



Embracing the Digital Revolution

Policies for Building the Digital Economy

February 2017



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Executive Summary

Policymakers face a choice. Digital and mobile technology advances have delivered far-reaching economic and social benefits for countries, companies and citizens. But these benefits are far from evenly distributed, there has been considerable disruption and the consequences for the disrupted have not always been positive.

As the digital and mobile revolution picks up speed, new technologies—artificial intelligence (AI), robotics and the Internet of Things (IoT), for example—promise both great progress and the likelihood for further dislocation. The right forward-looking policies enable countries, companies and citizens to continue to reap the benefits, improving lives and livelihoods while mitigating the adverse impact of disruption. On the other hand, the potential effects of new technologies in such areas as employment and the digital divide, if not well managed, could aggravate existing economic and social rifts. Policymakers need to embrace digital advances, and they also need to recognise the dangers of inaction and prepare for the changes that are coming.

“The right forward-looking policies enable countries, companies and citizens to continue to reap the benefits, improving lives and livelihoods while mitigating the adverse impact of disruption”

Digital technologies have had widespread and positive economic effects on the global economy as well as for individual countries. Digitalisation furthers economic growth, citizen participation and job creation. Digital technologies enable businesses to access new markets and customers and operate more efficiently, bringing new products and other innovations to consumers. Digital economies improve lives and bring more people and more businesses into the economic mainstream; they make it possible for more of them to participate in economic and social institutions. Digital technologies connect government and citizens. New technologies are also delivering more essential services to more people every day, from allowing remote diagnosis of illness to helping farmers to increase crop yields to providing safe, swift and secure financial transactions.

How countries, companies and citizens are affected by these technologies—and how they are able to manage their impact—largely depends on choices made by policymakers and other leaders. If the positive trends of recent years continue (or accelerate), the effects could be beneficial for all. But it is also foreseeable that new and deeper fault lines could open between digital “haves” and “have-nots.” This could lead to a world in which the benefits are not experienced by all, or even most—potentially widening economic, social and political fault lines. In both developed and developing countries, the difference between the positive and adverse scenarios described above is in large part a matter of policy. Governments should focus their attention and efforts on two broad objectives:

- Accelerating technology adoption to capture the economic and social benefits
- Mitigating the negative economic and social impacts of technological change.

The experiences of different countries show that digital economies can take root and grow under all kinds of circumstances if a few basic factors are in place. One is high-speed, reliable and robust digital infrastructure. But just as important are digitally willing and capable people (citizens, consumers and employees) and digitally competent and engaged companies. A government that “gets it” and uses policy to promote coverage, usage, innovation and new advances is critical. Better yet is a government that leads by example.

To realise the benefits of new technologies while navigating economic transitions, governments should pursue policies that incentivise investment and promote development of digital economies. Forward-looking governments will encourage network investment that improves connectivity. They’ll update regulatory regimes, adapting regulations to current times and market circumstances. They’ll promulgate policies that promote their digital economies—with specific actions to meet the needs of companies, consumers and the workforce. And they’ll demonstrate digital leadership, pushing their own services online and furthering citizen participation in the digital world.

For countries, success in a digital world requires an inclusive digital economy and society, where few feel threatened or left behind. To realise this success in the face of rapid and unstoppable technology advances, governments will need to act urgently on this broad set of policy areas.

“To realise the benefits of new technologies while navigating economic transitions, governments should pursue policies that incentivise investment and promote development of digital economies”



Introduction

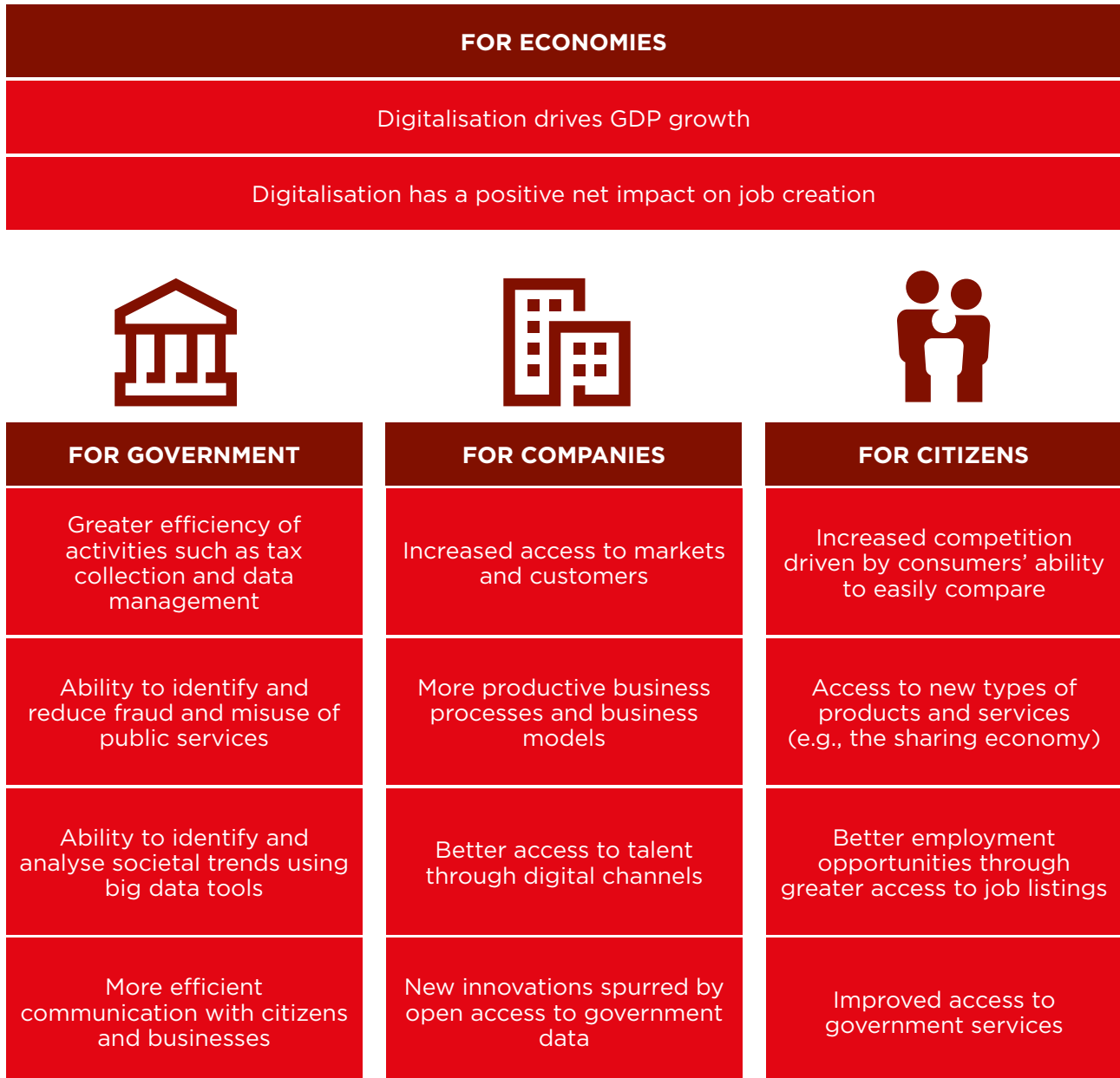
Consider two truths about technology. First, technology only moves forward, each advance building on the last until an inevitable breakthrough changes everything. Second, technology is impartial in its impact—how each advance affects individuals and society is left in large part to political and social institutions to determine. Eras of rapid technological change, such as the industrial and information revolutions, delivered both widespread benefits and economic and social disruption.

These truths bear consideration by policymakers and other leaders at a time of major breakthroughs in digital technologies and what these technologies enable people and organisations to do. Digital and mobile technology advances have delivered far-reaching economic and social benefits—for

countries, companies and citizens. (See Exhibit 1.) But these benefits are far from evenly distributed. Like all revolutions, this one has brought considerable disruption, and the consequences for those disrupted have not always been positive.

Exhibit 1

Digitalisation drives value for countries, companies and citizens



Source: BCG analysis



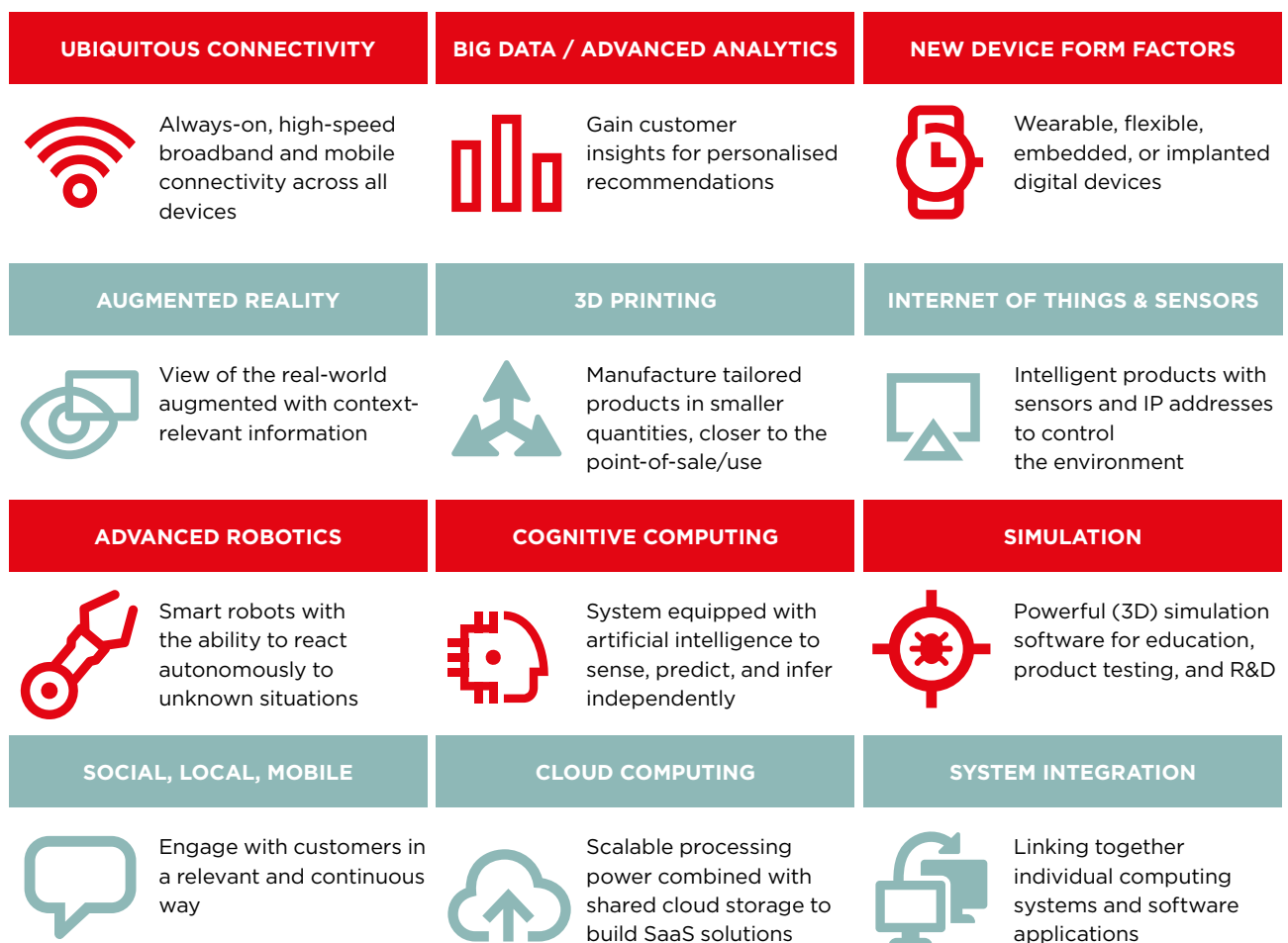
Digitalisation, which we define as the broad adoption of digital technology in homes, businesses and society, constitutes a transformative shift in technology across industries and society in general. It fundamentally changes the way people live, work and communicate and how they discover and purchase goods and services. It changes the way companies are run, how customers are acquired and how enterprises do business. And the pace of change is fast—those that are slow to react are likely to find themselves at a disadvantage to fleet-footed competitors.

