employees working on 4G dongles.

With forethought and collaboration between a city's landlords, developers, ISPs, property managers, legal firms, and government, a Standardised Wayleave can be created to help speed up the installation process of broadband. The City of London Corporation's Standardised Wayleave Toolkit launched in July 2016 is a great example of this. It provides all the relevant parties the starting documentation they require to deliver new digital infrastructure in a quick and effective way.

The Cursitor Building, Aberdeen Asset Management's new office development on London's Chancery Lane is a prime example of where an investment was made during the redevelopment stage to expedite new tenants getting set up with internet. As well as having a Standard Wayleave Agreement on file, Vodafone fibre is physically present in the building and three other fibre providers have signed letters of intent, confirming they are able to supply service to the building if requested.

Enabling access to better digital infrastructure

On a national scale, the government has continued to show that it understands the importance of improving and future-proofing the nation's digital infrastructure. Following the general election, Digital Minister Matt Hancock stated "We seek to be the best place in the world to start and grow a digital business" and reaffirmed the commitment to significant investments in full fibre broadband and supporting a smooth roll-out of 5G. To achieve this ambition and build better infrastructure, the government will need to collaborate with ISPs and communications service providers (CSPs).

For tenants to benefit from this investment, landlords and developers will also have to think about ways of adapting their buildings to this new technology. If unprepared, 5G will intensify indoor mobile coverage issues as it operates on very high frequencies. This means that 5G's signals are extremely short and are unable to penetrate walls and other

obstacles easily. With roughly 80 per cent of mobile phone calls now made from inside a building, it is critical that 5G coverage seamlessly extends throughout both commercial and residential properties.

Ensuring different stakeholders connect

No organisation has sole responsibility for providing good internet services. However, the impact of poor connectivity can have a monumental impact on both digital and traditional businesses that want to retain a competitive advantage in the market.

To ensure efforts are fully coordinated, it is essential for the government, landlords and developers, ISPs and CSPs to get together and develop the digital infrastructure that will meet the needs of modern businesses.



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Our authors are ICT leaders of industry, governments, regulators, international organisations, legal experts, bankers and their advisors.

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Co-creation: The key to valuation creation in the digital economy

by Michael Lake, President and CEO, Leading Cities

To unlock the true value of the digital economy, each piece will need to work together in collaboration with others to complete the puzzle. Co-creation is the means by which collaboration unlocks the economic, sociologic and ecologic opportunities created by the technologies and innovations within the digital world. Co-creation is a collaborative model engaging stakeholders in the process of improving products, processes and outcomes, whether in the private, public or any other sector. This powerful model is the key to both city success as well as the success of the digital economy.

The importance of collaboration in the digital economy starts right at the beginning—the formation of new digital companies. But, future success of digital technologies and the economy at-large, will be the effectiveness with which digital companies understand, embrace and engage in the complex ecosystem of cities. Like all startups, digital companies face certain capital challenges: human capital and investment capital. However, digital companies operating in the Smart City space face two additional capital challenges: political capital and city capital.



Michael is the founding President and CEO of Leading Cities. As President and CEO, Michael establishes and develops relationships with municipal governments, private sector businesses and universities around the world, creating a global network of partner cities dedicated to creating business development and government cooperation opportunities and implementing public policy that effectively addresses the shared challenges facing 21st century cities.

Michael has served as Special Assistant for White House Operations to two Presidents, policy research analyst to the former Prime Minister of Ireland, and Director of Development for United Way of Massachusetts Bay and Merrimack Valley.

The growth of the digital economy has been both significant and rapid. Today, we stand at the precipice of a new digital economic boom where new value will be created. Fueled by two decades of corporate applications, the digital economy has made way for new applications and opened major new markets. Chief among these burgeoning markets is the integration of digital platforms, interconnectedness and information communications technologies within cities globally.

The 21st century represents the first time in human history when more than 50% of the world's population dwells within urban centers. We have seen the advent and spread of Smart City solutions, as was covered in last years' edition of Connect-World. This new arena opens the flood gates for new opportunities in the digital economy: connecting departments within municipalities, integrating systems across digital platforms and co-creating new solutions with actors outside the public sector. Given the increase in urban populations, the need

for an estimated USD \$78 Trillion investment in city infrastructure worldwide, the proliferation of digital devices and the rapid development of new digital technologies, the vast and yet unrealized growth of the digital economy still awaits.

The success of the digital economy as it applies to cities is largely dependent on the level of collaboration among the array of stakeholders within cities. Currently, municipal governments are one of the most fragmented institutions in the world. According to Bruce Katz of the Brookings Institute, the United States alone has 19,492 units of general purpose municipal governments, 13,051 school districts, and 37,381 special authorities." Among these fragments of government, there seems to be an infinite number of systems, processes and technologies being used. Cities are far more expansive than their government. On the whole, cities are a complicated web of five interconnected and tangled sectors, which Leading Cities refers to as the Q-helix or quintuple helix: public, private, non-profit,

academia and citizenry. Together, these sectors form the quilted fabric of society, the cradle of innovation, and the launching pad for further growth of the digital economy. Ultimately, each stakeholder represents a piece in the giant jigsaw puzzle of the digital economy.

To unlock the true value of the digital economy, each piece will need to work together in collaboration with others to complete the puzzle. Co-creation is the means by which collaboration unlocks the economic, sociologic and ecologic opportunities created by the technologies and innovations within the digital world. Co-creation is a collaborative model engaging stakeholders in the process of improving products, processes and outcomes, whether in the private, public or any other sector. This powerful model is the key to both city success as well as the success of the digital economy.

The importance of collaboration in the digital economy starts right at the beginning

the formation of new digital companies. ecosystem involves alignment between this challenge with a strategy for collabora-But, future success of digital technologies and the economy at-large, will be the effectiveness with which digital companies understand, embrace and engage in the complex ecosystem of cities. Like all startups, digital companies face certain capital challenges: human capital and investment capital. However, digital companies operating in the Smart City space face two additional capital challenges: political capital and city capital.

Each of these four capital challenges offer unique obstacles for Smart City solution providers. First, this particular area of academic study is less developed than most and, therefore, few graduates enter the workforce each year with the cross-disciplinary skillsets necessary to effectively navigate the overlapping worlds of commercialization, policy, public procurement, engineering and finance. This results in a shortage of human capital able to meet the specific needs of the Smart City industry. Second, investment capital focused on Smart City solutions has not matured. Because most Smart City solutions involve technology of some degree, these startups are often dumped into the bucket of high tech companies, where investors are focused on high growth and rapid returns. These investors will suggest if not demand that the companies they invest in avoid working with the public sector, which operates at too slow a pace to meet their investment needs. It is essential for Smart City solutions to develop their own bucket with investors who understand the patience required and the economic return that is possible with Smart City solutions startup. Third, political capital, which refers to the political will and leadership of municipal officials to take risk on being the first client to implement a new Smart City solution. Finally, no matter how strong the will and leadership of a city may be, ultimately the city's treasury needs to be in a financial position to afford the implementation of a solution-new or old. In cities around the world, Leading Cities has concluded that collaboration and alignment of the stakeholders in the Smart City ecosystem is the fastest and surest means to reduce risk, achieve results and realize growth within this industry.

To succeed, digital companies producing the solutions to today's urban problems require the development of a collaborative environment and robust ecosystem that addresses these challenges of four capitals with the involvement and support of all five sectors of society. Collaboration within this

entrepreneurs, investors, academic institution and partnerships will be the leaders of tions, corporations, public leaders, govern- tomorrow's digital economy. ment and non-profit organizations. The academic community must be included to explore ways of providing skillsets for students to be better prepared for the jobs of the digital future as well as providing pathbreaking research and new discoveries. Business leaders must be engaged in everything from outsourcing their research and development through entrepreneurs, who are faster and far more nimble, to including emerging digital trends and technologies into their own strategic plans and actions. Collaboration with the public sector is critical to identify specific challenges that the municipality has deemed a priority and has set aside the funding to resolve the challenge. Citizens help by sharing valuable feedback in product design and application. Non-profit organizations who are working on these same urban challenges will then provide the institutional knowledge, framework and experience to shepherd projects through to fruition.

The greatest remaining hurdle for the digital economy to realize its full potential lies within the ability of the five sectors of the Q-helix to work together and fulfill their respective roles in this digital ecosystem. With people moving to urban areas at a rate of 1.3 million per week, this industry's greatest markets will be the world's cities and it is within these urban centers that collaboration with all the major actors is possible. Though the future growth of the digital economy is not limited to cities, these high-density regions of the world will generate the most significant returns and yield the greatest impact, provided collaboration drives change rather than change being forced upon unwilling parties.

Collaboration within the digital economy-at-large or more narrowly in the digital dimension of the Smart Cities industry relies on the establishment of a well-connected ecosystem where all elements are brought together to advance opportunities and support the establishment of a strong and collaborative network of stakeholders working together to build a more unified digital future for all humanity. Understanding and facilitating the interconnectedness of the five sectors of the O-helix is the cornerstone of the very foundation on which the future of the digital economy will be built. Every leader within the digital economy is presented with the same challenge—how to best engage all stakeholders in a collaborative process. Those organizations who accept and tackle



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Critical cornerstone for the digital economy: Why it is necessary for the current era of disruption

by Ms. Dato' Yasmin Mahmood, CEO, Malaysia Digital Economy Corporation

As consumers change according to trends, businesses must be ready for a never-ending game of evolution and be quick to absorb, understand, and adapt to rapid transformative processes. If they don't, there is no chance for them to ever catch up. This applies to all industry sectors as disruption is not discriminative and will have a knock-on effect among inter-related verticals.

Disruption is an inevitable process that, by how it progressed over the last few years, has now become nigh unstoppable. In fact, the premise that it appears to focus in limited sectors is false as many business leaders have pointed to digital transformation as one of the major factors feeding the continual growth of many socio-economies.



With an illustrious career spanning three decades thus far, Dato' Yasmin Mahmood started her career as an analyst programmer before working her way up to CEO and senior positions within Malaysia of global brands such as Dell, HP and Microsoft.

The older generation would remember her for the "Malaysianising Microsoft" vision when she aligned the strengths of what was then the world's most powerful software company with Malaysia's national and development agenda. In September 2014, she accepted the national calling of becoming CEO of MDEC. It was her life purpose of serving the nation by making a difference and utilising her expertise and experience for the betterment of Malaysia.

Dato' Yasmin is a most sought after leader and speaker. For example, she was a distinguished speaker at the World Economic Forum held in Kuala Lumpur in 2016, and also represented Malaysia at the Forbes "Finding the Next Billion" session held in Silicon Valley, United States in 2015. This year alone, Dato' Yasmin addressed the tech industry both in Sydney and Kuala Lumpur at The Wild Digital Conference.

The IT industry has been in a state of flux never-seen-before rapid pace, it is clear that over the last 12 months thanks primarily to disruptive technologies of all sorts appearing and rocking the status quo for many industries. This has become so extensive that it is imperative for all to identify current or upcoming trends that have the potential to influence the marketplace. Businesses need to be able to learn and adapt, or be left behind.

Consider the likes of iflix, Grab, AirBnB, Amazon, and other on-demand services that have appeared over the last five years. While their goal is to provide an entirely new level of service that is unprecedented for all, they have challenged the norm and forced many industries as a whole to face change. Mainstay players must now figure out how they can take on these fast-accelerating upstarts.

In fact, disruption – now a buzzword among innovators - has become a true force to be reckoned with as it has become a major wake-up call for businesses that are complacent or appear to be laggards.

Disruptive effects

that the digital age heralds at a growth of many socio-economies.

there is a revolution taking place right now with technology taking centre stage. Technology has, and still is, changing all the rules and propagating the fact of how disruption is now the new norm.

