B2O

ARGENTINA 2018
BUSINESS 20

DIGITAL ECONOMY & INDUSTRY 4.0

POLICY PAPER 2018

TABLE OF CONTENTS

FOREWORD BY THE TASK FORCE CHAIR MARCOS GALPERIN

For the first time in the history of humankind, we are at a moment when everyone in the planet can be connected to every other person, instantaneously and at an almost zero marginal cost. The power that this global, immediate, interconnected web has, is endless, like our universe, and equally hard for our brain to comprehend.

We have built our societies, our institutions and our economies in a world where this global network did not exist, and people therefore needed intermediaries and representatives to access goods, services, make decisions, or just live in society. In the next decades, as the benefits of these global interconnections continue to materialize, institutions that were once deemed relevant will become less so, and the same thing will happen to entire sectors of the economy.

We are convinced of the transformational power of technology and people working together to complement and enhance each other. We are now in a much better position to integrate billions of people to the expanding middle class, helping MSMEs to produce more, expand their boundaries, innovate, generate employment, and enhance their productivity.

However, all processes of change, create winners and losers and therefore resistance and conflict. But the overall outcome will be greatly positive for our societies. It is therefore paramount that governments continue to encourage the digitalization of our economies and processes while ensuring that the benefits of these changes, are fairly distributed within our societies.

Our task force focused on the importance of developing the necessary Digital Skills that people will need in order to better address the upcoming demands from companies in this new era.

The relevance of governments developing policies and investments in human capital and education to prepare the workforce for the future of work is essential. By 2020, 30 percent of tech jobs will be unfilled owing to digital talent shortfalls[1].

We address the importance of fostering the development and adoption of Industry 4.0 technologies as well as Digitalization of Micro Small and Medium Companies (MSMEs).

Thanks to technology, hundreds of millions of people will be able to join the expanding middle class and Micro Small and Medium Companies (MSMEs) -which today generate 70 percent of jobs in the Organization for Economic Cooperation and Development (OECD) countries- will be able to innovate, generate employment and improve their productivity.

Also, acknowledged the importance of Promoting Global Connectivity, connecting

---

[1] The Boston Consulting Group (BCG), *BCG Perspectives: How to gain and Develop Digital Talent and Skills* (2017), accessed February 26, 2018, 3, https://www.bcg.com/publications/2017/people-organization-technology-how-gain-develop-digital-talent-skills.aspx

the unconnected and driving the necessary investments in infrastructure development.

Digital trade is another aspect to consider as an engine of economic growth around the world, enabling new business models and helping local companies to reach international value chains. In the same line, supporting Fintech innovation is the way to achieve financial inclusion, which today leaves out 31 percent of the world's population[2] (in Latin America this figure reaches 50%[3]). Given the positive effect that financial inclusion has on the global economy, digitalization of finance could boost emerging countries' economies by 6 percent[4].

As digitalization continues it is essential to focus on improving cybersecurity to keep a safe ecosystem of information among users, devices and machines. Change is never easy, it is always feared because it brings many unknowns and humans love stability. But to reap the benefits of global, peer to peer interconnection, we will have to continue down this path of transformation that is already underway.

In order to facilitate this transformation, we encourage G20 governments to engage with the private sector, the NGO community, and other stakeholders to discuss how to establish ecosystems that promote innovation, entrepreneurship and economic growth, guarantee availability of key resources and digital inclusion, foster the development of digital enablers and ensure a sustainable and equal digital growth.

Sincerely,

Marcos Galperin
Chair of the B20-Taskforce on Digital Economy & Industry 4.0
CEO and Founder of MercadoLibre

---

[2] World Bank (WB), *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution around the World* (2018), accessed May 1, 2018, https://globalfindex.worldbank.org/
[3] Inter-American Development Bank, *Inclusión Financiera en América Latina y el Caribe* (2015), accessed July 2, 2018, https://publications.iadb.org/bitstream/handle/11319/6990/CMF_DP_Inclusion_financiera_en_ALC.pdf
[4] McKinsey & Company, *Digital finance for all: Powering inclusive growth in emerging economies* (2016), accessed July 4, 2018, https://www.mckinsey.com/~/media/McKinsey/Featured%20Insights/Employ-ment%20and%20Growth/How%20digital%20finance%20could%20boost%20growth%20in%20emerg-ing%20economies/MGI-Digital-Finance-For-All-Executive-summary-September-2016.ashx