The digital and mobile revolutions (in many ways they have converged into one powerful force) are still picking up speed. The changes that are upon us now—artificial intelligence (AI), robotics and the Internet of Things (IoT), for example—promise

both great progress and the likelihood for further substantial dislocation. (See Exhibit 2.) Already many policymakers and ordinary people are aware that these developments will have far-reaching impacts. An analysis of the English-language global press shows that the number of articles that cover both technological advances and economic/societal impact has been increasing strongly in the last years. Sentiment over 4G, 5G and LTE technologies is predominantly positive, with a strong focus on the economic benefits. Sentiment about IoT is mostly positive, with a significant batch of neutral and negative commentary on the associated privacy risks. But the role of AI and robotics in society and its potential impact on employment raises strong debate and mixed feelings. (See Exhibit 3.)

Exhibit 2

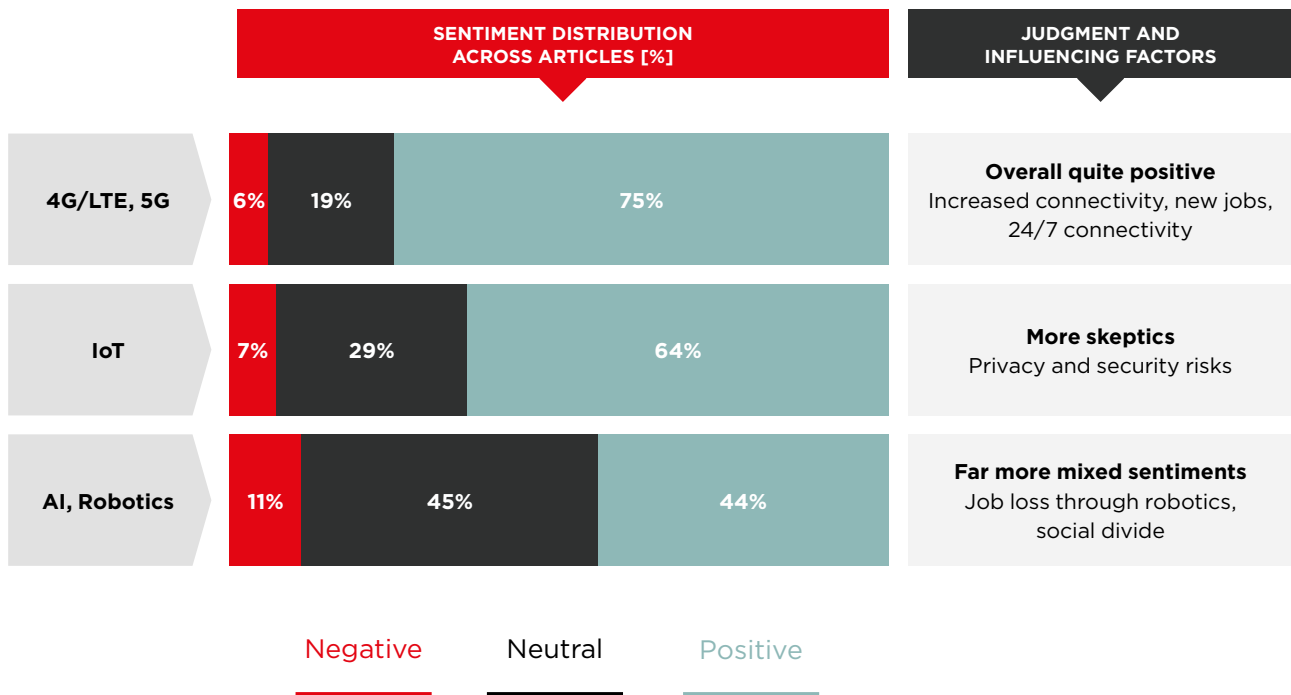
Digital technologies are reshaping industries and societies



Source: BCG analysis

Exhibit 3

Media sentiment for mobile technologies and IoT is positive AI coverage is mixed



Source: BCG, Quid

Now consider two scenarios for the future. In the first, forward-looking policies enable countries, companies and citizens to continue to reap the benefits of new technologies, improving lives and livelihoods while mitigating the adverse impact of disruption. In the other, there are few constraints on the dislocations caused and the benefits accrue to a few while the disruptions undermine many. The first scenario is the more likely, but it will not happen by itself. The second remains a distinct possibility, especially in the face of policy inattention and inaction.

This report examines why policymakers need to embrace digital advances, how they should prepare for them and the dangers of inaction as we climb to the inevitable cusp of the latest revolution. It provides the leaders of both the public and private sectors, who are responsible for ensuring that their countries and companies move in the right direction, with a broad overview of the enablers of a digital economy. It also outlines a set of policies that will ensure that advancing technology results in a “win-win” for everyone.



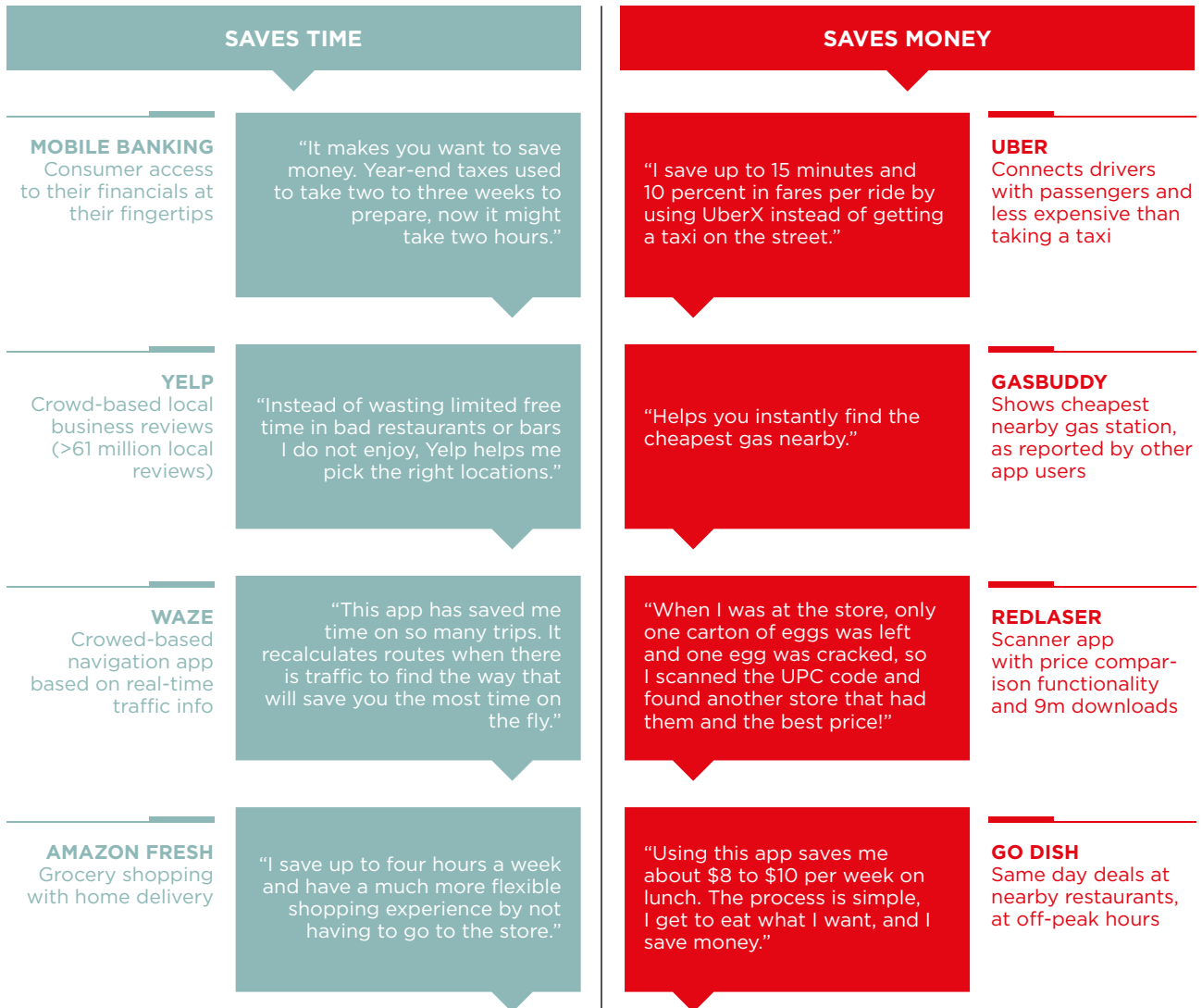
The Goal: An Inclusive Digital Economy and Society

From shopping to entertainment to socialising to managing the household—and household finances—digital technologies have fundamentally altered human behavior and consumers that have been presented with the opportunity have been quick to integrate digital tools into their daily lives. (See Exhibit 4.) Shopping is one example: e-commerce in the UK has been projected to reach almost 17% of total retail sales in 2016. The internet influences more than half of all retail purchases in Brazil. In India, BCG estimates that digital technologies will influence up to 45% of all retail sales by 2025.¹

1. UK: Twenga Solutions, <https://www.twenga-solutions.com/en/insights/ecommerce-united-kingdom-facts-figures-2016/>; US Fortune Magazine, <http://fortune.com/2016/07/11/amazon-prime-customers/>; Brazil: BCG, "Shopping in Brazil," <https://www.bcgperspectives.com/content/articles/globalization-consumer-insight-shopping-brazil-influence-potential-digital/>; India: BCG, "The Changing Connected Consumer in India", <https://www.bcgperspectives.com/content/articles/center-consumer-customer-insight-marketing-changing-connected-consumer-india/>.

Exhibit 4

Digitalisation brings many advantages to the consumer



Source: The mobile revolution (Qualcomm) p. 22



Finance is another. Digital and mobile technologies have transformed the customer experience in payments and banking. For example, mobile money is available in 85% of the countries in which the majority of the population lacks access to formal financial institutions. Such technologies enable customers to more easily and efficiently pay bills, deposit cheques, transfer funds and manage accounts.

There are many more. Travelers today use their phones to board planes, unlock hotel rooms, monitor devices at home (temperature and alarm settings, for example) and check-in via live video with their families. Customised mobile technologies and apps provide services to countless subsegments of consumers with particular needs. (See the sidebar, “Safety in an App.”) People are now less constrained by age, geography or income than in previous decades. For users of all ages, most nationalities and many income levels, the smartphone has become their always-on window on the world—the entire world.

The benefit consumers receive from mobile technologies can be quantified using an economic concept called consumer surplus—that is, the value that consumers themselves receive, over and above what they pay for devices, apps, services and Internet access. BCG research in six countries (US, Germany, South Korea, Brazil, China and India) showed that mobile technologies have created \$6.4 trillion of annual consumer surplus, which is more than the GDP of every country in the world, with the exception of the U.S. and China. (see Exhibit 5.)

Digital technology and the economic activity that it enables deliver broad economic and social benefits. GSMA research shows that the mobile ecosystem alone generated 4.2% of global GDP in 2015, a contribution of more than \$3.1 trillion of added economic value. In addition, the mobile ecosystem directly provided employment to nearly 17 million people and indirectly supported an additional 15 million jobs in other sectors of the world economy. The industry also contributed \$430 billion in general taxation—and paid another \$90 billion through spectrum auctions. (See The Mobile Economy 2016, a GSMA report).