Once this understanding gains more traction among businesses, the next step is to consider future-proofing for the variable factors that these disruptive forces might bring to the table.

Let's start with how disruptions affect businesses.

As consumers change according to trends, businesses must be ready for a never-ending game of evolution and be quick to absorb, understand, and adapt to rapid transformative processes. If they don't, there is no chance for them to ever catch up. This applies to all industry sectors as disruption is not discriminative and will have a knock-on effect among inter-related verticals.

Disruption is an inevitable process that, by how it progressed over the last few years, has now become nigh unstoppable. In fact, the premise that it appears to focus in limited sectors is false as many business leaders have pointed to digital transformation as one As the world struggles to embrace change of the major factors feeding the continual

The way forward is for all to embrace the idea of being disruptive or disrupted, rather than fearing it.

Digital take-up

Future-proofing covers a broad stroke of processes that mostly rely on engaging the digital native. That one aspect alone is a necessity as it will enable businesses to be more aware and highly relatable to the ever-changing landscape that on-going and soon-to-come disruptions have brought about.

Having such engagements in mind will give rise to interest or, perhaps, instantly spur many towards transforming how they operate to make it more technologically inclusive and be fully prepared for the oncoming wave of disruptions.

This is, essentially, a crucial factor for businesses to keep in mind as they study and figure out what is needed for future-proof-

Understanding the digital native certainly goes above and beyond deploying new technologies and enhancing how the workforce operates. In fact, the two inter-linked functions would only work when more start to understand and embrace the need to become digitally enabled, not

just from a business perspective but in how they go about their daily activities as well.

Digitally driven

With the Fourth Industrial Revolution now in full-swing, companies can no longer second guess themselves as newer innovations continue to show up and consistently shake-up the existing state of affairs. Industrial trends like Big Data Analytics, Internet of Things, Virtual and Augmented Reality, Mobility, and eCommerce have already broken the proverbial glass ceiling as they move to digitise the world. Seeing as these five empower the digital economy, it further reinforces the notion that they should not be under-estimated or disregarded.

Businesses must be immersed with any one, or all, of these influential factors to ensure their technology offerings are future-proof and able to take on these seismic shifts that the world is now experiencing.

The world had not been ready for the likes of Uber, AirBnb, and Alibaba. Even home-grown disruptors like Tripda and Hermo have started making in-roads for the ride-sharing and facial care spaces, further proving that industrial competitors are not the ones who will start any shake-ups. The use of advanced technologies will be vital to this and, thus, it is only appropriate that businesses step up their efforts to spur digital transformation from within at all levels.

MDEC is driving the digital economy in Malaysia.

In Malaysia itself, as a core path towards the development of a high-income knowledge-based economy, Malaysia Digital Economy Corporation (MDEC) has acted as the driving factor pushing for a fully connected digital economy.

SMEs, which have long been the backbone of Malaysia's economy will continue to play a strong part and are deemed by MDEC to be agile enough to compete effectively in this disruptive landscape. The rise in e-Commerce activity over the past few years has been significant, and MDEC expects SME exports to strongly push towards the 2020 goal of 30%.

Whatever it may be, the truth is that versatility is king today and will be in the future.



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Global interconnection as a strategy for local growth

by María Claudia Lacouture, Minister of Trade, Industry and Tourism, Colombia

Interconnectedness has manifold implications. From the Ministry of Trade, Industry and Tourism of Colombia we emphasize how it has made it possible to strengthen and leverage competitive advantages, evolution and growth trends for productive activities related with the service sector.

Our country has taken on the challenge of diversifying and enhancing exports to decrease our dependency on commodities that do not generate much in terms of added value.



María Claudia Lacouture is the Minister of Trade, Industry and Tourism of Colombia.

Bachelor's in Finances, Government and International Relations, Universidad Externado de Colombia; Master's in Economics and Marketing, Cornell University. 1996, began to work as a market research adviser, ProColombia. Former: Director of Tourism, commercial office, ProColombia, US, worked to reintroduce Colombia as a major cruise ship destination; Vice-President, Imagen País. Internationally recognized for work in nation branding and specifically for Colombia is Passion. Has worked with the Colombian business sector to create and articulate an accurate and positive image of Colombia to project to the world. Led the campaign Discover Colombia through its heart. As a specialist in international commerce for Trade Winds Network, Miami, focused on developing creative marketing strategies to promote Colombian agricultural products including, but not limited to, the Colombian coffee brand.

standard of their inhabitants depend on trade with the rest of the world. More so in an international world where the trend is to dilute borders, eliminate barriers and enter markets that expand and become more sophisticated.

Multilateral actions promoted from the World Trade Organization, regional blocks and bilateral treaties ensure the flow of goods and capital between nations. Businesspeople and consumers move in a different space from that of their parents and grandparents. Producers have potential clients all over the world. Users can avail themselves of an entire planet to choose options.

In a globalized world that is different from those that preceded it because it is accompanied by technological developments that have changed the concept of distance. Today, it is possible to be connected at any time with almost any place. Interconnectedness is more than a word, it is a permanent state.

This interconnectedness has manifold implications. From the Ministry of Trade, Industry and Tourism of Colombia we emphasize how it has made it possible to strengthen and leverage competitive advantages, evolution and growth trends for productive activities related with the service

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The economy of nations and the living diversifying and enhancing exports to decrease our dependency on commodities that do not generate much in terms of added

> One of strategy in this regard hinges on identifying and accompanying the outsourcing of business processes (Business Process Outsourcing, BPO; Information Technology Outsourcing, ITO; and Knowledge Process Outsourcing, KPO); likewise with software development and information technology services.

> In Colombia, exports of process outsourcing services (BPO & O) and software and technology services (industry 4.0) exhibited an average annual rate of growth of 15,1% for the period between 2010-2016.

> Sales overseas have been driven above all by call center services, that grew 20.6% and contributed more than nine percentage points to the positive growth of exports.

> Currently, these activities account for a six percent share of total employment in the service sector. It is a sector that brings foreign currency to the country and fosters its development, both by contributing to the economy as a whole, as well as for the benefits accrued to the regions where it sets up shop.

> Service companies not only come to the capital, they also set up operations in medium-sized and small cities, generating jobs that move local economies. According to the Colombian Association of Contact

Centers and BPO, the process outsourcing sector (BPO) and user services centers created 200,000 new jobs in 2016.

Among the businesses that have developed within the regulatory and economic framework that fosters the export of services, we have online travel agencies specializing in the sale of airline and overland tickets, industrial solutions from specialized mathematical modelling and innovative technologies with artificial intelligence, the development of smart electrical energy grids, shared services, consulting and specialized support centers.

The strategy

The world requires technologies, people and spaces to service the transactions that travel through networks. For sales, customer service, advice, troubleshooting or specialized services in companies. Service quality matters more now than geographical location.

What Colombia has done is to position itself as an option for servicing clients all over the world. The internationalization of this capacity is supported on four pillars: making companies stronger, investment in human capital for insertion in global services markets, trade promotion and improvement of the business climate.

Investment in human capital includes customized training, bilingualism, graduate scholarships, job fairs and certification of

Global Interconnectedness

of English language skills.

Making companies stronger includes We chose to be with the winners. productivity programs with 40 sector companies. Likewise, the implementation of cluster strategies in the software and IT sector in virtual and augmented reality through specialized knowledge transfer and international best practices.

To optimize the business climate, there was progress in drafting and enacting legal norms on Data Protection (Habeas Data) and tax exemptions on software exports, as well as building a National Science, Technology and Innovation Parks Strategy.

In the BPO sector, from 2010 to March 2017, 20 companies reported contracts for USD\$ 152.9 million with 63 buyers from 11 countries. 37 businesspeople have participated in three trade fairs and international business meetings in countries like Costa Rica, India and the United States, and 33 international buyers have had business meetings with Colombian businesspeople in seven trade fairs and conventions hosted in Colombia.

During this time, 59 investors from ten countries reported the start of investment projects that are expected to generate 47,219 jobs. In IT services, 18 investors from ten countries have announced initiatives whose job-creating potential amounts to 18,283 positions.

From 2010 to March 2017, 212 businesspeople reported contracts related to software for USD\$ 338.8 million with 747 buyers in 49 countries. During the same period, 421 businesspeople have participated in 23 trade fairs and international business meetings in the United States, Spain, Israel, Germany, Peru, Mexico, Panama and Greece.

Meanwhile, 668 Colombian businesspeople and 606 international buyers have met in business roundtables hosted in Colombia, the United States, Peru, Mexico and Brazil.

For call center services, five tax-free zones were created, located in the Departments of Antioquia, Atlantico, Caldas and Risaralda, which have generated 4,157 new direct jobs and 109 indirect jobs for a total of 4,266. The tax-free zones regime was recently modernized in Colombia.

Carving out space in global markets is a challenge that my country takes on with a forward-looking view. And the future is in new technologies and their disruptive effect on the economy. This is about a real phenomenon that has changed forever how business is done and where, as is the case with all changes, there are winners and losers.



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Our authors are ICT leaders of industry, governments, regulators, international organisations, legal experts, bankers and their advisors.

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Renewable Energy Revolution

Achieving the shared sustainable development goals: How the ICT sector can drive the renewable energy revolution

by Renat Heuberger, CEO, South Pole Group

The true catalysts of the 21st century low-carbon revolution will be information and communications technologies: within the next decade, the ICTs can save up to 20% of our global carbon emissions. To marry their ability to ensure climate-friendly solutions across industries with a sustainable way of doing so, leading ICT companies have signed long-term commitments to power their operations with renewable energy, lower their carbon footprint, and contribute to the global UN Sustainable Development Goals (SDGs). The new generation of renewable energy solutions can help overcome the historical challenges of procurement constraints, legislative restrictions, and lack of transparency that previously restricted ambitious climate action.



Renat Heuberger, CEO, South Pole Group.

Renat is a pioneer and social entrepreneur in the field of sustainability, climate change and renewable energies, where he is engaged since 1999. As a founding partner and CEO of the South Pole Group, he coordinated the set-up of the company's global sustainability solutions business. Before founding South Pole Goup, Renat was co-founder and CEO of the myclimate foundation, one of the world's first players on the voluntary carbon markets. Renat has been elected "Social Entrepreneur of Switzerland" by the World Economic Forum's Schwab foundation, and he serves as a member of the Global Agenda Council on Climate Change of the WEF. He is a board member of Climate-KIC, Europe's largest public-private innovation partnership focused on climate change, a board member of Climate Friendly Pty Ltd, Australia's leading voluntary carbon company, of Perenia Pty Ltd, and of Respect Climate in Sweden. He is a member of the advisory board of HUB Zurich, a platform for social entrepreneurship and MyNewEnergy, a company launching the first ever platform to compare power products in Switzerland.

Renat holds a master degree in environmental sciences from the Swiss Federal Institute of Technology.

The true catalysts of the 21st century low-carbon revolution will be information and communications technologies: within the next decade, ICTs can help slash up to 20% of our global carbon emissions by helping companies and consumers to more intelligently use and save energy.

A fluid and ever-changing ecosystem, ICT touches nearly every industry sector with innovative, personalised and efficient solutions. This digital revolution can also help form the foundation of a collaborative, sustainable global economy, and reach the UN Sustainable Development Goals (SDGs).

In the context of the global climate agenda, ICTs can - and will - provide benefits across the triple bottom line in the form of carbon emission reductions to the generation of additional cost savings, revenues and wider societal benefits. ICTs' ability to deliver on the 20% emission reduction potential by 2030 will come from its smart application in, among others, the realm of energy efficiency in transport, energy, and real-estate sectors. The increased information flow made possible by ICT solutions will uncover

hidden impacts and emissions, further optimising our existing systems: in a world where resources are scarce, new technology can help preserve ecosystems: from improved oceanographics, to GPS-technology that tracks deforestation and biodiversity loss . The transition to smart cities with integrated ICT infrastructure will create better solutions for delivering improved energy, water, and transport systems .