EXECUTIVE SUMMARY

Digital economy and Industry 4.0 permeate all aspects of society, including the way companies and governments work but also how people communicate and live their lives. The emerging digital economy has the potential to create economic growth and improve social welfare. Therefore, it is critical that policy makers create an environment for digitalization to flourish. B20 calls on governments to seize to the opportunity of digital transformation and Industry 4.0 with holistic enabling policy and regulatory frameworks based on 7 key pillars (digital skills, Industry 4.0, global connectivity, MSMEs, digital trade and data flows, financial technology and cybersecurity).

1. Digital Skills. Digitalization, automation and other technologies are fundamentally changing the nature of work. It is essential that governments focus on policies and investment in human capital and education to prepare the workforce for the future of work. In order to achieve a digitalized world, digital literacy and technical digital skills need to be fostered, no matter what job, what position or what industry today's children will be working on, they will require a certain level of digital skills. Governments, first of all, need to work together with businesses to assess the current and future digital skills gap and minimize that gap by investing in education programs, ensuring digital skills are an integral part to the curriculum, and also by helping to reskill and upskill the existing workforce. It is essential that education programs be accessible to both genders and address the digital skills gender gap.

2. Industry 4.0. Manufacturing practices are beginning to be transformed by the use of digital technologies. This fourth industrial revolution will make it possible to gather and analyze data across multiple devices, enabling faster, more flexible, and more efficient processes to produce higher-quality goods at reduced costs, leveraging technologies such as autonomous robots, big data and analytics, additive manufacturing and the cloud. Governments should support the creation of an Industry 4.0 ecosystem to foster best practices and use cases sharing, enable collaboration between public and private institutions and encourage innovation. Role of the Government will be bringing together and creating alignment between all key stakeholders, matching new technology users and suppliers, equipping initiatives with greater public weight and supporting them financially. These developments will need an unprecedented degree of integration among systems and across borders, creating the need for developing international standards that allow an international coordination and cooperation.

3. Global Connectivity. Connectivity is a prerequisite for digitalization and while the number of people "online" has improved during the last decade, there is still 50 percent of the global population "offline".[5] Given the enormous impact that connectivity has on a nation's GDP and welfare, it represents a relevant topic in every policy-maker's agenda. It is key then that governments encourage and facilitate private investment in infrastructure. The needed investments, focused on unserved areas, will allow consumers to have affordable connectivity while extending its coverage. To expand broadband connectivity, countries will also need to maximize spectrum availability ensuring an adequate mix of protected licensed, shared and

---

[5] ITU, *UN Broadband Commission sets global broadband targets to bring online the world's 3.8 billion not connected to the Internet*, accessed February 25, 2018, https://www.itu.int/en/mediacentre/Pages/2018-PR01.aspx

unlicensed spectrum. Demand side has to be enhanced as well, promoting the creation of content and online services that foster a higher adoption.

4. MSMEs. MSMEs are the predominant form of enterprise across the world. In surveyed countries across the world, they account for approximately two thirds of existing jobs.[6] With such an important share of the economy, their digitalization should be of prior importance to governments. Frequently the reason for MSMEs not adopting innovative technologies are: either being unaware of the existence of such technologies, missing implementation know-how or absence of awareness of the economic fundamentals that justify implementation. Governments must create awareness on cutting-edge technologies and best practices while improving support for regulatory compliance if MSMEs are involved in Global Value Chains. They should also foster discussion forums between larger and smaller companies to improve collaboration and even create commercial opportunities.

5. Digital trade and data flows. Digital trade has become an engine of economic growth for large and small businesses around the world. Already today, approximately 50 percent of all traded services are enabled by information and communication technologies.[7] Governments need to address e-commerce policies across borders that do not hinder international e-commerce growth, and coordinate cross-border payment systems, data security, consumer protection and authentication, among others. It is essential to encourage negotiations with international trade organizations to align on such cross-border policies. As governments seek to address the challenges to tax systems raised by the digitalization of the economy, they should pursue a multilateral, consistent approach and avoid unilateral measures targeting a single sector or group of companies. Moreover, to foster digital trade and international business operations it is important for countries to avoid data localization requirements and promote efficient data transfer mechanisms.