SAFETY IN AN APP

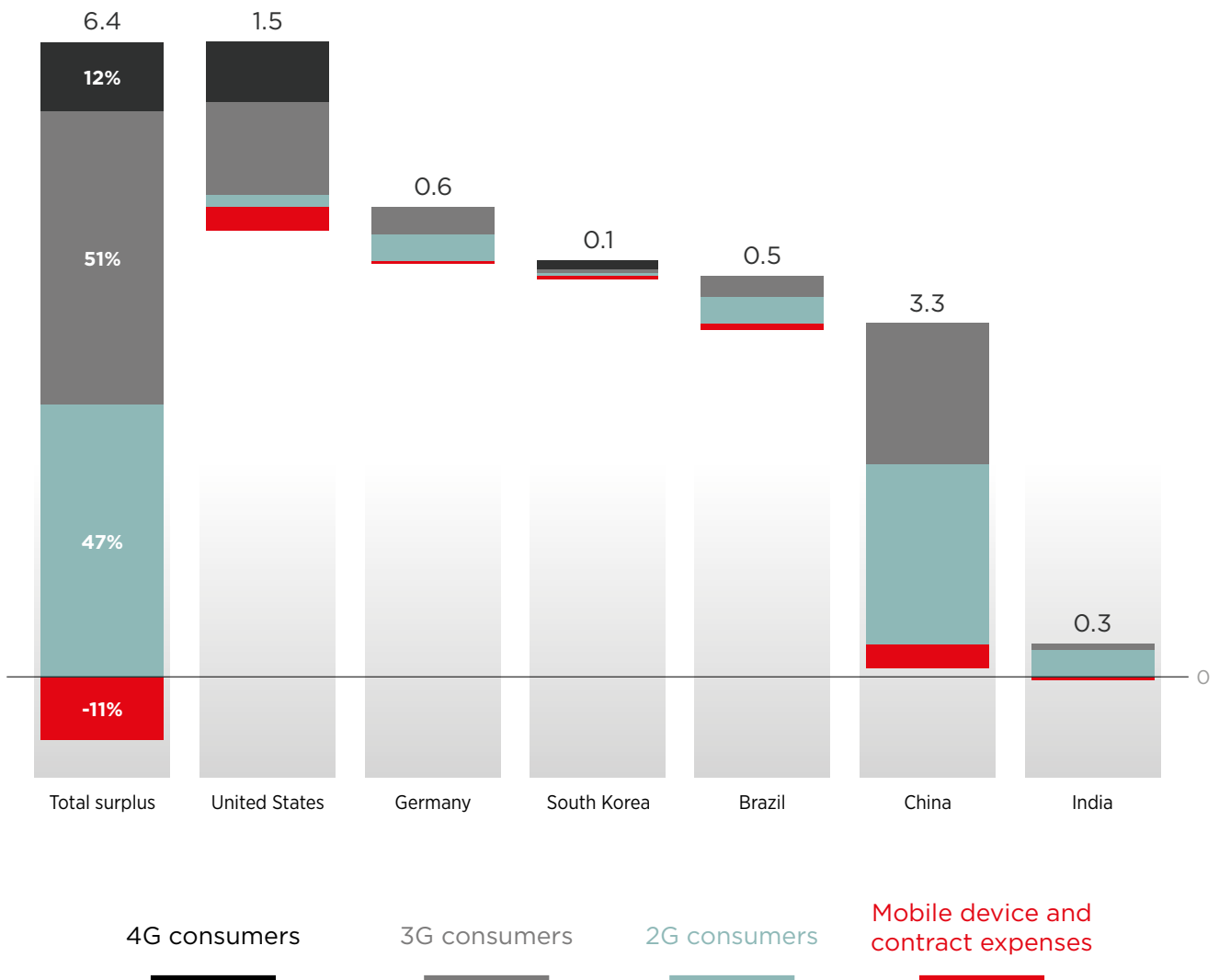
In India, an app called FightBack allows women to send out a security alert to friends, relatives and emergency services when they feel threatened or endangered. With the push of a panic button on the smartphone app, an SOS alert is triggered and sent out to a predefined list of six emergency contacts. This instant alert continuously pinpoints the user’s exact location through GPS tracking.

Beyond its immediate benefit of helping to protect women who are exposed to violence, the app also has far-reaching effects within the broader community. For example, it provides an interactive map of all locations in which alerts have been issued. This information has helped police officers to identify “hot spots” where women feel threatened on the streets and that information has been used to improve safety in these areas.

Exhibit 5

Mobile generates \$6.4 trillion of consumer surplus

Total consumer surplus generated by mobile technology (\$trillions)



Sources: BCG Consumer Impact Survey; BCG analysis.

Note: In developed countries, we show data for consumers of 4G technologies. In emerging markets, we show data for 3G consumers (as 4G has only very recently rolled out).



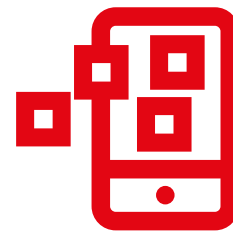
MOBILE CONTRIBUTING TO ECONOMIC AND SOCIAL DEVELOPMENT ACROSS THE WORLD



Delivering digital inclusion to the still unconnected populations
Mobile internet penetration
2015: 44%
2020: 60%



Delivering financial inclusion to the unbanked populations
270 live services in 90 countries as of December 2015



Delivering innovative new services and apps
Number of M2M connections to reach **1bn by 2020**

MOBILE INDUSTRY CONTRIBUTION TO GDP



PUBLIC FUNDING

Mobile ecosystem contribution to public funding (before regulatory and spectrum fees)



\$430bn **2015**
\$480bn **2020**

EMPLOYMENT

Jobs directly supported by mobile ecosystem



17M JOBS **2015**
20M JOBS **2020**

Plus an additional 16M indirect jobs supported by 2020

DIFFERENT PATHWAYS TO DIGITALISATION

The experiences of South Korea, the US and Europe's club of digital frontrunners show how embracing new technologies can have an outsize economic impact.

South Korea has quickly become the world's most advanced mobile economy, with mobile representing 11% of GDP, (\$143 billion).² It is a leading actor across all phases of the mobile value chain, particularly in its high-value segments such as design and production of devices and components. Two of the leading smartphone OEMs—LG and Samsung—are based in South Korea. These companies have managed to transition from low-cost products to premium, cutting-edge products, contributing exceptionally high value and building a strong global brand. South Korea has become a highly successful net exporter, with exports of devices and components significantly exceeding imports in overall value.

The U.S. is a major contributor to core segments of the mobile value chain, with companies such as Qualcomm innovating in core communications technologies, Apple leading in OEM, Google with the most widely used smartphone operating system (Android) and Facebook as one of the most popular global apps. U.S. app developers have generated an array of new businesses. Mobile's contribution to U.S. GDP was more than 3% (about \$550 billion) in 2015 and expected to reach nearly 5% by 2020.

Europe's digital frontrunners—Belgium, Denmark, Estonia, Finland, Ireland, Luxembourg, the Netherlands, Norway and Sweden—all small countries, have actively pursued digitalisation as a way of boosting their innovativeness, exports and growth. The average ICT goods and services exports as a share of GDP is 7.5%, compared with 1.9% for EU Big 5 (Germany, France, the UK, Spain and Italy). In terms of innovation, the digital frontrunners outperform EU Big 5 countries by 7% on average in the Global Innovation Index, co-published yearly by Cornell University, INSEAD and WIPO (World Intellectual Property Organization). The amount of venture capital invested in the frontrunner countries as a share of GDP is double that of the Big 5. English proficiency in the frontrunners is on average 18% higher than Big 5 countries (excluding the UK), increasing their competitiveness in an open digital market. The frontrunners' Internet sector made up 8% of GDP in 2014—almost 60% more than for the EU Big 5 countries, whose aggregated e-GDP share of GDP was 5.1% in the same year.

2. BCG, The Mobile Revolution: How Mobile Technologies Drive a Trillion-Dollar Impact.

The Enablers of a Digital Economy

The experiences of very different markets around the world—China, India, South Korea, Sweden and the US, for example—show that digital economies can take root and grow under all kinds of circumstances, if a few basic factors are in place. In the preparation of this report, the GSMA and BCG examined the enablers common to these and other countries, as well as the opinions and insights of such expert organisations as the World Bank, the World Economic Forum and leading industry associations, NGOs and academic institutions. One key factor, of course, is high-speed, reliable and robust broadband infrastructure. But just as important are digitally willing and capable consumers, digitally competent and engaged companies and a labour pool with the requisite digital skills. A government that uses policy to promote coverage, usage, innovation and new advances is a big plus. A government that leads by example has even more impact. (See Exhibit 6.)

Exhibit 6

Key enablers of a digital economy



Source: BCG analysis



Infrastructure: The Ability to Connect and Interact

A good telecommunications infrastructure is the prerequisite for digital inclusion and for a strong and growing digital economy. For many reasons having to do with reach and cost, as well as with the specific needs of the devices being connected (sensors in a car, for example), much of the infrastructure needs of the future are mobile.

“Mobile” means different things in different markets and geographies. About 95% of the world is covered by basic cellular networks and 3G coverage reaches 69% of the population, but only 29% of rural areas.³ While the mobile coverage figures are impressive, the type of network dictates the quality of service available and the capabilities of the devices consumers and business can use. Those living in areas with 2G coverage (and without fixed line infrastructure) only benefit to a limited extent from online connectivity.

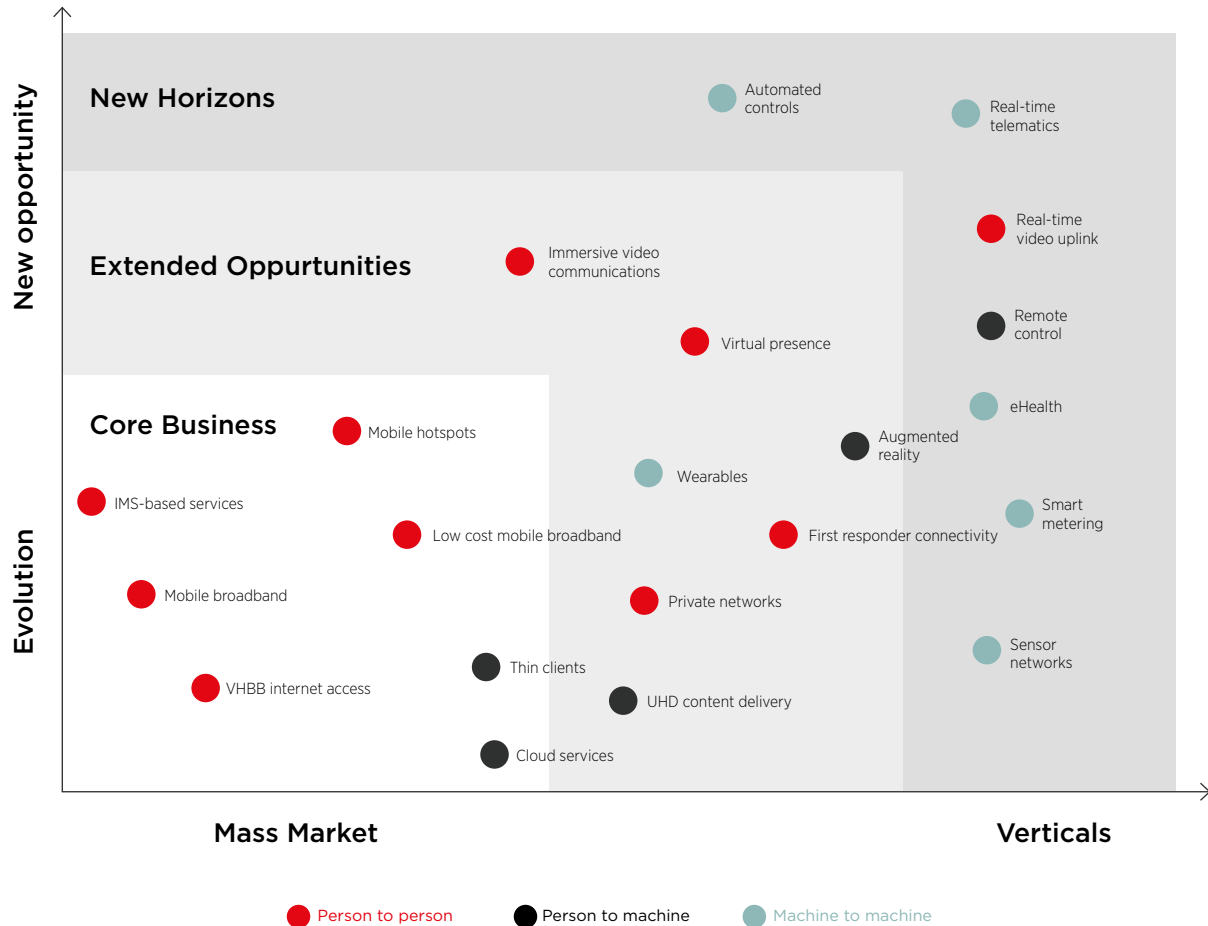
In much of the developed world, the challenge is to keep advancing network capacity and capability to meet rapidly rising consumer and business demand for data and the advanced needs of new technologies such as virtual reality and IoT. At a practical level, this means replacing older 3G and 4G networks with LTE-A and moving forward with the development of 5G as many more devices, sensors, gadgets, machines and other things become connected. Estimates put the number of connected devices at some 50 billion by 2020.⁴ Many, if not most, of these new connections will be via mobile networks, and they will require the capabilities of advanced 5G connectivity. (See Exhibit 7.)