ICTs are essential for delivering on the ambitious, shared global action plan for sustainability. Nonetheless there are challenges ahead in the evolution of the ICT ecosystem. As business paradigms change, the issues of climate change and resource efficiency are also becoming increasingly important for the industry itself.

How to balance ICT's role as a catalyst for innovation and sustainable growth, while ensuring industry resilience in a world constrained to a 2-degree global temperature rise?

The ICT industry not only enables climate-friendly solutions for greening other

sectors, but is also tackling its own ecological footprint. Twenty one leading ICT companies have signed long-term commitments under the RE100 framework, a global, collaborative initiative of influential businesses committed to using 100% renewable electricity. ICT companies thus represent almost one quarter of all RE100 signatories today: Telefonica SA is latest addition to ICT industry heavyweights such as Microsoft, Google and SAP who joined the initiative in the past years after it was launched at Climate Week NYC in September 2014. Trump is pulling the US out of the Paris Agreement, but this did not slow down corporates from committing to renewable energy, with RE100 signatories recently committing to the WeAreStillIn campaign. Furthermore, leaders such as Apple are pushing renewables into their own supply chains, helping to accelerate the growth of renewable energy worldwide: Apple recently committed to help its suppliers bring 4 GW of renewable electricity online by 2020.

However, these ambitions are often challenged by practical issues such as procurement constraints, legislative restric-

Renewable Energy Revolution

corporate walls, sustainability and procurement officers are now facing a tough challenge: How to underpin ambitious renewable energy targets with reliable belled RECs have been developed on the renewable energy solutions?

Luckily renewable energy offerings are developing quickly. For example, on site solar PV installations are now at cost parity with coal in U.S and Australia. Green tariff programs are increasing in U.S and Europe, as more corporate consumers seek to buy power from renewable energy in regulated electricity markets. Renewable Power Purchase Agreements (PPAs) are booming: Bloomberg New Energy Finance (BNEF) finds that corporate wind and solar PPAs outside the Americas more than doubled in 2016 to nearly 2 GW, with significant growth in Europe and the Asia-Pacific . Furthermore, rules are in place to help companies make credible renewable energy claims: The World Resource Institute's (WRI) Greenhouse Gas Protocol on Scope 2 Guidance and the Claims Guidance have become somewhat of a bible for the renewable energy practitioners. According to these guidance documents, the fundamental basis for any renewable energy consumption claims is contractual instruments that convey attribute information from generation to end-user. Companies can reduce their carbon footprint by using contractual instruments that meet specified quality criteria. Contractual instruments that are mostly used today are energy attribute certificates - such as renewable energy certificates (RECs) in the US, Guarantees of Origin (GOs) in Europe and International RECs (I-RECs) in jurisdictions without national renewable energy tracking systems.

This clarification on how RECs can be used to lower and account for emissions from the generation of purchased or acquired electricity (also known as 'Scope 2 Accounting'), has furthermore made RECs the number one instrument utilised by RE100 signatory companies for achieving their bold renewable energy consumption targets. In fact, two-thirds of all renewable electricity purchased globally by RE-100 signatories in 2015 was sourced through unbundled energy attribute certificates (RECs), as opposed to the shy 3.3% of electricity sourced via PPAs.

This rising popularity of RECs is due to the fact that they are legitimate, reportable, and accessible. Yet, not all renewable energy electricity was inputted into the grid and is retaining customers, employees

tions or unavailability of renewable energy owned by the end-consumer who holds the investors. solutions in certain jurisdictions. Behind REC. For corporates who are interested in supporting only recent renewable power plants, or power plants that ensure additional benefits for local communities, eco-lamarket. For example, Guarantees of Origin and I-RECs with the EkoEnergy label ensure that the price paid for electricity is reinvested in new renewable energy plants and helps to minimise the impacts of electricity production on ecosystems, habitats and the biodiversity of species.

> Another example is GoldPower, a renewable energy product based on Gold Standard labeled Renewable Energy Certificates (RECs) that not only provides the highest quality of renewable energy but has measurable, positive impacts on communities and the environment in developing countries. It combines robust verification and tracking of renewable electricity generation with additionality, social and environmental safeguards, and transparency through monitoring and 3rd party audits. In the ICT sector, Microsoft and SAP are among leading companies who chose to source GoldPower for greening their international operations.

Looking at the ICT landscape through the climate change lens, smart companies are well aware of economic trends that continue to point to the acceleration in growth of renewable energy sources, as well as the business potential and societal benefits of embracing sustainability:

SAP, for instance, is providing solutions to its customers in projects relevant to the SDGs. The various Internet of Things (IoT) and Big Data technologies from SAP are being successfully used in, among others, Buenos Aires to help mitigate flooding during seasonal rains, which are expected to intensify in the future. While such cloud solutions represent a major growth opportunity for SAP, energy-intensive data centers remain one of the main challenges to tackle, for the market leader in enterprise application software. SAP's quick growth has also bulked its electricity use and CO2 emissions, adding to the ~2% of global greenhouse gases emitted by the IT sector. Given the significance of its electricity consumption, accounting for one quarter of total CO2 emissions, the company decided to look for a way to power its global operations with 100% renewable electricity. Opting for GoldPower, the next generation of renewable energy certificates (REC), the certificates are equal. A REC only conveys company started leveraging renewables as a the information that a MWh of renewable powerful differentiator for attracting and

Lowering risk, saving money and boosting brand value by aligning with the SDGs - all benefits that forward-thinking companies can already expect to cash in for parting from fossil fuels and integrating renewable energy into their business with the use of labeled RECs.

ICT makes it possible for us to even dream about the success of the global Sustainable Development Goals. ICT-enabled solutions are expected to have the greatest impact across eight sectors, where smart manufacturing, agriculture, buildings and mobility contribute more than 70% of the total global emission reduction potential . Access to universal health coverage and education, improved energy efficiency these would all be out of our reach without the ICT revolution, which now gives us a path of acceleration in every area of our societies. ICTs make it possible for us to think big and scale solutions rapidly. They are the essential levers to transform the digital revolution into a development revolution, and move the globally shared SDGs from vision to action.

To further innovation and clean, low-carbon solutions across the globe, ICT companies now need to ask themselves: 'how can I leverage smart climate solutions to keep fulfilling my mission? How can I ensure resilient operations in a 2-degree reality?'

Why effective partnerships are needed to make e-commerce a tool for sustainable development

by Dr. Mukhisa Kituyi, Secretary-General, United Nations Conference on Trade and Development (UNCTAD)

We are only at the beginning of a new digital era, which will see greater reliance on e-commerce, connected devices (Internet of Things), data analytics, cloud computing, automation and robots. Predicting, with any precision, how this new world will play out in different economies, sectors and value chains is challenging. Nonetheless, countries will need to consider how best to prepare for this new situation.

In the context of the 2030 Agenda for Sustainable Development, it is our common responsibility in the United Nations and other international organizations to provide the necessary support to those countries that are less equipped to face this transformation. Given the rapid pace at which digitalization is unfolding -- for example, the number of new industrial robots deployed in 2015 was 250,000, twice as high as in 2010 - helping developing countries to prepare for the next stage of digitalization is by its nature a matter of urgency.



Mukhisa Kituyi, of Kenya, who became UNCTAD's seventh Secretary- General on 1 September 2013, has an extensive background as an elected official, an academic, and a holder of high government office. He also has wide-ranging experience in trade negotiations, and in African and broader international economics and diplomacy.

He was born in Bungoma District, western Kenya, in 1956. He studied political science and international relations at the University of Nairobi and at Makerere University in Kampala, Uganda, receiving a BA in 1982. He went on to earn an MPhil in 1986 and a doctorate in 1989 from the University of Bergen, Norway.

Dr. Kituyi served as a researcher at Norway's Christian Michelsen Institute from 1989 to 1991, and as Programme Director of the African Centre for Technology Studies in Nairobi from 1991 to 1992. He was elected to the Kenyan Parliament in 1992, and was twice re-elected. He was Kenya's Minister of Trade and Industry from 2002 to 2007. During this period, Dr. Kituyi chaired for two years the Council of Ministers of the Common Market for Eastern and Southern Africa (COMESA) and the African Trade Ministers' Council. He also served as chairman of the Council of Ministers of the African, PROSPERITY FOR ALL LINITED.

Recent years have witnessed unprecedented growth in electronic commerce (e-commerce) as both consumers and enterprises go online to find what they need. The United Nations Conference on Trade and Development (UNCTAD) now estimates that global e-commerce reached US\$25 trillion in 2015, with business-to-business transactions making up the lion's share. But among the top ten e-commerce markets, only one developing country – China – is represented.

The shift to more and more economic activities online presents major opportunities for making progress towards several of the 17 Sustainable Development Goals that world leaders agreed upon in 2015. E-commerce and various digital applications can be leveraged to promote the empowerment of women as entrepreneurs and traders (SDG 5, target b). They can support new productive activities, entrepreneurship, creativity and innovation, and create incentives for informal businesses to enter the formal economy (SDG 8). Digital solutions can also be leveraged to increase the access of microenterprises and small enterprises in developing countries to financial services and markets as well as enabling their integration

into value chains (SDG 9). In addition, e-commerce will become increasingly important for achieving SDG 17, target 11, which is about significantly increasing the exports of developing countries, and to double the share of global exports of the least developed countries by 2020.

The continued transition towards more digitalization is transformational. But while it undoubtedly creates many new opportunities for inclusive growth and development, new challenges and potential risks are also emerging. Digitalization will disrupt existing practices in many areas, expose incumbents to competition, change the skill requirements of workers and lead to the loss of jobs in some countries and some sectors. Adequate actions on the part of Governments in developing as well as developed nations are therefore needed to avoid widened digital divides, polarization of labour markets and greater income inequalities between and within countries.

We are only at the beginning of a new digital era, which will see greater reliance on e-commerce, connected devices (Internet of Things), data analytics, cloud computing,

automation and robots. Predicting, with any precision, how this new world will play out in different economies, sectors and value chains is challenging. Nonetheless, countries will need to consider how best to prepare for this new situation.

In the context of the 2030 Agenda for Sustainable Development, it is our common responsibility in the United Nations and other international organizations to provide the necessary support to those countries that are less equipped to face this transformation. Given the rapid pace at which digitalization is unfolding -- for example, the number of new industrial robots deployed in 2015 was 250,000, twice as high as in 2010 -- helping developing countries to prepare for the next stage of digitalization is by its nature a matter of urgency.

A number of key challenges will need to be addressed in order for more countries and enterprises to seize the potential of the evolving digital economy:

• Half the world's population is not connected to the Internet. In the least developed countries, only one in nine people is online.

- There is a huge e-commerce divide. While 60%–80% of people in many developed countries already buy goods and services on the Internet, the equivalent share in most of the world's countries is below 3%.
- An increased reliance on e-commerce and data-driven development will require adequate protection of consumers and data privacy, laws that are absent in half of all developing countries.
- Further digitalization will change the skills requirements in the workforce in the direction of skills that are currently in particularly short supply in most developing countries.
- While online and mobile payments will be central to the use of e-commerce by small businesses, there is a lack of trust in such payment solutions in most developing countries leading to continued reliance on cash.

Our current efforts are simply inadequate. Although many organizations are providing different kinds of support that can be of help in this context, they are highly fragmented and of insufficient scale. To raise a country's e-commerce readiness and ability to benefit from digitalization, a number of policy areas need to address holistically the development of affordable information and communications technology infrastructure, logistics and trade facilitation, the legal and regulatory environment, payment solutions, skills development and entrepreneurship financing, as well as the funding of e-commerce innovation and new digital startups. A much more concerted approach is essential.