6. Fintech. More than 30 percent of the population across the world does not have a bank account; a gap that is unevenly distributed among developed and developing countries.[8] Supporting Fintech innovation is one of the potential solutions to close this financial gap, which is key given the positive effect that financial inclusion has on people's welfare and GDP. G20 members should adopt policy frameworks that enable financial technology services by players from different sectors, promoting competition within all levels of the financial service value chain, fostering innovation. Moreover, governments should encourage companies to provide environments for cooperation which allow the Fintech ecosystem to facilitate testing and connectivity to current systems (e.g., APIs, Sandboxes).

7. Cybersecurity. In this era of digitalization where an increasing amount of information is shared among users, devices and machines, cybersecurity becomes a key issue. Cyber-crime has had an impact of as much as us$600 billion in 2017, and governments have a key role to play to stop cyber-threats.[9] In order to improve cybersecurity across countries, governments should partner with industry to adopt

---

[6] World Trade Organization (WTO), *World Trade Report (2016): Levelling the trading field for SMEs*, accessed June 19, 2018, https://www.wto.org/english/res_e/booksp_e/world_trade_report16_e.pdf

[7] UNCTAD, *Information Economy Report* (2017), 30, accessed February 28, 2017,http://unctad.org/en/PublicationsLibrary/ier2017_en.pdf

[8] World Bank (2018), op. cit.

[9] McAfee, *Economic Impact of Cybercrime Report* (2017), accessed May 2, 2018, https://www.mcafee.com/us/solutions/lp/economics-cybercrime.html

a holistic cybersecurity risk management approach. Both have a joint responsibility to protect and empower people globally, to partner with others and increase the security of our technology to assure cybersecurity and to combat offensive cyber capabilities of criminals, terrorists, and other threats, avoiding damaging trust in the online environment. G20 members should agree on starting baselines to adopt increasingly ambitious goals regarding cybersecurity frameworks. A collaborative environment, cross-sector and cross-border, is needed and should be achieved through information sharing efforts. This will allow countries to protect valuable data from malicious actors.

KEY POLICY RECOMMENDATIONS AND ACTION PLAN

TOPIC 1: HELP WORKFORCE DEVELOP THE NECESSARY DIGITAL SKILLS

Recommendation 1: Understand the current and future digital skills gap with reliable, substantiated and regularly updated forecasts on demands of jobs and competencies

Main policy actions: Organize skills councils, inter-ministerial working groups and industry-specific strategic foresight groups to evaluate present and future skills demand, fostering the development and use of standardized skills taxonomies and coordinate multi-sector efforts to agree on a future skills forecast.

Recommendation 2: Minimize the skills gap in the future by investing in digital education programs today

Main policy actions: Increase access to and popularity of STEM and computer sciences throughout the educational system, teach programming and coding to children and young people and foster "soft" and "complementary" skills that are uniquely human (e.g., critical thinking). Build on cybersecurity awareness.

Recommendation 3: Bridge the digital skills gap by re- and upskilling the existing workforce

Main policy actions: Define digital core competencies and create a common taxonomy of digital skills. Co-fund adult digital learning opportunities. Encourage companies to provide a minimum amount of training. Redesign education courses to make them more specific and support the provision of online learning platforms. Encourage companies to rethink how they assess qualifications and credentials.

Recommendation 4: Facilitate job transition by addressing the lack of flexibility

Main policy actions: Support workers who have been affected by changing skills needs and make proven job search technologies available within government employment programs. Equalize rights and benefits for employees and self-employed and attach rights, benefits and obligations to a person, rather than to the employer.

Recommendation 5: Ensure access of women and girls to digital education

Main policy actions: Create educational opportunities in digital literacy and skills targeting women and girls, both in and outside the formal education system, include STEM training in the first years of primary education, develop scholarship programs for STEM courses aimed at women and launch public awareness campaigns.