3. International Telecommunication Union (ITU), 2015 ICT Facts & Figures.

4. Ericsson, “Connected Devices,” https://www.ericsson.com/openarticle/mwc-connected-devices_1686565587_c

Exhibit 7

5G will unlock a multitude of new uses



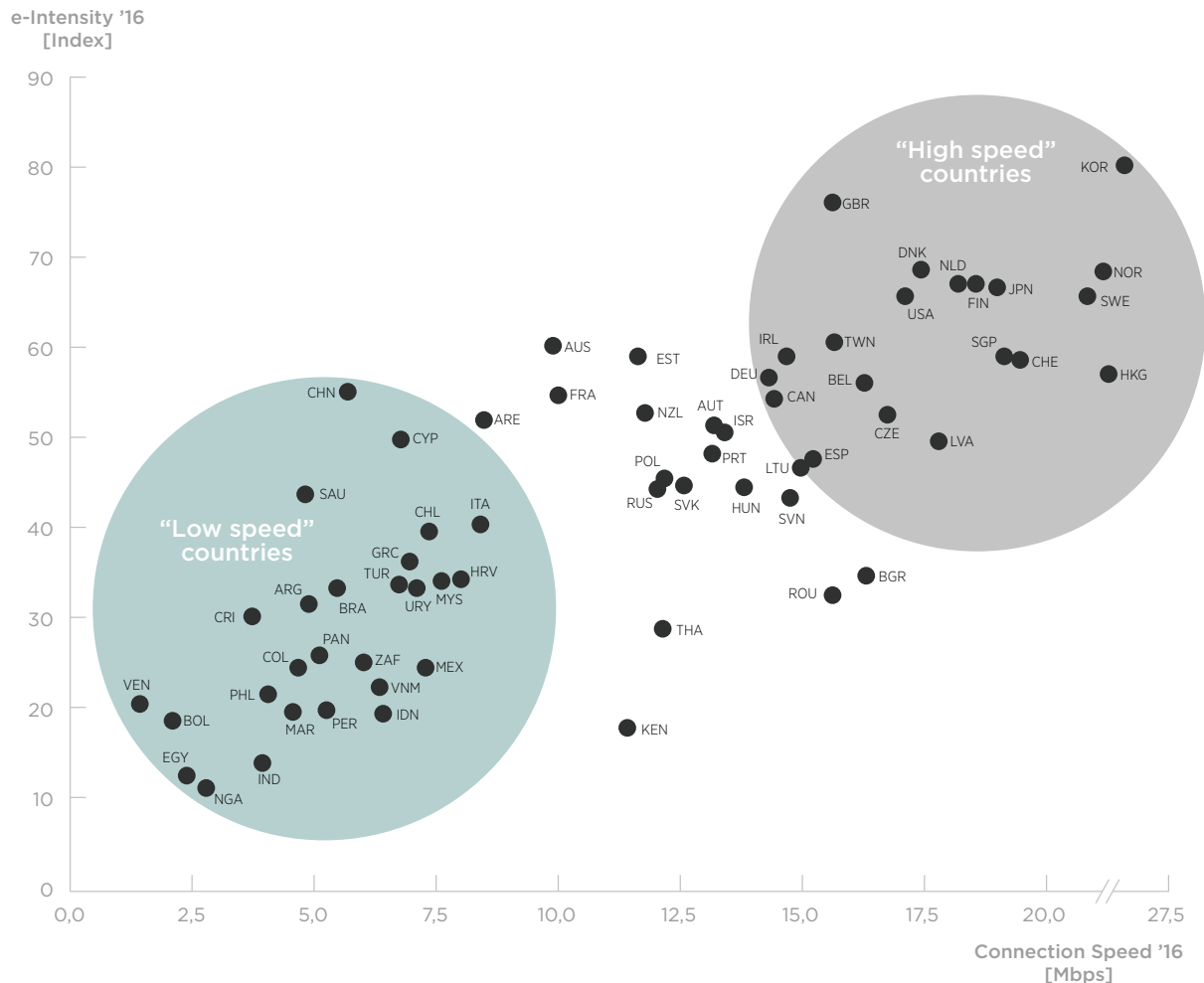
Source: GSMA Report "Commercial Opportunities"

A fast and reliable connectivity infrastructure, together with a dense grid of data centers (which help ensure fast response times) is another important ingredient for the technologies of tomorrow. Several developed countries are quite

advanced in terms of available internet speeds (South Korea, Norway, Hong Kong, for example), but others are playing catch-up or face significant disparities between urban and rural regions. (See Exhibit 8.)

Exhibit 8

Countries with highest internet speeds typically show a higher grade of digitalisation



Source: BCG and Akamai

In developing markets, the challenge is more often about connecting people in remote, hard to reach, or economically unviable areas. But it also involves moving from older 2G and 3G networks with limited capabilities to 4G and advanced connectivity, which enable people to use smartphones and more fully interact, transact and engage with friends, companies, content and the rest of the world. As advancing technologies demand more capable and efficient telecommunications networks, the availability of radio spectrum for mobile use—at affordable prices and without unreasonable conditions or constraints—is another important prerequisite.

Other basic physical infrastructure is often an issue. A reliable energy network is, of course, essential; innovative efforts are underway in many developing countries to bring affordable sources of power to poor or remote places. Digital commerce requires transportation infrastructure (roads, bridges, airports) and a well-functioning logistics system for the delivery of goods ordered online.

In all markets, legal and regulatory systems that provide certainty for investment and commerce and establish a level playing field for all marketplace participants are additional important enablers.



Trust, Safety and Security

Using digital services beyond basic search requires trust in the digital system: users must feel safe online, transactions must be secure and private, and goods ordered and paid for should be delivered. Without this trust, no digital economy can thrive.

In many markets, trust, safety and security are huge and multifaceted issues that affect multiple areas of digital use, interaction and value generation. BCG's latest Big Data and Consumer Trust Survey of 8,000 consumers in the US and the five largest European economies found that concerns about data misuse remain at high levels across generations and countries. In the US, for example, nine in ten 70-to-75 year-olds feel they need to be careful sharing personal data online—hardly a surprising finding. But eight in ten 18-to-34 year-olds feel exactly the same way. Approximately half or more of consumers in France, Germany, Italy, Spain, the UK and the US believe that companies are not honest about the ways in which they use data and only one quarter or less of consumers in the same countries believe that they can trust companies to do the right thing with personal data. (See Bridging the Trust Gap: Data Misuse and Stewardship by the Numbers, BCG slideshow, October 2016.)

Major data breaches at banks, credit card companies, health care providers and other online companies have been well publicised. The prospect of billions of connected devices and machines raises new security concerns. Multiple disaster scenarios have been already painted for the hacking of “smart” electrical grids, autonomous cars, global financial systems and countries’ entire cyber-security networks. Melodrama aside, the fears are real and the importance of secure digital infrastructure is a top concern for governments, companies and consumers alike.

Safe, easy-to-use digital identities that serve multiple online purposes are a critical component of the security solution. For example, almost 95% of Estonia’s 1.3 million residents carry an e-ID card, which can be used for conducting financial transactions, voting online, accessing government databases, maintaining healthcare records and picking up e-prescriptions. The card is embedded with a chip that, using 2048-bit public key encryption, enables it to be used as definitive proof of ID in an electronic environment.



Furthering Inclusion with Locally Relevant Content and Services

Multiple studies have concluded that digital ecosystems that produce local content and apps are vital for building digital literacy, attracting local users and serving local needs. Digital services can be a big step towards addressing local problems and boosting competition in an increasingly international digital services market. Lack of content (and capability) lead too many people in too many markets to conclude that the internet is not relevant to them. Even in the US, one survey found that 34% of people that don't use the internet think it's irrelevant.⁵

Lack of relevant local-language content is one inhibiting factor. The World Bank estimates that 80% of online content is available in one of 10 languages: English, Chinese, Spanish, Japanese, Arabic, Portuguese, German, French, Russian and Korean. Only about 3 billion people speak one of these languages as their first. More than half of all online content is written in English, which is understood by just 21% of the world's population, according to estimates by Mozilla and the GSMA.⁶

In addition to language constraints, basic services, such as information on public transportation or local events, often cannot be found online. In some markets, app developers are filling the void. According to App Annie, the number of apps downloaded in India is projected to grow from almost 8 billion in 2016 to 20 billion in 2020. Many users in developing markets use social networks, both local and international, as their online onramps.

Relevant services that bring people into the economic and social mainstream provide a big boost to both usage and inclusion. As the World Bank observed, "Inclusion, efficiency, innovation—these are the main mechanisms for digital technologies to promote development. (See "World Development Report 2016: Digital Dividends, Overview and the sidebar, "Paying School Fees with Mobile Money: Everybody Wins—Part One.")

5. See for example, World Economic Forum, *Delivering Digital Infrastructure: Advancing the Internet Economy*, 2014; Monica Anderson and Andre Perrin, "13% of Americans don't use the internet. Who are they?" Pew Research Center.

6. See *Approaches to local content creation: realizing the smartphone opportunity*, a report by GSMA Mobile for Development Impact and Mozilla.

PAYING SCHOOL FEES WITH MOBILE MONEY PART ONE

Until relatively recently, the Côte D'Ivoire's cash-based system for paying school registration fees led to multiple problems including time wasted by parents standing in long queues and armed robbery, which both threatened the safety of parents and children and reduced Ministry of National and Technical Education (MENET) revenue collection. In 2011, MENET began collaborating with mobile money and digital payment providers to digitalise annual school registration fee payments for the country's then approximately 1.5 million secondary school students (at no extra cost to the students). Working with industry players, over the following years MENET devised a business model, conducted a successful pilot, integrated its student record database into the payments system so that, along with fee payments, students can now update personal information in the database using the mobile money menu on their mobile handsets. By 2014, more than 70% of payments were made digitally. MENET then moved to make digital payment mandatory and in the school year 2014-2015, more than 99% of students paid their registration fees digitally, with 94% of payments made via the country's three MNO mobile money providers.

Among the benefits, mobile payments have:



Drastically reduced lost payments, fraud and theft as well as lowering the cost and administrative burden of managing cash



Increased safety and security for parents and school personnel involved in fee payment and saved time for all concerned



Enabled the government to collect fees in full, earlier in the calendar year and over a shorter period, leading to improvement of annual budget management

In addition, this scheme allowed the ministry to build a student database that has become a powerful tool to inform wider education policy.

(For an explanation of how policy enabled this program, see Part Two, on page 26.)