To make e-commerce a vehicle for sustainable development we need to connect the dots. This means bringing all relevant stakeholders together - as opposed to continuing our bad habit of working in silos - and to work simultaneously across the main policy areas. This is why UNCTAD in 2016 launched the eTrade for All initiative (etradeforall.org). It is a concrete example how the international community, in partnership with Governments, the private sector and civil society can come together to make our support fit for purpose. It was formed in the spirit of SDG 17: to revitalize the Global Partnership for Sustainable Development.

The eTrade for All initiative raises awareness of opportunities, challenges and solutions related to e-commerce in developing countries, mobilizes financial and human resources for e-commerce projects in developing countries; and strengthens coherence and synergies among partners'

platform, which helps developing countries and donors alike navigate the supply of technical and financial support available to foster e-commerce and digital trade, learn about trends and best practices, and raise the visibility of the various initiatives and resources available. The platform was officially launched in April 2017 during the

UNCTAD E-commerce Week in Geneva, which gathered more than 1,000 participants to discuss how to make e-commerce more inclusive. It also saw the first ever ministerial meeting organized by the Group of Friends of E-commerce for Development, at which they called "upon the partners in eTrade for All to ensure they allocate adequate resources to programmes that support the priorities herein so that developing countries can maximize their ability to benefit from the potential of e-commerce and, where necessary, to allocate additional resources as relevant". As of May 2017, more than 20 national and international organizations had joined the initiative, and 33 private sector entities were members of the Business for eTrade Development initiative, which encourages public-private dialogue on e-commerce.

I think the approach we are using in the case of eTrade for all can be emulated in other areas where ICTs should support the SDGs. In this way, we will respond more effectively to the desire among people in developing countries to connect to the new world of technological progress and the prosperous future they deserve.







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Scaling mobile payments infrastructure to make life simpler, safer and more convenient for consumers

by Mark Elliott, Division President, Mastercard, Southern Africa

A new world of consumer choice – powered by on-demand technology – is changing customers' expectations of the payments experience



Mark Elliott is Division President, Southern Africa at Mastercard. He is responsible for the overall performance, strategic direction and brand development of Mastercard in Southern Africa. His role includes finding new ways to scale the latest payments technologies to drive financial inclusion.

Mark joined Mastercard in 2011 as Global Products and Solutions Lead and Debit Lead for Mastercard in the Middle East and Africa region.

Prior to that he worked at Barclays as Head of Sales and Distribution and Head of Retail for Barclays United Arab Emirates. Mark also held the position of Director of Business Development for Absa Card South Africa.

Mark holds a BA (Hons) in Combined Studies and is a Member of the Institute of Chartered Accountants for England

He is a British national who grew up in Hong Kong and India.

The app economy is here, and it has changed traditional card terminals are not a practical the way that we live. We depend on our smartphone apps for everything from entertainment to photography to messaging to personal productivity to ordering transport or accommodation. And in South Africa, we're becoming increasingly open to using our smartphones for in-app, in-store and online payments.

This is the culmination of the long relationship of trust we have developed with our mobile devices - we trust our device manufacturers and the developers of our favourite apps to keep our data secure and private. If we can trust our smartphones to keep pics of our children and our personal and business emails safe, we feel we can trust them as a payments environment.

According to the Mastercard Impact of Innovation Study, 73% of South African consumers are ready to pay with their mobile phones. That's why we are seeing the rise of innovative payments apps that enable you to use QR codes or contactless technology to make payments - whether you're paying a municipal bill, buying prepaid airtime or purchasing a cappuccino in your favourite coffee shop.

Any mobile device is a payment device

We're also seeing merchants use apps that turn their smartphones into point of sale devices or use QR codes to accept mobile payments from their customers. The mobile brings the convenience and safety of cashless transactions to spaza shops, flea payment'. They're just going about their market stalls, trades people like plumbers everyday lives and are looking for better and electricians, and other sectors where experiences, shortcuts. They want paying

or affordable solution

Access to capital and size are no longer constraints for merchants who want to accept digital payments. The natural endpoint is that we'll see much of today's large-scale physical payment infrastructure move onto smartphone apps and easy to deploy QR codes, giving merchants and consumers a simple, seamless, on-demand experience. For payments SnapScan, a mobile payments solution backed by Standard Bank, makes it affordable and easy for merchants to accept digital card payments, with merchants simply needing to display a QR code at the till, online or on a bill. This means that entrepreneurs can go down to the farmers market on a Saturday and start selling their goods using a QR code. They don't need to worry about having to manage cash, or getting robbed, and can increase sales by giving their customers the choice and flexibility to pay with their cards in their mobile wallets.

Mobile innovations need to improve the consumer experience

As we think about the rapid adoption of mobile payments, we believe the promise of mobile payment services lies in creating safer and richer experiences for consumers. But, the key is not to simply recreate what you could do before, but to enable users to do something new and better. We know consumers don't set out to 'make a

for things to be simpler and faster. That's why connecting with consumers wherever they are and whenever they want is critical. Imagine, for example, a world where people don't need to queue for hours to send money to their families in the rural areas or where no one needs to withdraw cash from an ATM and then stand in a long queue at a retailer on a Saturday to pay a rates bill. They don't even need to log in to online banking and input a lot of payment information.

Instead, they'll be able to scan a QR code on the statement and pay from an app. And at a Quick Service Restaurant, rather than queuing in a takeaway store to place an order, they could order and pay from their smartphone as they enter the doors.

The future is already here

This is a world where merchants don't need to keep large amounts of cash on their premises. It's one where consumers demand convenience and control, and expect payment experiences to make their lives

We are not talking about a distant future, either. In South Africa, nearly one million ratepayers in the City of Ekurhuleni can now pay their municipal bills online with their smartphones, using Masterpass, our global digital payment service. Masterpass is also accepted online by a growing list of merchants of all sizes as well as in-app for convenient air and data mobile top up. Mastercard's recent collaboration with SnapScan also gives consumers more than 30,000 locations like coffee shops and markets to pay for goods and services using Masterpass app on their smartphones.

Partnerships are key to drive mass digital payment adoption

As simple as the consumer experience is, there is a lot of complexity in the background as technology companies like Mastercard, telecoms operators, issuers, retailers, regulators, FinTech innovators and the other members of the value chain work together to ensure that digital payments systems are secure and interoperable. Without collaboration across industry boundaries, it will not be possible to deliver the experiences consumers demand or achieve the momentum required to scale mobile payments.

We at Mastercard are expanding our relationship with these partners to innovate not only in the traditional spaces of card payments but to pioneer the next generation of digital innovations to ensure that every one of our accounts is as digital as the people using them.

We are collaborating with key players to form partnerships that will assist in developing and delivering new consumer propositions that span multiple industries across multiple channels – in-store, in-app and online. And in doing so, we're bringing to safer and richer payment experiences to enable consumers to make every day payments using the device they already have in their pockets – their mobile phone.



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Our authors are ICT leaders of industry, governments, regulators, international organisations, legal experts, bankers and their advisors.

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Collaborating toward the realization of 5G

by Chris Pearson, President, 5G Americas

The Third Generation Partner Project (3GPP) is providing the structure necessary to make certain that a global 5G standard is established. They have established a process for a consensus driven standard. 3GPP Releases 15 and 16 will provide the needed structure to form a standard where chipsets, devices, infrastructure and other 5G connections can be built. The mobile wireless industry has a tremendous historical track record of developing an interoperable ecosystem that flourishes. GSM, WCDMA and LTE are great examples of successful technologies developed to provide a platform for huge economies of scale and scope.



Chris Pearson is the President of 5G Americas. In his executive role, he is responsible for the overall planning of the organization and providing management for the integration of strategy and operations in the areas of technology, marketing, public relations and regulatory affairs. As President of 5G Americas (formerly called 4G Americas), Mr. Pearson represents the organization's Market Representation interests within the 3rd Generation Partnership Program (3GPP) organization.

Mr. Pearson led the organization from its inception in 2001 as the 3GPP family of technologies market share grew from 10 percent in 2001 to more than 90 percent in North, Central and South America. Mr. Pearson came to the organization from the Universal Wireless Communications Consortium (UWCC) where he served as Executive Vice President in charge of the strategic executive management of the global TDMA wireless technology consortium. Prior to joining the UWCC, Mr. Pearson held several senior technical and marketing positions at AT&T Wireless and GTE. With more than 30 years of experience in the telecommunications industry, Mr. Pearson is a recognized spokesperson in mobile wireless and 5G technology trends and has spoken at technology conferences throughout the world including CES, Mobile World Congress, CTIA Super Mobility, LTE World, 5G World North America, and 5G Forum USA

Chris Pearson earned a Master of Business Administration degree from The Albers School of Business and Economics at Seattle University and a Bachelor of Arts degree with emphasis in Marketing and Finance from the University of Washington.

Key ingredients: Structure, co-operation and collaboration

They are needed for any great soccer, basketball or football team to be successful. They are even needed for any successful pasta dinner or soufflé. The same can be said about technology progress. The wireless industry is on the precipice of a new technology shift towards 5G and there are key ingredients needed to form a foundation for 5G to be successful, not only as a mobile wireless evolution, but to progress the way we live, work and play in society. 5G has three main families of use cases to progress the connected society that we live in: Enhanced Mobile Broadband, Massive Machine to Machine Internet of Things and the Ultra-Reliable and Low Latency services. These three families of use cases will require a high level of structure, co-operation and collaboration to ensure the successful development and deployment of 5G. The stakes for the final "dish" are high--as 5G will enable things that were not thought possible twenty years ago such as autonomous driving, Vehicle-to-Everything, Machine-to-Machine, remote surgery and the enablement of new productivity in the vertical industries.

Key Ingredient: Structure

The Third Generation Partner Project (3GPP) is providing the structure necessary to make certain that a global 5G standard is They have established a established. process for a consensus driven standard. 3GPP Releases 15 and 16 will provide the needed structure to form a standard where chipsets, devices, infrastructure and other 5G connections can be built. The mobile wireless industry has a tremendous historical track record of developing an interoperable ecosystem that flourishes. GSM, WCDMA and LTE are great examples of successful technologies developed to provide a platform for huge economies of scale and scope. The mobile wireless ecosystem is flourishing with over 7.56 billion GSM-HSPA-LTE connections as of July 2017, according to Ovum, which is more than the world's entire population. The mobile wireless industry has changed the way residents of the world live every single day of their lives. Furthermore, LTE is a tremendous success with over two billion connections worldwide today and almost 5 billion LTE connections forecast by Ovum by year end 2021. This LTE success is predicated by the structured standards process that 3GPP has created. This

structure in place yesterday, today and tomorrow is important as LTE forms the mobile wireless foundation for 5G while the 5G standard is being developed. Structure in standards is not just important, it is paramount to the success of mobile wireless technology.

Key Ingredient: Collaboration

5G Americas works collaboratively with other leading 5G visionary associations to share information about 5G. This collaboration lead to a 5G Global Event MOU signed in October of 2015 that now includes: 5G Forum (Korea), 5G Americas (Americas), IMT-2020 (5G) Promotion Group (China), the 5G Infrastructure Association (5G-IA, Europe), the Fifth-Generation Communications Promotion Forum (5GMF, Japan) and Telebrasil - Projeto "5G Brasil". The signatories pledged to cooperate in organizing a series of bi-annual "Global 5G Events" in the interest of efficiency and building global consensus on 5G. As of June 2017, 5G Americas and many of our member companies have participated in three major 5G conferences developed to provide a forum of cooperation in exchanging information about 5G and related technologies. Each of the conferences has had a central theme to working together

to progress 5G throughout the world with the latest conference in May of 2017 in Tokyo, Japan rightly titled "Creating the 5G Americas, the voice of 5G and LTE for crossover collaboration for the 5G Eco-Society." In the first half of 2018, 5G Americas will host a Global 5G Event to be co-located with 5G North America in Austin, TX bringing together the world's global 5G leadership groups on further development and collaboration opportuni-

In addition, our association regularly publishes a variety of educational white papers on 5G topics from global developments to technology to spectrum requirements. The papers are featured on the 5G Americas website.