TOPIC 2: FOSTER THE DEVELOPMENT AND UPTAKE OF INDUSTRY 4.0 TECHNOLOGIES

Recommendation 6: Support the creation of an ecosystem fostering the development and implementation of Industry 4.0 technologies

Main policy actions: Establish and run an online platform for all stakeholders to become involved; initiate, fund and support research and company-led projects, test-beds and competence centers for the piloting of production systems; create and fund dedicated centers of excellence or research projects driving innovation and adoption of new manufacturing technologies; foster the participation of MSMEs in the adoption of Industry 4.0technologies.

Recommendation 7: Encourage the development of international standards and definitions for Industry 4.0 technologies

Main policy actions: encourage the relevant stakeholders to work together to develop relevant and appropriate definitions and globally interoperable standards. Foster the use of such standards by supporting industry-led multi-stakeholder cooperation and market driven standardization initiatives.

Recommendation 8: Encourage development & roll-out of Industry 4.0 technologies

Main policy actions: foresee policy approaches focused on motivating sustainable private financing of Industry 4.0 initiatives and set clear priorities on what aspects of Industry 4.0 should be supported. Engage MSMEs in Industry 4.0 initiatives and generate forums and spaces where interactions between large companies and MSMEs may lead to commercial links.

TOPIC 3: PROMOTE GLOBAL CONNECTIVITY & INFRASTRUCTURE DEVELOPMENT

Recommendation 9: Encourage and facilitate private investments in infrastructure to expand coverage, even in less profitable areas

Main policy actions: assess availability, quality and cost of infrastructure to create the appropriate policies. Commit to comprehensive digital agendas and broadband plans. Create a policy environment that is simple and transparent to enable industry players, support them to avoid administrative barriers and ease public rights of way.

Recommendation 10: Promote affordability by facilitating access to devices and connectivity, especially in developing countries

Main policy actions: avoid imposing restriction for device manufacturers to enter the market, consider the negative effects of taxes and foster availability of as many connectivity choices as possible, considering deployment in public spaces.

Recommendation 11: Promote broad spectrum usage

Main policy actions: leverage and utilize as much spectrum as possible to enable Internet access through a "balanced spectrum policy" and encourage a variety of technologies to build and deploy networks. Provide incentives for spectrum investment by adopting a market-based spectrum pricing and designing a coherent and consistent tax system.

Recommendation 12: Promote the creation of content and services that foster demand

Main policy actions: encourage third parties to develop new and innovative Internet services, while avoiding unnecessary regulation of Internet content, services and applications. To enhance demand, governments should also incentivize digital interactions with citizens leading by example.

TOPIC 4: FOSTER DIGITALIZATION OF MSMES

Recommendation 13: Create awareness and share information on cutting-edge technologies and best practices

Main policy actions: spread success stories in which the adoption of cutting-edge technologies had a positive impact. To accomplish this, governments need to foster discussion forums / platforms between smaller and larger companies while setting the right incentive scheme for big corporations to share their knowledge.

Recommendation 14: Foster interactions with governments services through digital channels

Main policy actions: increase the digital services offered to MSMEs and enable a wider access by encouraging them to interact mainly on digital channels.

Recommendation 15: Improve support for regulatory compliance for MSMEs participating in GVCs

Main policy actions: provide advice and support on international, commercial partner's regulation compliance for MSMEs including companies from all sectors and activities.

TOPIC 5: ENABLE DIGITAL TRADE AND INTERNATIONAL DATA FLOWS

Recommendation 16: Implement robust, future-proof, common, inter-operable and nondiscriminatory e-commerce policies across borders

Main policy actions: coordinate cross-border aspects of Internet taxation, payment systems, data security and consumer protection, foster interoperable and technologically neutral approaches to authentication, establish dialogues on e-commerce related policies among G20 and non-G20 countries and ensure they are aligned with existing international standards and guidelines.

Recommendation 17: Encourage negotiations on digital trade within the WTO and other trade organizations

Main policy actions: encourage a dialogue aiming at continuous negotiations on digital trade with the WTO and other trade organizations.