MOBILE MONEY IN KENYA



More than **half** of all Kenyans use **M-Pesa** to pay bills

120,000 also use **M-TIBA** to pay for healthcare services



Indian farmers use **mKrishi** mobile app for agri services, crop advice & weather. Farmers using the tool have increased productivity by **15%**

MOBILE HEALTH (MHEALTH)



Digital technologies are changing the way we use social services, including health and social services



Emerging economies use mobile applications to deliver medical information, access data, obtain insurance, provide clinical services

INDIA



Swasthya Samvedana uses mobile technology to improve maternal health

RWANDA



Zipline uses drones to deliver medical supplies

FIXING A 30-YEAR OLD PROBLEM IN TANZANIA

For nearly thirty years, the Convention of the Rights of the Child and numerous international treaties have afforded every child the right to be registered at birth and to possess both a name and nationality. Yet disparities in birth registration rates are significant; the World Health Organization estimates that 99% of unregistered births—more than 50 million per year—take place in developing countries and nearly 80% occur in South Asia or sub-Saharan Africa. The barriers to birth registration in a country such as Tanzania are varying and complex. More than half of all children are born at home rather than in a hospital or health facility. With only one registrar office per district, many new parents must make at least two long journeys in order to register their child and collect a birth certificate. Many parents simply lack the financial means to pay for the cost of travel and the mandatory registration fee.

Mobile technology can play an important role in speeding up birth registration and the provision of unique identities in underserved communities. In 2011 a partnership among the Tanzanian government, mobile operator Tigo and UNICEF set out a five-year birth registration strategy that aimed to make the process more affordable, widely accessible and efficient. When the new mobile registration system was first piloted, the registration rate of children under five in the pilot areas increased from 8% to 45% within six months. Since then the mobile registration system has successfully registered more than 420,000 births and by the end of 2019, it is expected that 90% of newborns and 70% of all children under the age of five in these areas will be registered and have certificates. Many of the under-five children who are not registered will be reached through linkages with health and social protection services that are already in contact with the children.



Digitally Capable Citizens, Consumers and Employees

A well-functioning digital society requires that individuals acquire certain capabilities and skills so they can function effectively as digital citizens, consumers and employees.

Education programmes need to provide citizens with digital literacy skills so they can use the internet to enhance their daily lives and navigate the online world with confidence in their ability to recognise and avoid abuses such as false data, fraud and offensive content. As the reliability of information on the web becomes more and more varied, the ability to check and compare multiple sources of information is increasingly important. Consumers also need to be able to transact digitally in order to engage in commerce and interact with government services such as tax and fee payments.

A digital economy needs a digitally skilled workforce, which means employees who can use digital technology, handle large amounts of data and act with a high degree of flexibility and creativity. The advent of new technologies requires continuous upgrading of relevant skills as a prerequisite to remaining employable.

In its Digital Dividends 2016 report, the World Bank highlights the skills (beyond the basic cognitive skills of literacy and numeracy) that individuals will need to function in the economy of the future.

These include:

- Higher-order cognitive skills—“the ability to understand complex ideas, deal with complex information processing, adapt effectively to the work environment, learn from experience, engage in various forms of reasoning, to overcome obstacles by critical thought.”
- Technical skills, including ICT skills—“those abilities needed to carry out one’s job, such as the ability to repair a water leakage for a plumber, the knowledge to operate a machine for a worker at a factory, or the knowledge to work with a software for a person at a bank. ICT skills refer to the effective application of ICT systems and devices and range from ICT specialists who have the ability to develop, operate and maintain ICT systems, to basic ICT users, who are competent users of the mainstream tools needed in their working life.”
- Interpersonal skills—“a broad range of malleable skills, behaviors, attitudes and personality traits that enable individuals to navigate interpersonal and social situations effectively.”

Digital literacy and skills building not only need to be included in national curricula, they also must be made available to and used by working-age people and the elderly.



Digitalising Companies

Digital economies only grow if companies are online and taking advantage of technology to gain access to new customers and markets and to improve operations. Moreover, as digitalisation spreads through sectors and industries, companies that do not make use of new technologies, such as automated machines, sensors, improved analytics, will find themselves outpaced by those that do. Countries that do not enable their businesses to “go digital” will inevitably hurt their economies as local businesses lose out to more capable and more efficient competitors from abroad. In addition to strategic intent, companies need the financial means, regulatory leeway and a skilled labour pool in order to digitalise their operations.

The impact of digital technologies on business, especially small and medium-sized enterprises (SMEs), has been transformative. There are virtually no industries today that do not apply digital technologies in some way in their product manufacturing, service provision, or business processes. Digitalised companies have big advantages over their non-digitalised peers (including higher efficiency, better customer experiences, leaner and faster processes and higher level of innovation, to name a few). Companies that fail to digitalise risk falling behind and losing out to more agile competitors. Governments that fail

to encourage digital adoption among companies today are asking for job stagnation tomorrow. On the other hand, governments that use policy levers, from removing obstacles to facilitating adoption to incentivising digitalisation, can encourage more companies to digitalise their operations and expand the digital economy.

Among the biggest beneficiaries (real and potential) of new technologies are SMEs, which are also major drivers of growth and jobs. SMEs are responsible for up to 65% of all jobs in many economies, according to the Organisation for Economic Cooperation and Development. As with all technological advances, there are leaders and laggards in the adoption of mobile technology. BCG research among 3,500 SME decision makers in the U.S., Germany, South Korea, Brazil, China and India—six of the world’s largest and most diverse economies—found widespread disparity in the performance between leaders and laggards. Mobile leaders have grown revenue up to two times faster than laggards and have added jobs up to eight times faster in the three years studied. Most SMEs report that having a mobile presence is quickly becoming a must-have to attract customers, but a significant portion of small businesses are falling behind. (See the sidebar, “Crowdsourced Reviews: Leveling the Playing Field for Small Business.”)



LEVELING THE PAYING FIELD FOR SMALL BUSINESS

Small businesses are constantly looking for ways to set themselves apart from larger competitors. Crowdsourced referral apps like Yelp in many countries, or Siksin Hotplace in South Korea, give small businesses the chance to stand out among their peers (even if their peers have much deeper pockets) and gain customer trust.

In the U.S., 30% of businesses report that a large portion of their customers come from referral apps like Yelp. According to a BCG survey of nearly 4,800 small businesses, companies that had a Yelp profile but did not advertise on the site nevertheless reported generating incremental revenues of \$8,000 annually from Yelp—a kind of passive halo effect. The return is even more powerful for small businesses that actively shaped their digital presence through advertising campaigns on Yelp. The survey found that those companies achieved an average uplift in annual revenue of more than \$23,000. (See “Unlocking the Digital-Marketing Potential of Small Businesses,” BCG article, March 2013.)

In the six countries evaluated, closing the mobile divide among SMEs could add 7 million jobs over the next three years. It could also increase GDP growth by 0.5 percentage points and help reduce unemployment by more than 10%. In countries such as Germany or the U.S., closing the mobile divide could help reduce unemployment by as much as 15 to 30%.

The good news is that in many markets, the cost of the investment required to digitalise keeps coming down. Better and faster connectivity is one factor; cloud-based capabilities and services are another. Companies today can effectively rent the ICT capabilities they need without having to make capital-intensive investments in machines or software—assuming, of course, that 1) cloud based services are available in their home markets and 2) there are no legal or regulatory roadblocks to accessing them.

In many sectors in many markets, regulation and existing contracts hinder a full move to digitalised operations. The barriers to driverless cars, for example, have more to do with regulation than technology. Similar barriers exist in healthcare and other sectors and services. It's hard to imagine a sector where regulatory change is not required.

The ability of companies to make use of new technologies is potentially constrained by a shortfall in skilled labour—which means that demand for those skills and the willingness to pay for them, will rise. Already today, in many markets there is a big shortage of IT professionals and related functions. Ensuring timely and sufficient supply of these skill sets cannot be left to market forces alone.



The Importance of Government Leadership

When it comes to building digital economies, governments can facilitate (through regulatory policy, for example), they can encourage (using incentives, such as tax policy) and they can lead the way through their own actions. Among Europe's digital frontrunners, for instance, are several countries that are trailblazers in constructing working digital identity systems, digitalising government-citizen interactions and pushing government services online.

Other countries have made a point of using government policy and programmes to push digitalisation through industry and society. Hong Kong has steered development over many years through its Digital 21 Strategy. South Korea saw the potential of information and communication technologies during the Southeast Asian economic crisis of the late 1990s and used a digital strategy to turn itself into an economic powerhouse. In 2010, Colombia launched its Plan Vive Digital “to give the country a technological leap through wide dissemination of the Internet and the development of its national digital ecosystem.” The country's former ICT minister has described the plan as “the most ambitious public policy strategy ever implemented by the Colombian government for the ICT sector.” The government of Senegal has long regarded telecommunications as a priority sector to foster economic growth and reduce poverty. As a result, Senegal has benefitted from international access through multiple analog and

more recently, fiber-optic, undersea cables. Senegal is a communication hub in West Africa and delivers international connectivity to neighboring countries such as Mali, The Gambia, Guinea Bissau and Mauritania.

The common factor among all these countries is the recognition by government leaders that digitalisation of their economies and societies carries big benefits and that they themselves have an important and multifaceted role to play. (See the sidebar, “Paying School Fees with Mobile Money—Part Two.”)

Digital technologies also allow connected citizens around the world to access all manner of government services much more easily and efficiently. BCG research shows that usage and satisfaction with digital government services has been rising consistently in both developed and emerging markets. People are accessing more services more frequently online. And they are interacting with governments using an expanding array of devices. Users are also accessing a substantial selection of services. Relatively simple interactions, such as seeking real-time information on traffic, filing taxes and making payments are most common. But more complex and high-impact services, such as those related to employment, are also highly sought after—by more than a third of all respondents across the 21 countries in the recent BCG sample—and more than 40% in developing economies.

PAYING SCHOOL FEES WITH MOBILE MONEY—PART TWO

Five government policies were critical to the success of Côte D'Ivoire's mobile payment program highlighted on page 20.

A Willingness to Invest in Digital. The Côte D'Ivoire's education ministry (MENET) is committed to investing in digital platforms and technical capabilities. It was open to exploring new technologies and innovative business models. Its database is now updated frequently, giving detailed insight into the needs of students and impacts of the initiatives that serve them. This investment has deepened the digital capabilities of the government and has provided a solid foundation for further digitalisation of other government payments.

Government Leadership and Collaboration. Strong government leadership and effective project management was vital to the success of the project. MENET worked to achieve buy-in and coordinated collaboration amongst the private sector stakeholders. This effort brought all players to the table to agree key actions (such as marketing messages and user experience improvements) and held all to agreed timelines to ensure efficient running of the service year on year.

Win-win Business Model. The successful implementation of an attractive and sustainable business model for all parties was critical. From the outset, the government sought to work with all mobile money providers in the market, rather than any one preferred supplier. This guaranteed a level playing field for all providers and that the maximum number of people could access the service. All parties had a vested interest in the success of the project and by combining resources such as marketing budget and aligning key messages, they elevated awareness raising efforts.

The government agreed to pay mobile network operators (MNOs) a fee for each payment processed to cover MNOs' costs of providing the service, which meant that the service was sustainable for MNOs. The government took a forward-looking approach to assessing the benefits from this business model: rather than simply tracking savings from the system, it tracked the new revenue, leak prevention and informational improvements the service enabled, which meant that the sustainability fee for the MNOs more than paid for itself.

Enabling Regulatory Environment. There existed an enabling regulatory framework for mobile money in Côte d'Ivoire, which meant that no new approvals or laws were required to move to mobile payments. The enabling environment also meant that there were no taxes on mobile payments imposed by the government, meaning these did not have to be factored into the business model.

Long Term Political Vision. Long term vision and buy-in from high-level government stakeholders, gave the project time to be developed and demonstrate success. Building on this project the Ministry of ICT has recently engaged in a new initiative with support from GSMA to drive collaboration across line Ministries to digitalise new government payment flows.