Key Ingredient: Cooperation

The regulatory process for the enablement of 5G has required cooperation between the mobile wireless industry and governments throughout the world. Spectrum is the lifeblood of the industry and more is needed for the success of 5G. Licensed, shared and unlicensed spectrum below and above six GHz is needed. ITU's WRC-15 has set an agenda item at the WRC-19 for studying the appropriate spectrum bands for IMT-2020 (5G). However, through cooperation, hard work and great efforts of governments and industry throughout the world, low, mid and high band spectrum for 5G is already being studied and allocated in some countries. Both industry and government have worked closely to best understand the appropriate allocation of millimeter wave spectrum bands for 5G. 5G Americas white paper on 5G Spectrum Recommendations in early 2017 is a spectrum policy guideline for the world. 5G Americas has worked for years on furthering the progress of 5G and the mobile wireless ecosystem through technical white papers, webinars, seminars, keynote presentations and government filings. As an example of this successful cooperation process, in the United States, the Federal Communications Commission established an information gathering process (Notice of Inquiry) in 2014 to learn more about spectrum bands above 24 GHz. This was followed up with a historic milestone in July of 2016 by establishing rules for mobile wireless operations in the 28 GHz, 37 GHz and 39 GHz spectrum bands.

Structure, cooperation and collaboration. It is needed for any great sports team and any great soufflé, the 5G mobile wireless ecosystem is well on its way to greatness!

About 5G Americas

the Americas, is an industry trade organization composed of leading telecommunications service providers and manufacturers that are committed to the key ingredients of a successful 5G ecosystem from structure, cooperation and collaboration. The organization's mission is to advocate for and foster the advancement and full capabilities of LTE wireless technology and its evolution beyond to 5G, throughout the ecosystem's networks, services, applications wirelessly connected devices in the Americas. 5G Americas is invested in developing a connected wireless community while leading 5G development for all the Ameri-



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What if your next DDoS attack is an inside job?

by Erez Antebi, CEO, Allot Communications

It looks like we're slated for more attacks like Dyn-Mirai. Gartner predicts there will be more than 20 billion IoT devices in use worldwide by 2020. Many of these devices use inexpensive hardware and simple operating systems with minimal provision for access security or integrity. Lack of sophistication and security makes IoT devices easy targets for hackers to infiltrate and recruit for denial of service attacks.



Erez Antebi is CEO of Allot Communications and has over 35 years of industry experience. Most recently, he served as CEO of Gilat Satellite Networks, a leading NASDAQ-listed satellite communications technology and services company.

Prior to that, he held a number of other senior positions within the Gilat group, where he pioneered the company's entry to the HTS satellite market.

What if your next DDoS attack is an inside job?

DDoS attacks aren't new. But their methods and intensity are evolving in tandem with technology advances. In 2014, the average size of a DDoS attack was just over seven Gbps. Fast forward to October 2016, when the infamous attack on Dyn was launched by IoT devices that were infected with the Mirai botnet. The attack took down major DNS platforms and Internet services in the USA and Europe. That attack peaked at 1.2 Tbps, making it the largest-ever DDoS attack to date, and one of the most damaging in terms of downtime and recovery costs. But that's only part of the story.

Why didn't the DDoS Protection systems in all those networks stop the attack? Or at least mitigate some of the damage? What really caught everyone off guard was that the Dyn attack was launched by an army of bot-infected IoT devices connected to service provider networks. While DDoS Protection systems stood guard at the network perimeter, monitoring inbound traffic, connected IoT devices launched an attack from inside those same networks and the impact was overwhelming!

The IoT DDoS attack was very successful for two major reasons. First, because most DDoS Protection systems utilize offline scrubbing centers, and they simply are not built to divert inbound flows of such speed and volume. Second because most DDoS Protection systems are blind to outbound traffic flows, so they can't detect anomalous device activity within the service provider network and stop it before it turns into a

major problem.

More connected devices + More bandwidth = more DDoS opportunities

It looks like we're slated for more attacks like Dyn-Mirai.

Gartner predicts there will be more than 20 billion <u>IoT devices in use</u> worldwide by 2020. Many of these devices use inexpensive hardware and simple operating systems with minimal provision for access security or integrity. Lack of sophistication and security makes IoT devices easy targets for hackers to infiltrate and recruit for denial of service attacks.

Moreover, Deloitte says the problem will only get worse. Not only will there be millions more connected devices, there will likely be hundreds of millions of gigabit-capable connections worldwide by 2020. In other words, we're widening the highway and raising the speed limit, which attackers will happily exploit for their own malicious purposes. Deloitte also predicts that Dyn-level attacks over one Tbps (Terabytes per second) will occur at a rate of once per month. Even the biggest networks and organizations will be challenged to stop attacks of that size and scale.

What's a service provider to do?

The Dyn-Mirai attack changed our assumptions about DDoS Protection - especially for service providers. The threat from within the network is real and significant, and the threat from without is growing in size and scale that were not anticipated until recently.

Defense strategies need to adjust accordingly. The layered approach that service providers, and most organizations take to securing their networks is still valid. But when setting up their defenses, networks need to look inside-out as well as outside-in.

A new playbook for DDoS protection

There are three important defense tactics that service providers can add to their DDoS Protection playbook to defend against evolving DDoS threats, and to safeguard the availability, integrity and reputation of their service.

Powerful defence: Make sure your DDoS defense is big enough and fast enough and can block both ways. The only truly effective way to do this is to detect and mitigate inline, at wire speed, so inbound and outbound attacks are neutralized on the spot - before they inflict damage. With inline DDoS protection deployed at Internet exchange points and peering points, you can stop inbound attack traffic, while an additional deployment in your core network will stop outbound attacks.

Proactive defence: Shape your DDoS defense to prevent blitz attacks from rushing in to take down firewalls, routers, and other network elements. Decide ahead of time the maximum capacity your firewalls and routers can handle, and then make sure that they never have to handle more than that. One of the best ways to do this is with traffic shaping policy that automatically kicks in when throughput thresholds are exceeded. This is best understood by an example.

Let's say your firewall capacity is 10Gbps. Without warning, a DDoS attack arrives at 20 Gbps in large fragmented packets that are purposely designed to drive firewalls crazy. No matter how fast your DDoS protection system works, some attack traffic will get through and it will take down the firewall because it's coming in at twice the rate your firewall can handle. By enforcing a traffic-shaping policy that allows no more than 9.95 Gbps to flow to the firewall at all times, you can keep this critical resource up and running during an attack. You can also use traffic-shaping policy to prioritize important applications, so they get through the firewall first. Service providers who take proactive measures like these will greatly reduce the risk of service downtime and quality degradation.

Pre-emptive defence: Prevent connected devices from becoming infected in the first place. Use anti-malware monitoring to detect when IoT devices attempt to download malware or communicate with botnet Command & Control systems. The key to monitoring millions of connected devices is to implement anti-malware solutions at the network level, so there is no need to install a client on the device. Clientless protection also makes it possible to rapidly onboard millions of devices from a multitude of manufacturers.

Another pre-emptive tactic is to monitor normal device behavior, and to automatically enforce restrictions on device activity that exceeds normal bounds.

Time to play defence

The next DDoS attack is inevitable. Falling victim to it is not. Attackers are changing their tactics and recruiting millions of vulnerable IoT devices to do their bidding. If your DDoS Protection strategy doesn't keep pace, your business may be at risk. Right now, service providers should be bolstering existing DDoS systems with powerful, proactive and pre-emptive defense tactics to make sure they can meet IoT DDoS attacks head-on and come away unscathed.



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Platform strategy: How to thrive by mastering the new rules of business in the Digital Age

by Annabelle Gawer, Professor, Digital Economy, University of Surrey, Surrey Business School, Co-Director of the Surrey Centre in Digital Economy (CoDE)

Governing the platform ecosystem is an essential part of succeeding as a platform leader. It requires a vision that extends beyond one's own firm, and aims to build and sustain an ecosystem of partners, which it governs in a benevolent and masterful way. Becoming a "team captain" for its ecosystem requires building legitimacy, and implies some degree of neutrality and benevolence over its business partners. Governing the ecosystem means making well-judged decisions as to who should have access to the platform, how to divide value between ecosystem members, and how to resolve conflicts or manage sometimes increasingly divergent objectives. It also means deciding about the process by which these decisions will be made (more centralized? More democratic?). Policies should stimulate complementors' value creation as well as high-quality participation on the platform. Giving away product or services away for free can be fruitful to attract one side. Learning to govern platform-based ecosystems is rapidly becoming perhaps the most important new capability that firms need to learn to succeed in a digital economy.



Professor Annabelle Gawer, Chair in Digital Economy, Co-Director of CoDE, the Centre for Digital Economy, University of Surrey Business School.

Award-winning researcher, author and educator, Professor Annabelle Gawer is an expert on digital platforms such as Google and Facebook, and on platform-based innovative business ecosystems.

Highly-cited author of two books (Platform Leadership, and Platform, Markets and Innovation) and over a dozen articles in top international journals, Prof. Gawer's seminal research on platform leadership and innovation ecosystems explains how innovation and competition interact to shape platform-based markets and the digital economy. Annabelle's work has been featured in The New York Times, The London Times, The Financial Times (here and here), The Economist (here and here) and The Wall Street Journal.

A pioneer of international stature in the field of digital platforms, Annabelle is a leading voice in advancing research (Google Scholar indicates over 4770 citations as of Sept 2017), as well as managerial practice and European policy. Prof. Gawer advises the European Commission, the UK Parliament House of Lords, and the OECD on issues related to the future of ICT research directions in Europe and on the question of regulation of online platforms.

Annabelle's seminal research offers insights on the strategic management of platforms and the governance of their innovation ecosystems by exploring systematically the interaction between economic forcesorganizational forces, and technological design. She has published her research in top international economics journals as well as top international organization studies journals. Her recent publications include a Research Policy 2014 article downloaded over 17,000 times and cited 250 times since its publication, and a global survey of platform companies (Jan 2016). She is currently working on her third book on Platform Strategies.

Prof. Gawer's books and articles have been translated in Chinese and Japanese, and she is regularly invited to address international audiences as a keynote speaker in both business conferences and academic conferences, such as for example for the European Policy EuroCPR Annual Conference "New Intermediaries in the Hyper-Connected Society" (Brussels, 2015), the Academy of Management Annual Conference (Philadelphia, USA, 2014), the "Future Payment" Conference (London, UK, 2014), the Strategic Management Society Start-up Conference (Tel Aviv, Israel, 2014), the GSMA "Connected Europe" Annual Conference (Brussels, 2013 & 2012), the Annual European Conference on the Management of Technology (Finland, 2012), the NFC World Congress (Sophia-Antipolis, France, 2012), the European Commission's Digital Agenda Assembly (Brussels, 2011), "Shanghai Expo" World Expo (Shanghai, China, 2010), and the Technology Policy and Strategy Conference (Japan, 2007). She is the Co-Chair of the first Academy of Management Specialized Conference on Big Data and Managing in a Digital Economy, to be held at the University of Surrey in April 2018

Having taught to hundreds of participants and students, first at MIT (1994-2000), then at INSEAD (2000-2004), then at Imperial College (2004-2015), and now at Surrey (since January 2016), Annabelle has great experience in teaching strategy, high-tech strategy, digital platforms economics and strategy and innovation, and reliably receives top lecturer evaluations. She has designed and directed Executive Education programmes in innovation management, business strategy at INSEAD and Imperial College Business School.