Which Road Will You Take?

Despite incredible progress in a relatively short time—the first iPhone was introduced only a decade ago—the economic and social benefits of digital and mobile technologies have been unevenly spread across regional and national lines, owing partly to the state of market development but also significantly to the extent to which national policies encourage digital development (in both technology and content) and mobile connectivity.⁷ (See The 2015 BCG e-Intensity Index, a BCG interactive, November 2015).

The US is home to the vast majority of the big tech global players, especially content companies—Google, Facebook, Amazon and Netflix—for example. Several Asian economies have profited greatly from digital engagement, particularly in device and component manufacturing, digital services and e-commerce, among them South Korea, China and Taiwan. Europe's consumers have benefited from widespread connectivity and access

to digital services, but many European countries lag other digital pioneers. Generally speaking, the digital economies of northern European countries are significantly more developed than those in central, southern and eastern Europe. (See Digitizing Europe: Why Northern European Frontrunners Must Drive Digitization of the EU Economy, BCG report, May 2016.) Most emerging markets trail in internet connectivity, usage and “eGDP.”

7. See The 2015 BCG e-Intensity Index, a BCG interactive, November 2015

We can count on many new digital technologies coming into play over the next decade at a more rapid pace than ever. Thanks in part to advances that improve critical network capabilities, multiple disruptive technologies are currently on the brink of breakthrough or expected to enter the mainstream in the next five years. These new technologies will become available to an expanding group of consumers and businesses worldwide as new uses gain scale and prices drop. Current cutting-edge technologies, such as additive manufacturing, robotics and cognitive computing, will enter the mainstream. More extensive use of data-driven services, new ways of working, new business models and new customer habits will have a profound impact on society.

Many countries today experience uneven distribution of wealth and well being.⁸ Even in highly developed and wealthy countries, recent events show how this can lead to heightened political and social tensions. While digital technologies are hardly at fault, it's easy to foresee the rapid technological advances of the next decade contributing to a world in which there are a few winners and many losers—or at least the perception thereof. Instead of bringing widespread benefits, the impact of new technologies could widen current economic, social and political divisions. (See Exhibit 9.)

Exhibit 9

Two potential scenarios for the digital future

Win Win Scenario



Forward-looking policies enable countries, companies and citizens to reap the benefits of new technologies, improving lives and livelihoods of many and furthering social inclusion.

UNEMPLOYMENT



GDP

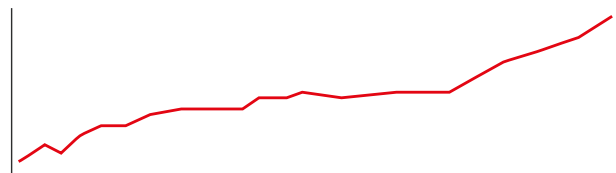


Win-Lose Scenario

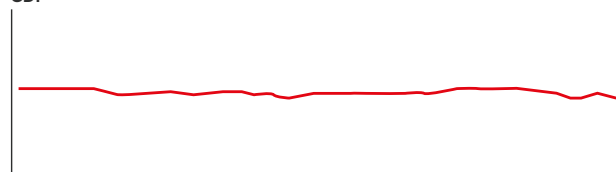


The benefits of digitalisation only accrue to the few while disruptions undermine the many – resulting in reduced social inclusion, social instability and economic stagnation.

UNEMPLOYMENT



GDP



8. See Why Well Being Should Drive Growth Strategies: the 2015 Sustainable Economic Development Assessment, BCG report, May 2015.

How societies, citizens and companies approach new technologies and manage their impact largely depends on choices by policymakers and other leaders. (See the sidebar, “The US View of AI.”) For example, countries that digitalise first can secure advantages in productivity, efficiency and global reach over those that do not. The right policies encourage digitalisation; others put up roadblocks.

Digital technologies bring the benefits traditionally available only to the “few” to the “many,” in a digital world, an individual or small business can attract an audience or a market and compete with the largest players. At the same time, technologies can also be highly disruptive, causing economic, social and personal dislocation and their impact can be highly uneven.

THE US VIEW OF AI

A December 2016 report by the Obama Administration in the US, Artificial Intelligence, Automation and the Economy, encapsulates the challenges policymakers face on new technologies and the kind of responses they can make.

The report says:

“Although it is difficult to predict these economic effects precisely with a high degree of confidence, the economic analysis in the previous chapter suggests that policymakers should prepare for five primary economic effects:

- Positive contributions to aggregate productivity growth;
- Changes in the skills demanded by the job market, including greater demand for higher-level technical skills;
- Uneven distribution of impact, across sectors, wage levels, education levels, job types and locations;
- Churning of the job market as some jobs disappear while others are created; and
- The loss of jobs for some workers in the short-run and possibly longer depending on policy responses”

The report suggests “three broad strategies for addressing the impacts of AI-driven automation across the whole US economy:

1. Invest in and develop AI for its many benefits;
2. Educate and train Americans for jobs of the future; and
3. Aid workers in the transition and empower workers to ensure broadly shared growth”



Win-Win ...

If the positive trends of recent years continue (or accelerate), the effects could be beneficial for all. The developed world will see increased economic productivity and growth and the quality of life will improve owing to better accessibility to high quality education, better access to information and rising quality of life-bettering services. While digitalisation will do away with some “legacy” jobs, it will create more new ones as happened during previous major economic transitions. For Europe’s digital frontrunners, for example, BCG estimates the net growth in jobs due to digitalisation at 5% to 8% of the total workforce.

In a win-win scenario, productivity gains in the manufacturing (Industry 4.0) and the service (Service 4.0) economies will be fairly distributed and workers whose positions are made redundant are able to find a new job in digital arenas, thanks in part to continuing education and skills training programmes. In addition, the product and service benefits of new technologies give life to sea-change improvements in the quality of life through development of such innovations as smart cities, autonomous vehicles and new life-saving tools.

As affordable connectivity becomes more widely available and other preconditions, such as basic skills training and education, are met, people put digital and mobile technologies to work in way that rapidly improve daily life, sometimes radically. Rural farmers can check crop prices, school children can attend class, sick people receive medical advice and treatment and users join the mainstream economy using mobile payment applications. New uses are invented all the time. (See the sidebar, “An Explosion of Digital Activity in India.”)

Indeed, many predict the biggest impact will come in the increasingly crowded urban centers of the developing world. Half of humanity—3.5 billion people—live in urban areas today and by 2030, two-thirds of the global population will reside in urban locations. Cities account for 60% to 80% of energy consumption and 70% of worldwide greenhouse gas emissions.⁹ Digital technologies can have a big impact on the ability of cities to manage such demanding issues as mobility, safety and energy consumption.

AN EXPLOSION OF DIGITAL ACTIVITY IN INDIA

As internet adoption and use rises in India, the government and others are increasingly turning to digital solutions to long-standing problems.

The government has also announced plans to build 100 smart cities across the country. The “Digital India” initiative, launched in 2015, aims to increase the optical fibre network to local governments in thousands of villages where two-thirds of the population lives. The opportunity for expansion of service delivery is huge as the number of connected Internet users in India is expected to more than double in the next few years to as many as 550 million. New users are expected to comprise more older people, rural residents and women.¹⁰

Under the Unique Identification Authority of India (UIDAI) system, anyone can obtain an electronic and digitally-signed proof of identity. The government also seeks to provide each citizen with a “digital cloud” for storing data related to their electronic identities. Almost the entire adult population carry Aadhaar cards that facilitate electronic payments, and the electronic payment industry today encompasses telcos, banks, wallet companies and e-commerce firms. BCG projects that more than 50% of India’s internet users will use digital payments by 2020 when the size of digital payments industry in India will be \$500 billion.¹¹

9. BCG, Self-Driving Vehicles, Robo-Taxis and the Urban Mobility Revolution, July 2016.

10. See “The Changing Connected Consumer in India,” BCG article, April 2015, and “The Rising Rural Connected Consumer in India,” BCG Focus, August 2016.

11. See Digital Payments 2020: The Making of a \$500 Billion Ecosystem in India, BCG report, July 2016. The November 2016 banknote demonetization will support/accelerate the trend.

... Or Win-Lose?

At a very basic level, the uneven distribution of access and use of digital technologies means that many people do not participate in the digital economy and do not benefit from improved access to information, health care, education, and numerous social and commercial services. It's also possible that in today's highly charged macro political and economic climate, the socio-economic ramifications from the rapid rise of new technologies could play out in different ways. Already the pace of technological change is creating lots of uncertainty: many consumers can't fully grasp the extent of the coming change and this leads to fear of the impact on their jobs and livelihoods.

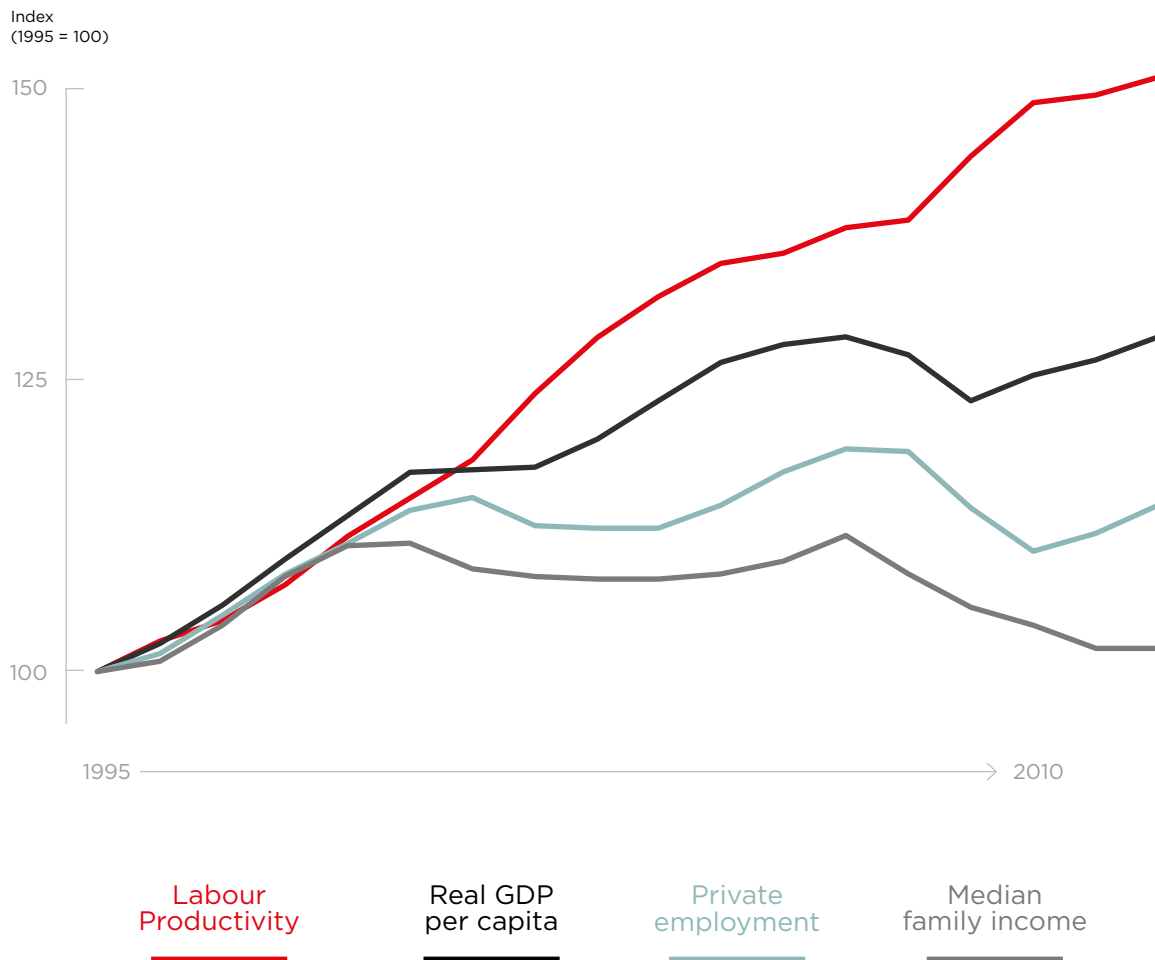
They have reason to be concerned. Under an adverse scenario, the benefits of technological advances accrue (or are seen to accrue) to a relatively few (rich nations, tech companies and highly educated and skilled workers) while the broad base of global society and traditional industry suffers most of the dislocation in terms of job loss and business disruption. There are few winners and many losers. In developed countries, the biggest winners include those companies that most aggressively pursue digital transformation, embracing the automated processes enabled by such technologies as AI and robotics, processes that replace jobs with machines. For example, a 2016 report by Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO),

details just how extensive the impact of such advancements as AI, cognitive computing, robotics and automation will be on the Australian job market. (See Tomorrow's Digitally Enabled Workforce, CSIRO report, January 2016.) The research projects almost three quarters of all jobs in Australia being affected over the next two decades and about one third of all current full-time equivalent work effort being automated. If we extrapolate this finding for the rest of the developed world, we are talking about hundreds of millions of automated jobs.