Annabelle also consults as a strategy coach for top management in major international corporations in the US and Europe. Examples of such engagements include Huawei (China), IBM (UK), Microsoft (USA), Nokia (Finland), Symbian (UK), BT (UK), AT&T (USA), BASF (Germany), Philips (Netherlands), Vodafone (UK), Telefonica (Spain), Unilever (UK), SAP (Germany), DaimlerChrysler, Ingenico (France), Gemalto (France), ARUP (UK), Atkins (UK), Mace (UK), EdF (UK), etc., as well as to digital start-ups and for all kinds of internet businesses requiring platform business models and the development of innovative ecosystems.

Prof. Annabelle Gawer is currently working on her next book on platform strategy, coauthored with MIT Prof. Michael Cusumano and Harvard Business School Prof. David Yoffie.

an increasing proportion of the most powerful, fastest growing companies today are operating digital platforms. Enterprises that leverage the power of platform business models have grown dramatically in size and scale over the past decade, totalling a US\$4.3 trillion market capitalization. No longer the sole domain of social media, travel, books or music, platform business models have made inroads into transportation, banking and even healthcare and energy. Platforms are now active in North America, Europe, Asia, Africa and Latin America. Platform ecosystems are gaining ground through the digitalization of products, services and businesses processes and are reshaping the global business landscape. Platform competition is exciting and opens up new business opportunities, but it can be brutal, and the power of digital juggernauts awesome. The platform is the new dominant form of organization in the digital age. Crafting platform strategies is therefore becoming an essential skill for business leaders.

Platforms create value differently: Self-Propelling businesses and technologies

The term "platform" is becoming fashionable, to the point that it is overused and sometimes confusing. Part of the confusion stems from that the term is both used for platform technologies, as well as for business models. Both uses are valid. What matters most is to understand that "platform" refers to a specific way of creating value, one that taps into both technology and business - and to the choices managers make across both dimensions that reinforce each other.

A fundamental feature of platforms is the presence of network effects: as more users engage with the platform, the platform becomes more attractive to potential new users. This explains why some platforms have had viral growth. There are two kinds of network effects: direct network effects (as in more Facebook users will beget more Facebook users) and indirect network effects where more users of one side of the platform (as is, video game users attracts more video game developers and vice-versa). Jeff Bezos, Amazon's founder and CEO, refers to this reinforcing virtuous dynamic as the "Amazon flywheel." This dynamic in turn triggers a self-reinforcing cycle of growth.

outcome of initial success and the engine for Predix, are all innovation platforms. This is succeed in a digital economy.

Google, Facebook, Amazon, Alibaba, and the further growth. Network effects existed achieved by platforms' opening up the before online platforms, for example, the platform to third parties' innovation, telephone network. But today, with perva- application, or content - both through sive connectivity facilitated by the Internet technical design decision (e.g., open the and 7 billion mobile phones in the hands of users, and millions who know how to program using standardized software languages and tools -network effects are multiplied. Generating and mastering this dynamic to create a self-sustaining momentum for growth is the nature of the work for platform strategists.

> Most of today's platforms are digital: they capture, transmit and monetize data, including personal data, over the Internet. Most successful platforms today take advantage of the power of pervasive Internet connectivity in the hand of billions of users and have at their heart a software engine.

Defining platforms: Transaction platforms and innovation platforms

Platforms create value in two principal ways. The first way, which corresponds to what we call transaction platforms, facilitates transactions between different types of individuals and organizations that would otherwise have difficulty finding each other. This type of platform is what economists call a multi-sided market, as coined by 2014 Economics Nobel Prize Jean Tirole. Google Search engine, Amazon Marketplace, Uber, Airbnb, are all transaction platforms. So are the social media platforms such as Facebook and Twitter. In a way, transaction platforms are simply digital marketplaces or digital exchanges, who efficiently match buyers and sellers in the market, or people who want to read news (or posts, or tweets) and people who want to write them. The digital aspect, harnessing speed, scale and reach of the Internet, reduces the natural friction associated with transactions between buyers and sellers and helps them finding each other and exchange with each other, makes these markets incredibly efficient.

There are also innovation platforms, which consist of technological building blocks that are used as a foundation on top of which many autonomous innovators can develop complementary services or products. Innovation platforms allow platform owners to tap into a potentially unlimited pool of external innovators, in what is called an innovation ecosystem. These autonomous innovators can be anyone and anywhere in the world. Apple iOS, Google Android, Intel With platforms, scale is therefore both the microprocessor, Microsoft XBox, GE ant new capability that firms need to learn to

interfaces, expose the Application Programming Interfaces) and business decisions (e.g., let the complementors reap enough financial rewards), helping platform become a magnet for complementary innovators.

Some of the most powerful platforms today are hybrids, which combine the power of transaction platforms and that of innovation platforms. For example, Apple created an innovation machine facilitated by the Apple iOS, resulting in third-party developers generating ideas at a speed and scale that Apple could not have achieved with internal developers alone. Apple then linked these apps to its transaction platform (Apple App Store) allowing the app innovators to connect and transact with its network of millions of customers in nearly 200 countries. Thus, it creates a hybrid model of platforms, multiplying the effect of transaction and innovation platforms by having them leveraging each other. Google is a hybrid, having both Google Search (a transaction platform) and Google Android innovation platform). Similarly, Facebook, Amazon, too are hybrids.

Governing platform ecosys-

Governing the platform ecosystem is an essential part of succeeding as a platform leader. It requires a vision that extends beyond one's own firm, and aims to build and sustain an ecosystem of partners, which it governs in a benevolent and masterful way. Becoming a "team captain" for its ecosystem requires building legitimacy, and implies some degree of neutrality and benevolence over its business partners. Governing the ecosystem means making well-judged decisions as to who should have access to the platform, how to divide value between ecosystem members, and how to resolve conflicts or manage sometimes increasingly divergent objectives. It also means deciding about the process by which these decisions will be made (more centralized? More democratic?). Policies should stimulate complementors' value creation as well as high-quality participation on the platform. Giving away product or services away for free can be fruitful to attract one side. Learning to govern platform-based ecosystems is rapidly becoming perhaps the most import-

Digital Platforms

Platform power

Platform companies contribute importantly to the economy. They have driven up productivity in multiple ways. One source of productivity has been achieved through highly efficient matching. Platforms have also improved productivity by supporting more efficient asset utilization. The ability of platforms to better utilize houses, cars, workspaces among other assets has spawned considerable interest and passion around the potential of the so-called "sharing economy." In addition, platforms generated innovation, for example nine U.S. platforms were awarded 11,585 patents in 2014. Finally, many start-up platforms have been successful in attracting significant investment from venture funds. Most so-called "unicorns" are in fact platform companies.

At the same time, platform companies have been disruptive and raised concern. Online platforms have upended numerous brick and mortar chains and are making deep inroads into other industries from television to transportation. They have the potential to be equally disruptive to traditional approaches to banking, healthcare and energy services. Platforms have attracted regulatory controversy, for example over their ability to dominate markets and undermine competition. There have also been concerns that it may be easier for platform companies to avoid tax and insurance obligations. Finally, there has been a range of concerns about how platform companies classify workers as independent contractors in ways that unfairly squeeze wages and benefits. Increasingly, international and national institutions around the world, including the European Commission, the UK House of Lords, the French Conseil National du Numerique, the OECD, are trying to come to grips with the platform phenomenon, and trying to find a way forward to regulate digital juggernauts, without, however, restricting the benefits that come to millions of individuals and organizations from the usage of platforms. This contested arena is the subject of intense scrutiny and lobbying from many sides.

We are therefore reaching a somewhat ironic point in the history of business development. The digital platforms of today emerged in mostly free market economies, and their take-off are a testimony to the autonomy and agency of millions of individuals who engaged with platforms with gusto and enthusiasm. Value has never been created by so many, together. But so much value has also rarely been captured by

so few, in such a centralized way. We are getting to a point where a few dominant platforms, the "frightful five" (Apple, Google, Facebook, Amazon, and Microsoft) are centralizing so much power, constantly harvesting and using in often opaque ways the data which users (most of them unwittingly) share, that we are witnessing the emergence of centralized platform-centered economies, with a small number of quasi-monopolistic private platform companies at their core, and these platforms may more powerful than Nation-states' ability to enforce their power through regulation over digital platforms is actually debatable - unless, like China, nations resort to hard-ball protectionism (which is not how usually Europe, for example, operates). Learning to play ball with governments and institution is another essential skill that platform leaders need to learn, or they will pay heftily.

A few years ago, Marc Andreesen, the founder of Netscape and the well-known venture capitalist, famously wrote that "software is eating the world". The platform business model may not be eating the world, but powerful platforms sure look hungry, and it is essential for all business leaders to understand clearly how this new form of business works. In the digital economy, there will be two choices: become a platform and rally an ecosystem of complementors around you, or learn to survive within one (or several) platform-based ecosystems. Mastering platform strategy is becoming an imperative for forward-looking business leaders.

Internet of Things (IOT)

Industry-wide collaboration is key if the IoT is to grow

by Fran O'Brien, Ph.D., Steering Committee Chairman, oneM2M

Industry-wide collaboration through standardization efforts is already ensuring the market does not fragment and wide-scale deployments are not plagued by interoperability issues and vendor lock-in, but there is more to do. Progress was recently made at an IoT Industry Day hosted by oneM2M, the global standards initiative that covers requirements, architecture, API specifications, security solutions and interoperability for Machine-to-Machine and IoT technologies. At that meeting, representatives from oneM2M, the Zigbee Alliance, Open Connectivity Foundation, the Industrial Internet Consortium (IIC) and the Thread Group came together to work towards increased collaboration. Following this, the IIC reached a memorandum of understanding with one M2M to work together to prevent fragmentation and further advance the Industrial IoT (IIoT) through joint IoT use cases and architectures.



Dr. O'Brien is currently a member of the Service Provider CTO team at Cisco Systems. He is active in a variety of standards bodies and fora throughout the world including 3GPP, 5GAmercias, ATIS, ETSI, GSMA, ITU, NGMN, oneM2M, and TIA. He is a regular participant in GSC (Global Standards Collaboration). Dr. O'Brien is the Steering Committee Chair of oneM2M. He has served on the OMA Board of Directors, where he also was the Finance Vice-Chair and was a member of the IEEE-SA Board of Governors

Dr. O'Brien received both his Ph.D. and M.A. degrees in Physics from Boston University and his B.S. in Physics from Rensselaer Polytechnic Institute.

While the eventual scale of the Internet of requirements, architecture, API specifica-Things (IoT) is unknown, one thing that tions, security solutions and interoperability experts agree on is that it is going to be huge. Gartner, for example, predicts that there will already be more than one connected device in use for every person on the planet by the end of 2017. While the IoT is already making a difference across all walks of life, the global benefits it can deliver will not be fully realized until the market matures.

To reach the level where the convenience and efficiency of the IoT will transform lives, collaboration across the industry is essential. The pace of development at the moment is frenetic, with global players all pursuing the end goal of a ubiquitous solution – but the speed of deployment will only be sustainable and the economic promises of widespread IoT realised by working together to share best practice and lessons learned.

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Better together

The most obvious advantage of standards work is that it leads to interoperability. As the number of IoT deployments increases globally, so does the complexity of the wider making ecosystem, interoperability essential. Bringing together billions of connections - many of which do not incorporate a human interface - makes interoperability incredibly complex, with authentication and security paramount. However, if these devices communicate via global standards initiative that covers the run of a much larger ecosystem from

which to base future deployments.

A common set of standards and protocols to work from significantly reduces duplication of efforts from vendors and service providers, which can base their platforms on best practices and get their solutions to market quicker, accelerating deployment and improving economies of scale.

Standards are the solution

The good news is that work to produce the detailed specifications required has been underway for some time, with major companies, such as HPE, Interdigital and SK Telecom, deploying oneM2M's global standard. The standard is continually evolving, with the latest release tackling the need for a common IoT Service Layer that can be readily embedded within various hardware.

oneM2M's technical specifications address the need for a common M2M service layer which sits between M2M applications and communication hardware and software that transports data. The layer is software-based and provides functions that M2M applications across different industry segments commonly need, which are then exposed to

Internet of Things (IOT)

applications via APIs, allowing for distributed intelligence.

One of the key benefits of Release 2 - the most recent iteration of the specification – is that it enables interworking with popular IoT device ecosystems such as AllSeen Alliance, Open Connectivity Foundation and Open Mobile Alliance Lightweight Machine-to-Machine, allowing legacy systems to be upgraded without needing to be completely overhauled. oneM2M's standards do not work in isolation, and it is only through collaboration with other ecosystems such as these that it can help the IoT reach its full potential. Many of the current standards and technologies are designed to complement each other's operations rather than compete with them, which will strengthen the IoT going forwards.

Working collaboratively across the verticals will build up a more holistic ecosystem for the IoT, particularly for the growing number of deployments that are being made for the IIoT, where many of the devices and sensors will not be user-facing. This area is currently a real growth spot for the IoT and the wide variety of stakeholders that could potentially be involved in these industrial applications illustrates how collaboration is urgently needed to further the development of the technology.

The network of the future

Looking forward, an important thing to bear in mind is that while the growth of the IoT is rapid, there is still a distance to cover. Wide-scale deployments and nationwide IoT networks are very much in their infancy, but progress will be accelerated if collaboration between the major players is front and centre.

Industry bodies have a key role in enabling and encouraging the advancement of the IoT industry through standards, but the reality is that we are only ever going to see the full potential of what the IoT can do if the key players – be they vendors, service providers or standards organisations – are pulling in the same direction.

Work to that end is already being done through collaborative agreements and discussions between oneM2M and other industry bodies. The IoT is a rapidly-growing market, and complete, interoperable solutions will be essential to maintaining this momentum. With standards-based solutions, customers are given access to an eco-system of multiple solution providers. This is the only way to ensure multi-vendor interoperability and supplier choice and, therefore, deliver on the actual promise of



2030 Agenda for Sustainable Development

Open Solutions for the 2030 Agenda for Sustainable Development

by Irina Bokova, Director-General of UNESCO

New opportunities must be available to all, to empower all, for the benefit of all, starting on the benches of schools, to empower young women and men with the knowledge, skills and attitudes for lifelong learning and employment opportunities within the digital economy. In this respect, ICT Open Solutions can be a driver and enabler of SDG 4, to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." Spearheaded by UNESCO, many initiatives to achieve SDG 4 are underway to make the most of the opportunities opened by the rapid development of digital technologies.



Irina Bokova, born on 12 July 1952 in Sofia (Bulgaria) has been the Director-General of UNESCO since 15 November 2009, and reelected for a second term in 2013. She is the first woman to lead the Organization.

Having graduated from Moscow State Institute of International Relations, and studied at the University of Maryland (Washington) and the John F. Kennedy School of Government (Harvard University), Irina Bokova joined the United Nations Department at the Ministry of Foreign Affairs of Bulgaria in 1977. Appointed in charge of political and legal affairs at the Permanent Mission of Bulgaria to the United Nations in New York, she was also a member of the Bulgarian Delegation at the United Nations conferences on the equality of women in Copenhagen (1980), Nairobi (1985) and Beijing (1995). As Member of Parliament (1990-1991 and 2001-2005), she participated in the drafting of Bulgaria's new Constitution, which contributed significantly to the country's accession to the European Union. Irina Bokova was Minister for Foreign Affairs a.i., Coordinator of Bulgaria-European Union relations and Ambassador of Bulgaria to France, Monaco and UNESCO and Personal Representative of the President of the Republic of Bulgaria to the "Organisation Internationale de la Francophonie" (OIF). As Secretary of the Council of Ministers for European integration and as Foreign Minister a.i., Irina Bokova has always advocated for European integration. Active member of many international experts networks, active in civil society and especially President and founding member of the European Policy Forum, she has worked to overcome European divisions and to foster the values of

dialogue, diversity, human dignity and human rights.

As Director-General of UNESCO, Irina Bokova is actively engaged in international efforts to advance quality education for all, gender equality, cultural dialogue and scientific cooperation for sustainable development and is leading UNESCO as a global advocate for safety of journalists and freedom of expression.

Irina Bokova is co-Vice-Chair of the Broadband Commission and chair of the UN High Level Committee on Management. She also served as Executive Secretary of the Steering Committee of the UN Secretary-General's Global Education First Initiative (GEFI, 2011-2015). Irina Bokova has received state distinctions from countries across the world and is Doctor honoris causa of leading universities.

In addition to her mother tongue, she speaks English, French, Spanish and Russian.

We are living through times of deep change that are opening vast new opportunities for development, exchange and dialogue. They are also times of uncertainty and social transformation, when the prospects for justice are uncertain, when economic security, the right to education, and the benefits from digital innovations are not enjoyed by all. This is the importance of the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs), as well as the Paris Climate Agreement -this is the world's most ambitious collective vision for building a better future for all, to leave no one behind, to strengthen the foundations for peace and sustainability.

We must nurture every lever of dynamism to take forward the new agenda, and information and communication technologies (ICTs) have a vital role to play as forces for individual empowerment, for more inclusive societies, for more sustainable development. At least ten of the seventeen SDGs, and as many as 38 concrete targets, are closely tied to issues relating to digital ICTs and data. The 2030 Agenda recognises that the

"spread of ICT and global interconnectedness has great potential to accelerate human progress, to bridge the digital divide, and to develop knowledge societies." So much is clear, but this will not happen by itself. It will take strong political will, effective policies, appropriate resources and innovative partnerships.

Digital access is a global challenge requiring global solutions, engaging the wider digital ecosystem of private and public sector, civil society as well as international organisations. This is one of the goals guiding the Broadband Commission for Sustainable Development - a governmental, private sector and civil society strategic body created by the International Telecommunications Union (ITU) and UNESCO in 2010, co-chaired by President Paul Kagame of Rwanda and Carlos Slim. For the Broadband Commission, collaboration is essential in four core areas -- network coverage, affordability, digital skills and locally-relevant content.

to issues relating to digital ICTs and data. Mobile and broadband networks are, indeed, The 2030 Agenda recognises that the essential infrastructure to catalyse progress.

This is why SDG 17, addressing partnerships for sustainable development, includes a target to "enhance the use of enabling technologies, in particular ICT"-- while SDG 9 calls to "significantly increase access to ICT and strive to provide universal and affordable access to Internet in Least Developed Countries by 2020."

Already 80 percent of the current 4.7 billion mobile phone subscribers live in low- and middle-income economies, with more than 560 million mobile subscribers based in Africa alone, according to the 2016 State of Broadband Report, published yearly by the ITU and UNESCO. As of November 2016, more people access the internet through mobile devices than computers and laptops.

Mobile devices have now become the primary interface for Internet-linked development services, enabling highly localized access to educational resources, healthcare, agricultural services, natural resource management, banking and payment services, as well as job opportunities. Globally accessible and increasingly cost-competitive satellite technologies are

2030 Agenda for Sustainable Development

reach even the most remote and vulnerable populations, including mobile educational resources to help address the refugee crisis affecting so many children.

These are all positive trends. However, key innovations at the global scale still often fail to reach where they are the most needed. Similarly, innovation that is taking place at the local level has yet to be properly appreciated or integrated into the technological forces that are driving wider economic and social development. This disconnect must be bridged for all societies to move forward. Access to faster and more affordable broadband is only one part of the solution. Developing human capacity, through new knowledge, skills and competences, is absolutely vital -- for all women and men, and especially for those who are responsible for catalysing change in their societies, including teachers and trainers.

History shows that true innovation lies less in access and technology itself, and more in the use put to it by women and men, in the ingenuity that they bring to harnessing its power to better their lives. This message of the Broadband Commission was echoed in the World Bank's 2016 World Development Report: Digital Dividends. In the words of the Report: "To get the most of the digital revolution, countries also need to work on the analog complements." 'Analog complements' include skills, competences, applications, services and content, which are essential to cross divides and not deepen

New opportunities must be available to all, to empower all, for the benefit of all, starting on the benches of schools, to empower young women and men with the knowledge, skills and attitudes for lifelong learning and employment opportunities within the digital economy. In this respect, ICT Open Solutions can be a driver and enabler of SDG 4, to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." Spearheaded by UNESCO, many initiatives to achieve SDG 4 are underway to make the most of the opportunities opened by the rapid development of digital technologies. Digital and ICT-driven educational services can increase impact, improve efficiency, and lower costs and other institutional barriers to access. One key area is in Open Educational Resources (OER) - a term coined in 2002 at UNESCO. Through the 2012 Paris Declaration, the OER movement has advocated that textbooks and learning materials should be published under an open license if paid for through public or taxpay-

also helping to bridge the digital divide and er funds. This policy shift reflects better stewardship of scarce public education funding, and opens the doors to further innovation, collaboration and broadening of public access to affordable and high quality educational resources. In September 2017, UNESCO and the Government of Slovenia will bolster the mainstreaming of OER by hosting the 2nd World OER Congress, marking the 5th anniversary of the Paris Declaration and the 15th anniversary of the birth of the OER movement.

> Big data for science has emerged as another major area for collaboration in the digital economy. The 2030 Agenda recognizes the need for more transparent, open and equitable sharing mechanisms for data. Taking forward the SDGs will require continuous access to quality data and shared research knowledge -- this is the importance of the shift in research outputs towards Open Data and Open Sciences. For its part, through its Open Solutions programmes, UNESCO is determined to support such examples of collaboration in the sharing of scientific research data and information available.

> Scientific research output is increasing in a number of developing countries. For instance, statistics show a 194 percent increase in original scholarly research output from countries that since 2002 were part of the Research4Life project, such as Kenya, Nigeria, Tanzania, Bulgaria. This is a 6.4 fold increase in original scientific articles published in peer-reviewed journals. compared to a 0.25 increase in non-Research4Life countries.

> As with OER, any digital content can be published on Open Access, whether this be texts or data, including integrations of text with data, multi-media and executable code. Open Access also can apply to non-research content, such as music, movies and novels. UNESCO's message is clear. Innovation cannot be limited to the technical -- it is about creating an effective ecosystem. Mobile subscriptions - held mainly in the hands of young people - are becoming the primary driver for internet growth. To make the most of this promise, we must empower all young people with new competences, skills and values to develop and promote locally relevant mobile apps that solve local issues of sustainable development. For this, open solutions, resources and access, are essential



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The Data Economy

The new data economy

by Prof. Irene Ng, Director, International Institute for Product and Service Innovation, WMG Warwick University, Chairman and Founder of the Hub of All Things

The many benefits to society of a digitally-connected economy are obvious; we have been discussing them globally for over a decade. The sales and contextual data that shine a light on our purchasing and lifestyle habits give consumers value and minimise economic waste. And clearly, the power and the potential of technology to make human beings more productive has allowed us to focus our resources on the activities and relationships that matter, ultimately improving our health, wellbeing, and happiness.