This is a fundamentally different and much more powerful force than the move of manufacturing jobs from developed countries to less expensive emerging markets over the last few decades. This time, a massive number of jobs will be replaced by technology and large segments of the workforce will not only find themselves out of work, they will have little prospect of finding new employment without, at minimum, expensive and time-consuming training in new skills. Employment will be disproportionately affected with jobs in fields such as sales, service and administration hit unequally hard. Moreover incomes in these sectors for those who keep their job are likely to fall given the imbalance in the labour market. The US has already started the "great decoupling" of productivity, growth, employment and income—with the possibility of more to come. (See Exhibit 10.)

Exhibit 10

US has experienced “the great decoupling” between median family income & GDP growth



Source: (US Data) Federal reserve bank of St. Louis; Erik Brynjolfsson and Andrew McAfee; From “The Great Decoupling, June 2015;

This is the challenge facing most governments. Their policies can further the digitalisation of their economies, with all of the benefits that this brings, or they can stand in the way. At the same time, governments should recognise the potential for adverse or uneven impacts of new technologies and take steps early to help navigate the inevitable

economic and social transitions. Fortunately, most governments are armed with the necessary tools. But since every country is different, their leaders need to determine how to proceed in ways that maximise the benefits of digital technologies for their economies and societies. The next chapter presents ways they can move forward.

Policies for Progress

To position their countries to achieve the benefits of new technologies while navigating economic transitions, governments should prioritise policymaking in several areas. These include infrastructure and investment, regulation, promoting their digital economies and demonstrating digital leadership. (See Exhibit 11.)

Exhibit 11

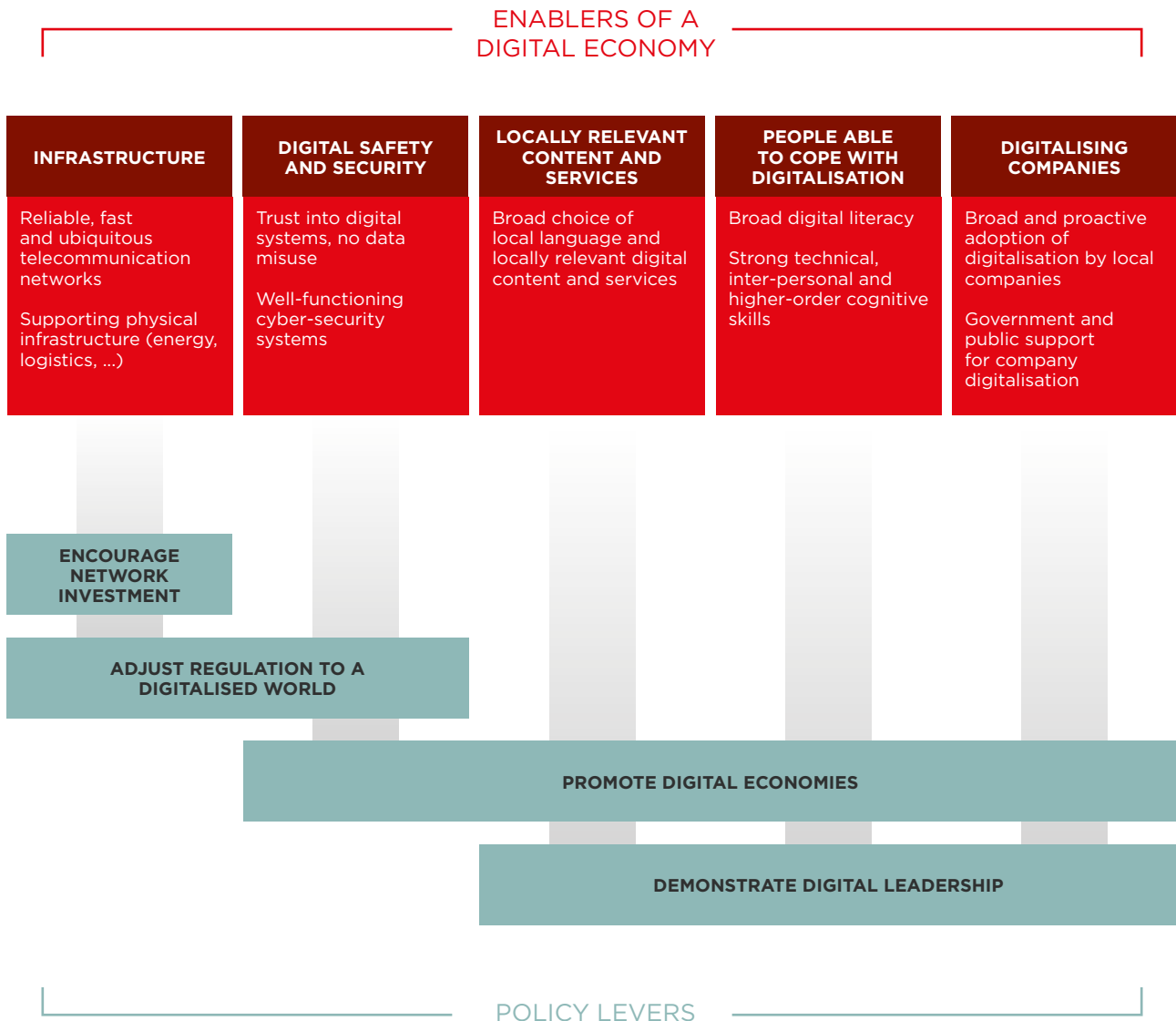
Key policy levers to promote widespread digital benefits and inclusion



Source: BCG analysis

Exhibit 12

These four policy levers will drive the five key enablers of a digital economy





Encouraging Network Investment to Improve Connectivity

Extending networks' reach, expanding their capacity and continuously upgrading their capabilities (in critical areas such as speed and latency, for example) all require continuing substantial investment. Government policy in multiple areas, including capital controls, spectrum allocation, foreign investment, taxation and infrastructure sharing can either encourage or impede investment by network operators and others. The same is true of regulatory philosophy and approach.

Take the example of the EU. Recognising that putting “the EU at the forefront of internet connectivity” requires enormous investment in boosting network capacity and speed, the European Commission has proposed a European Electronic Communications Code (EECC) that aims to modernise regulation of the sector and create an environment conducive to investment in and development of, next-generation digital networks and services, while ensuring European citizens benefit from consistent protection for digital services. It sets common EU broadband targets for 2025, including download/upload speeds of 1 Gigabit of data per second for all “schools, transport hubs and main providers of public services as well as digitally intensive enterprises”; download speeds of at least 100 Mbps (which can be upgraded to 1 Gigabit) for all European households; and uninterrupted 5G wireless broadband coverage for all major roads and railways.¹²

Policy with respect to spectrum allocation and use is one of the most powerful levers governments can pull to further connectivity. But many governments regard spectrum as an asset whose financial value to the state should be maximised rather than as a potent means of expanding coverage and use. High auction prices can also limit successful bidders' ability to make the capital investments that are necessary to put their newly acquired purchases to use, turning a scarce resource into a wasted one.

The primary goal for policymakers and regulators should be to maximise the use—rather than the revenue to the state from spectrum. This can be best achieved by making sufficient spectrum available for mobile networks. The 2015 auction by Germany's Bundesnetzagentur (which awarded spectrum in the 700 MHz, 900 MHz and 1800 MHz bands) is an example of a process that resulted in sufficient spectrum availability for all players and prices that allowed for infrastructure build-out after the auction, due to an open and transparent system, early consultation with the critical participants and consideration of local market dynamics.

Some governments are also addressing spectrum shortages by permitting spectrum sharing under certain circumstances. India, for example, allows spectrum sharing in situations where both the licensees own rights to spectrum in the same band. Regulations that encourage sharing of passive infrastructure, such as cell towers, are another way that governments can further network investment.

12. European Commission, press release and fact sheet, September 14, 2016.



Adjusting Regulation to a Digitalised World

The GSMA has argued consistently that regulatory regimes need to be rethought for the digital and mobile age. (See *A New Regulatory Framework for the Digital Ecosystem*, GSMA report, February 2016.) Current regulatory systems in many countries were developed for outdated technologies and markets; they are not only obsolete, they can also actually do harm by slowing innovation and technological and market advances. Prescriptive, ex ante regulatory regimes—like those traditionally governing communications markets—are no longer effective in the face of rapid innovation and technology convergence. In many cases, as competition increases, the need for such regulation has disappeared altogether. In addition, legacy regulation is discriminatory, particularly the legacy regulation of communications services and service providers, which is far more intrusive and prescriptive than regulation of other elements of the digital ecosystem. Regulatory discrimination can harm competition and reduce consumer welfare.

The good news is that policymakers recognise the need to change. In many jurisdictions, they are working on reforms that will protect competition and consumers without impeding social and economic progress. The EU's EECC initiative, discussed in the preceding section, is one example.

As they move forward, we believe policymakers should stay focused on three priorities:

- Regulatory objectives can best be met by focusing on the services delivered to consumers, not the type of company or technology that delivers them. Regulation should be designed to achieve its objective in the most efficient way, without regard to technologies, industry structures, or legacy regulatory regimes.
- Measurable, performance-based approaches should be favoured over prescriptive regulations, promoting market dynamism and driving consumer welfare. Regulatory systems need to accommodate rapidly changing markets and technologies and create enough regulatory confidence for companies to take risks. Static regulation needs to be replaced by dynamic regulation.
- Policymakers should take a fresh look at legacy rules and discard those that are no longer relevant, applying a consistent set of criteria throughout the digital ecosystem. In many cases, intense competition in the ecosystem means that regulation is no longer needed, or can be significantly scaled back.

Regulation in many traditional sectors, from insurance to automotive, is not up to dealing with the advent of digital technologies. Here a similar structural reform is required as in the telecommunications sector. How, for example, should regulators account for accident liability with respect to autonomous vehicles or new

financial models such as bitcoin? Regulatory reform discussions should follow a bottom-up approach that takes entirely new approaches into consideration—and is willing, where appropriate, to jettison old ones. (See the sidebar, “Europe’s General Data Protection Regulation”)

EUROPE’S GENERAL DATA PROTECTION REGULATION

The EU’s General Data Protection Regulation (GDPR) reform is a good example of policy direction leading to modernising regulation.

The EU Data Protection Directive of 1995 and the OECD privacy guidelines, from which it drew inspiration, both incorporated the idea of “privacy principles” that would apply to any processing of personal data. Since 1995, these general data privacy rules in the EU have, therefore, been sector- and technology- agnostic.

Enacted in May 2016, the GDPR set out to improve the regulatory landscape for data-driven innovation by maintaining the principles-based approach of the previous decade while introducing a more dynamic, ex post framework. It abolished the system of detailed national registrations and prior approvals in favour of placing the responsibility on organisations not only to comply with the rules but to implement comprehensive policies and safeguards and to be able to demonstrate compliance. Organisations that hold themselves accountable in this way benefit not only in relation to registrations, but also when it comes to formalities required for cross-border transfers and the imposition of sanctions.

The GDPR also introduced stronger rights for individuals and a risk-based approach in several areas, for example, requiring organisations to identify and mitigate risk throughout the entire lifecycle of a project, product or service or when deciding when to report a data breach.

Cumulatively, these changes incentivise organisations to focus on genuine and effective safeguards to protect individuals rather than wasting energy on unnecessary administrative formalities. This in turn gives them the freedom to operate and to innovate by applying the principles dynamically to new technology and business models as they arise.



Pursuing Policies that Promote Digital Economies

As technologies advance, governments should consider how policy can be used to achieve economic goals, such as speeding growth and increasing employment, and mitigating adverse impacts, such as job loss through rising automation. Smart government policymaking can have widespread benefits with respect to consumer usage, business adoption and labour market adaptation.

Data Security. Data security and privacy are fundamental to building consumer trust in digital services. The necessary safeguards should be derived from a combination of internationally agreed approaches, national legislation and industry action. Governments should ensure legislation is service- and technology-neutral, so that rules are applied consistently to all entities that collect, store and process data.

Digital literacy and lifelong learning. Countries cannot build vibrant digital economies and societies without an educated and digitally literate user base. The challenge is especially big for many developing countries that suffer from high rates of basic illiteracy. Digital and mobile technologies can help address this fundamental problem as countries as diverse as China, India, Colombia and Uruguay have demonstrated with innovative programs to get ICT tools into the hands of students (and adults).

Even in developed markets, education is an issue. Many countries do not stress the acquisition of digital skills in schools or afterward. This is a critical failing because many are not equipped to deal with the risks that come with technological advances, such as privacy concerns, security, fraud and, most recently, “fake news.” Moreover, as digital technologies become a bigger part of most economies, workers of all kinds will increasingly need ICT skills. There is an urgent imperative to both embed ICT training in national curricula and develop programmes (in concert with the private sector) for lifelong training in technical skills.

Policymakers should ask themselves several questions, among them:

- What current initiatives in the educational system promote and facilitate acquisition of ICT skills and encourage Internet use?
- Does the educational system offer formal training in ICT skills?
- Is there readily accessible opportunity for ICT training as workers mature?
- What is the extent of usage of ICT tools in teaching other subjects, such as languages, math and sciences?

There is no question that new technologies will automate and otherwise obviate existing positions across all sectors. Countries that want to enhance their own skills and competitiveness and prevent a win-lose divide from opening up in their labour markets, must move quickly on several fronts while keeping a few key principles squarely in sight. Companies need flexibility to access the labour market and seek the skills required to build digital economies. Workers need the prospect of employment and ways of keeping their skills relevant and up to date. The most effective solutions will likely involve multiple parties (in addition to the individual worker)—one that provides the education or training, for example, and another that provides the funding. Companies, governments, labour unions and educational institutions, among others, all have a role to play.

Successful programmes will also be suited to national circumstances. Different countries are already applying different approaches. Denmark has a “flexicurity” policy that aims to “promote employment security over job security.” The idea of a “basic income” has been floated in a number of countries. Singapore has implemented a national educational voucher system, which the government funds.

New players are entering the game, many from the tech industry, where the need for up-to-date skills is especially strong. Digital technologies themselves may provide part of the solution with Internet-based education and training programmes based

on the MOOC, or massive open online courses, model. The Economist reported in January 2017 that at last two MOOC providers have retooled their offerings to include technical skills upgrading.¹³ Such programmes could enable governments and industry to provide workers access to continuing training and education at relatively low expense and for workers to acquire new skills without having to travel far from home.

Encouraging the Digitalisation of Companies.

Governments can encourage adoption and use of new technologies by businesses of all kinds, not just tech companies. Tax policy (tax credits for digital investments, for example) is one tool. Denmark’s government requires that all communications with companies (as well as citizens) use digital channels. A number of governments actively seek to attract, or kick-start, digital entrepreneurship. The South Korean government, for example, is attempting to foster new high-growth businesses and accelerated growth of entrepreneurship with a \$4 billion initiative from the newly created Ministry of Science, ICT and Future Planning. The US government is spurring entrepreneurship with its Startup America initiative that provides access to capital and removes barriers for businesses. It encourages small businesses to conduct research and development in response to specific US government needs through the Small Business Innovation Research initiative, which has an annual budget of \$3.5 billion. The UK government has released a range of policies and initiatives aimed at attracting entrepreneurs from overseas, stimulating domestic entrepreneurship (through teaching of entrepreneurship skills in universities, for example) and equipping the workforce with critical future skills (by providing companies with funding for training).

At a local level, cities as far flung as Berlin, Tel Aviv, New York, Nairobi and Stockholm have shown success by investing in establishing themselves as technology and innovation hubs through policies that attract tech businesses and workers.

13. “The Return of the MOOC, The Economist, January 14, 2017.



Demonstrating Digital Leadership

Leading digital economies have leading digital governments. These countries are creating digital citizens and providing government-issued digital IDs that enable people to do more online and coordinate a wide range of activities. They are also supporting the adoption of digital financial infrastructures and are putting their services online, which both facilitates access and use and promotes digital engagement in their populations.

In the area of digital identity, Estonia has gone further than most, but other governments also offer their own form of e-IDs. French users can access some 30 government services with a single user name and password. The Australian government offers federated authentication processes with one user name and password that links existing accounts and connections to new services. Some 9 million Australians now have a myGov account. Singapore's SingPass programme provides a single online authentication system through which users can access 270 different services from 58 government agencies using one identifier and password, starting from a single online portal. SingPass has a more than 90% utilisation rate, with better than 80% satisfaction among users. The government of India has issued more than 1 billion 12-digit "Aadhaar" identity numbers to the country's residents.

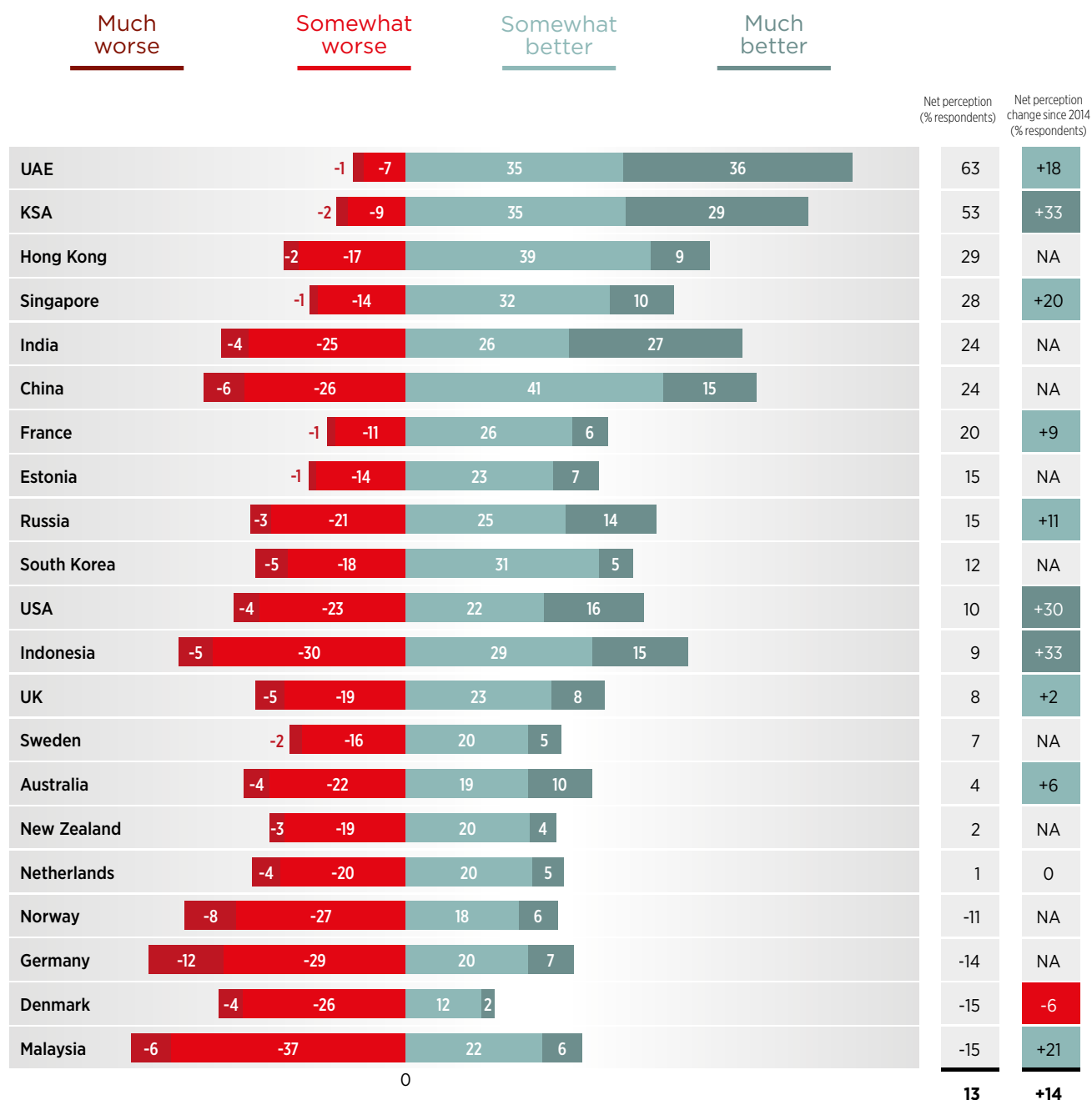
BCG research into digital government services has shown that governments have continued to lift their game in recent years, with plenty picking up the pace of improvement. In countries around the world, citizen satisfaction with public sector digital performance is catching up with—or sometimes even surpassing—the private sector. (See Exhibit 13.) Users have responded enthusiastically. There is, however, still considerable room for improvement. In most countries, most of the services offered and accessed online are relatively simple interactions—registering or searching for information, filing an application, or paying a fee, for example. More complex social services, such as those related to health care, education and social welfare, still require substantial offline engagement.

As technologies advance, user expectations rise and new applications and models keep coming to market, governments can't rest on their success. They need to continue to push more services online and enable more complex and intensive online interactions. A growing number of governments, for example New Zealand, the United Arab Emirates, Finland and Singapore, are establishing centralised digital service or digital transformation offices to lead the effort.

Exhibit 13

Public sector services are improving relative to the private sector

**“Compared to the private sector,
Government online services are generally...”**



Survey question: Thinking about how government online services compare to private sector online services from banks, telecoms, insurance, retail, hotels and airlines, which of the following statements most reflects your view? Compared to the private sector, Government online services are generally...
Response options range from 1-5, where 1 = Much better, and 5 = Much worse. Perception change from previous survey, "na" when a country was not included in previous survey

Source: BCG 2016 Digital Government Satisfaction Survey, 2014 Digital Government Survey



Moving Forward

In addition to relentless advancement and impartial impact, there is a third truth about technology, or at least digital technologies—they can be a powerful equaliser. All of the capabilities of the internet are available to anyone with a smartphone and the ability to use it.

Winning and losing in the digital economy is therefore neither predestined nor mutually exclusive. Countries, societies and companies can all take the steps necessary to win and if one country or company wins, another doesn't necessarily lose. But digital process does require forethought,

strategy, investment and action. Leading governments will make this an organising principle for their policies and their programmes. Full promotion and use of the digital technologies available now and those coming in the near future should be a priority on a par with economic growth and global competitiveness, as the former is increasingly the biggest single enabler of the latter.

Forward-looking policymakers will be those who seize the reins digital technologies hold out and use them to drive their countries, societies and economies ahead.



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