Irene Ng is an academic and entrepreneur. In her early career, Irene was CEO of SA Tours and Travel group of companies (Singapore, Malaysia, China and UK) and founded Empress Cruise Lines, a company with an annual turnover of USD250m, which she sold in 1996. She is currently the Director of Institute for Product and Service Innovation and the Professor of Marketing and Service Systems at the Warwick Manufacturing Group, University of Warwick. She is also the founder and Chairman of the Hub-of-all-Things (HAT) Foundation (http://hubofallthings.com) and the inventor of the HAT, a personal data Internet Platform. Irene is an advisor to several large organisations, startups and governments on design of markets, economic and business models.

She is one of the ESRC/Innovate UK Caucus Thought Leaders (http://innovationcaucus.co.uk) the ESRC/AIM Services Fellow and the ESRC/NIHR Fellow. Irene has written 3 books, published in top journals, written in highly acclaimed scientific magazines and blogs, and well known for her academic papers that have steered the discipline of marketing, service operations and its roles in the digital economy and the Internet of Things. As a scientist and a social scientist, Irene holds a grant portfolio in access of £10m. Her personal website is at http://ireneng.com.

Irene Ng has a BSc. Degree in Physics and Applied Physics from the National University of Singapore and a PhD, specialising in economic pricing models also from National University of Singapore.

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Across the world, data value is rising. At the same time that we scale the raw quantity of information that we can capture and store, the insight and information that we can glean from it is also climbing, as links and integrations between the silos in which we store it become more intricate, and meaningful.

Today, the value of our personal data is the fastest-growing thing on the Internet. It has a market value of an estimated €272m in the EU alone. It is the future of our data-driven economies. As we come to rely on our Internet services just to function day to day – booking train tickets, navigating for work and pleasure, maintaining the climate and security of our homes, communicating with our friends and colleagues, and managing our finances – our dependence on our connectivity grows, and the understanding that can be derived from it is deepened.

The many benefits to society of a digitally-connected economy are obvious; we have been discussing them globally for over a decade. The sales and contextual data that shine a light on our purchasing and lifestyle habits give consumers value and minimise economic waste. And clearly, the power and the potential of technology to make human beings more productive has allowed us to focus our resources on the activities and relationships that matter, ultimately improving our health, wellbeing, and happiness.

Then, the exploitation of the data created in these contexts enhances decision- and policy-making at an organisational level. The intelligent allocation of activities, services, and resources, and the increased differentiation between signal and noise in identifying human preferences and desires are both data-dependent corporate activities. A digitally-connected society is critical for the development of Smart Cities, the useful deployment of the Internet of Things (IoT), the growth of predictive analytics, and the future of the digital economy itself.

Complicated problems

But, of course, where connectivity brings convenience it also brings challenges. Every user signing on to a new Internet service creates for themselves a unique user account every time, surrendering some form of their personal data in the process. As few hundred, if not a few thousand equivalent accounts are created by each of us in our lifetimes. And the number of times we will do this each week, each month, or in our lifetime is increasing rapidly as the IoT expands.

But more than that, for being the world's most valuable resource, data is remarkably under-developed. We keep it locked in carefully-managed vertical silos so that we can control and manage it, and we do this with good reason – the silos we create are still leaky to cyber attack, even after our best efforts. But partitioning information hamstrings us. It removes our ability to understand the story that data tells, by forcing us to try and understand the minutiae of trees without the context of the forest. We need the links between our siloed data that give it context. We need data to centralize and coalesce around the person.

There are many challenges coming to our connected digital economy. Together, we risk the creation of illegal data markets, the deterrence of the creation of apps and services, the monopolisation of the digital economy, and the marginalisation of entire populations of the market if we do not discover a solution to a market economy that cannot deal with the current challenges of consumer data control.

The coming storm

If the consumer is at the center of the data economy of the future, we are failing terribly to address their needs. If we allow personal data fragmentation to continue as it is, illegal markets will form for personal data exchanges. Non-anonymised data is valuable, and anonymisation is costly. The opacity of this market makes enforcement difficult, which will inevitably lead to a black market. Even with the granting of consent, services that have an appetite for

rate-owned information in a fragmented marketplace.

This deters new services, and incentivises the market to build on the platforms of incumbents, where one set of APIs can bind multiple disparate datasets. Fragmentation in this way may inevitably result in centralisation. If greater monopolistic power were to be bestowed upon a centralised data firm, Internet customers of every online service could ultimately become locked to that single provider of personal identity, which could force the entire ecosystem to do business with a single monolith, or risk losing access to the information that makes their Internet services run.

We are at risk at the society level as well. Ultimately, corporate data ownership could result in a loss of privacy and confidentiality so great that large segments of the market start to withdraw from the Internet entirely. An adverse market effect, in which only the rich can afford to secure and encrypt their data, could come to govern. Even before the market fractures, the integrity and the quality of the personal data in this economy will begin to suffer, as advocates subvert the system with fake accounts that are easy to generate but difficult to cull.

And the cyber security risk of having so many points of vulnerability on the Internet will continue to increase, as we are already seeing. Securing one honeypot is hard against the state-of-the-art attacker. Securing an entire market of them is next to impossible. In a fragmented market, the digital assets of individuals could come to be dispersed across the Internet.

Needs and responsibilities

Global incumbents and new challengers are both ready to embrace the opportunities of the data economy. It is creating more value for us, at large, than any technological advance in history, and the consumer advantages it vields are monumental. The individual recipient of these boons, and the corporations creating them, are both massively to benefit – if we can keep everything on the rails.

To today's (and tomorrow's) businesses, the promise of rich, interconnected data are an entirely new economy of value - still almost universally as-yet untapped. Where technology, for the first time in human history, has given our customers the ability to track and generate insight about themselves, their lives, and their desires, companies will be able to generate goods and services with a brand new efficiency. Services will become

data need to invest heavily to access corpo-streamlined, margins will increase, and the societal advantages our leading organisations create will continue to grow. But more than that, entire economies will crop up, where technology empowers insights we couldn't possibly have leveraged in the past. supplant large cloud architectures due to

> Human data doesn't yield merely the exploration of the self as we understand it. It helps us to uncover the human being as it is, in ways we could never have previously understood. New micro-services, thriving off of the datafication of the self, could vield the frontier for both straightforward new markets in consumer insight, personalisation, and commerce, while laying the groundwork for the frontier technologies of the future: Brain-Machine Interfaces, personalised Artificial Intelligence, and virtual experiences.

The groundwork

The data challenges we face today are the barrier to that future, and they must be overcome. They demand a technology and a market solution that corrects the imbalance in our digital economy. The rot that has set in, manifesting as the misalignment between the data businesses need to survive, and the data consumers are comfortable offering them, will eventually cause a breakdown in the Internet economy. Every year, consumer confidence in Internet services falls, while corporate data ownership rises. Every newsworthy security breach erodes the faith that customers have in the businesses they use online.

It can be addressed. Private, standalone databases for personal data that can be owned, solely controlled, and used by individuals have the potential to make individuals data controllers and processors, in the same way PCs liberated individuals from mainframes in the eighties. Containers, encasing various discrete components of application logic and requiring only minimal resources to do their job, have in the past been used to create agile services. There is no reason why they cannot today be used to manage a database containing a user's personal data.

Accounts such as these do not need an operating system. Instead, they call for operating system resources via an Application Programming Interface (API), isolating them at the (micro) server level, and adding robust additional security. They localise the impact of security breaches to the individual container, and they mitigate the risk of sysadmin-granted unauthorised access. Any content stored inside this technology can be

easily encrypted and backed up, and it lets traditional direct database access to information be replaced by server-level API calls. Through containerisation, modular and micro cloud services are beginning to their portability and scale anyways - and in this implementation, we see the coming of an entirely new economy.

If the use of such containers as a private data microservice account (PDMA) were to become universal best practice, it would make a user's personal data, sitting at rest within his or her own dedicated database, a resource that they could legally own. It would change the fundamental nature of the data economy of today. Individual themselves would become data controllers, and to some extent data processors as well, operationalising the bundle of rights to which they are due.

The private data account can have the technological capability to acquire and exchange data online in the same way any user account on any application or website would, but now the relationship between user and service would be transparent, secure, and explicit.

This would come with significant benefits. First, the legal constraint that corporations faced as data controllers restricted them from being able to share non-permissioned data between silos would disappear individuals can do with their data as they please. They can combine it, share it, and reuse it, for themselves and for others, as much as they choose. Second, with a marginal cost of data exchange at near-zero, data could easily be reused, re-combined, and re-shared between multiple services, significantly contributing to GDP. Finally, with an explicit data exchange as the foundation transaction on the Internet, we could create new taxable revenues out of the opaque shadow data economy that currently moves data around 'behind the scenes.' New data processing services, data use cases, and data opportunities would surface at the market level, and a vast multiplier effect would descend upon the economy.

We ought, as individuals, to be able to exchange our personal data for our own benefit, deriving income from it, or transferring it for fun or service if we wish. We ought to have control over our own information, at least insofar as we ourselves choose to yield it to partners or vendors for personal return. We ought to trade this resource, which will prove to be much more valuable that oil. We ought to champion a primary market for its trade.

The Data Economy

This is the true data economy of the future. Our siloed organisations will continue to painstakingly construct the links that join their massive data resources into context-generated insights. But a new era dawns also, in which the individual, at the hub of all things, creates a data economy for themselves.



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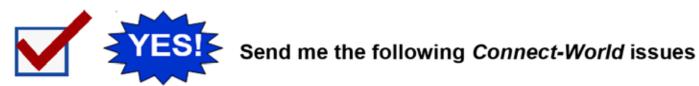
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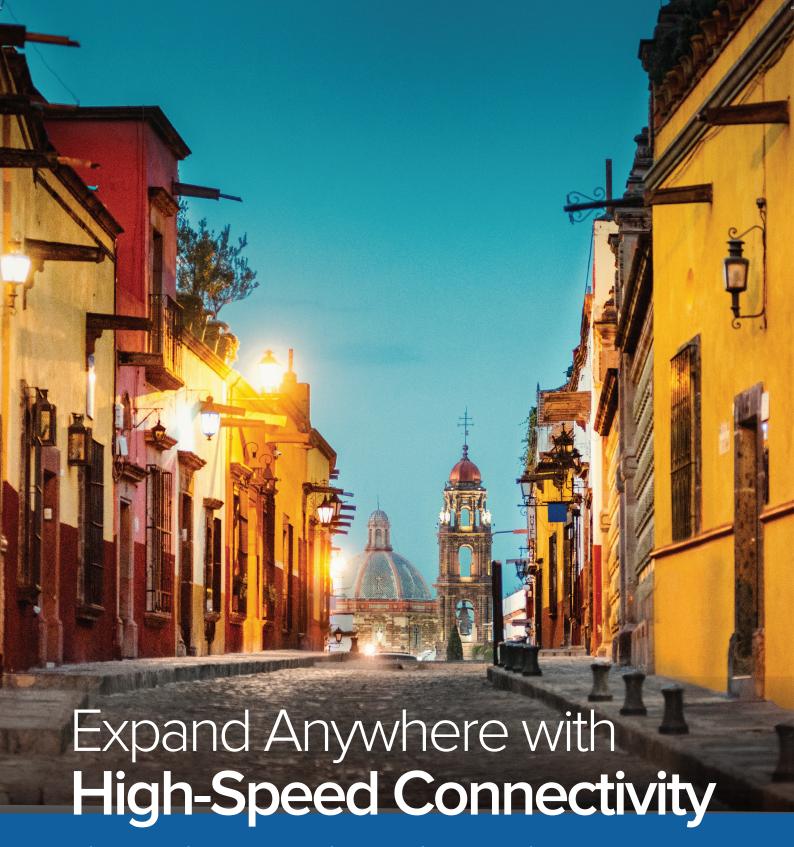
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