Recommendation 18: Work towards consistent tax rules

Main policy actions: do not rush to enact new measures until the effects of implementation of BEPS process are fully realized. Refrain from unilateral actions or interim measures that could lead to double taxation, create significant uncertainty and negatively impact investment, innovation and growth. Continue to work together through the Inclusive Framework at the OECD to develop consistent and sustainable

tax rules that do not discriminate against any industry or specific group of companies.

Recommendation 19: Foster interoperable data protection and privacy protection standards

Main policy actions: develop frameworks for privacy and data protection using as a reference the Privacy Guidelines provided by the OECD and seek to establish cross-border data transfer mechanisms wherever possible. Foster portability of data.

Recommendation 20: Avoid data localization requirements, promote efficient data transfer mechanisms and reduce barriers on digital trade

Main policy actions: keep requirements to store data within a particular jurisdiction or locate computing facilities locally to a minimum and promote efficient transfer mechanisms of all forms of data across borders. Favour a level playing field among sectors and consider IP protection and enforcement and appropriate limitations of liability for intermediaries as important elements of a balanced policy framework. Remove unnecessary barriers to cross-border law enforcement requests.

TOPIC 6: SUPPORT INNOVATION IN FINANCIAL TECHNOLOGY

Recommendation 21: Adopt flexible policy frameworks that enable financial technology services by players from different sectors

Main policy actions: promote competition within all levels of the financial services value chain and update regulation in order to best meet innovation, while weighing heavily financial inclusion when designing the tiered approach to KYC.

Recommendation 22: Help individuals create a valid digital identity

Main policy actions: promote public-private sector collaboration to create a valid and interoperable digital identity while educating consumers to appropriately manage their digital footprint.

Recommendation 23: Foster the development of enabling architecture and common standards

Main policy actions: promote regulation that does not imply the usage of a specific technology or solution while encouraging companies to provide environments for cooperation (e.g., APIs). In addition to this, encourage regulatory tools such as sandboxes that foster innovation and collaboration.

TOPIC 7: IMPROVE CYBERSECURITY

Recommendation 24: Partner with industry to promote holistic cybersecurity and cyber-risk management and align on cybersecurity and cyber-risk frameworks

Main policy actions: Hedge the impact of cyber-crime and create a common basis of trust across globalized markets with all stakeholders to work together, taking

responsibility at the highest levels and deepening common understanding of cybersecurity requirements.

Recommendation 25: Work towards a platform to share information on cybersecurity globally and across sectors

Main policy actions: encourage research, data and intelligence sharing among stakeholders from the private and public sectors by providing adequate exchange platforms. To further enhance information sharing, work with industry to identify changes in regulations or policies that would encourage companies to more freely share information on cyber incidents.

Recommendation 26: Commit to promoting responsible nation state behavior in cyberspace

Main policy actions: promote a reinvigorated international dialogue on the ways to promote responsible state behavior online, in a multi-stakeholder way. Leverage previous agreements on norms providing a roadmap for future discussions.

Recommendation 27: Agree on a minimum set of principles to reduce cyber-risk and protect citizen information

Main policy actions: promote coordination between the private and public sector since it will benefit both consumers, companies and regulators. Additionally, seek to engage in more ambitious cybersecurity policies and support the private sector in complying with them.

INTRODUCTION

The digital economy and Industry 4.0 permeate all aspects of society, including the way people interact, the economic landscape, the skills needed to secure employment, and political decision-making. Rapid technological innovation is an enabler of millions of businesses in every sector to reach more clients and consumers, hire more people, manage their operations more efficiently, and reach new markets abroad. The emerging digital economy has the potential to generate new scientific research and breakthroughs, fueling job opportunities, economic growth, and improving how people live their lives and interact with each other.

All this creates new jobs and opportunities but it can also bring challenges: when it is not broadly shared, people feel left behind, especially at a time when jobs are changing. Technology also plays a key part in answering these challenges by helping people and businesses to access opportunities. Cybersecurity is another key aspect to enable a sustainable digitalization process as it will increase trust in businesses and consumers during their digital journeys. The way government and business leaders respond to these challenges will shape the way the global economy works for everyone.

To facilitate this transformation, G20 governments should consult with the private sector, the NGO community, and other stakeholders to establish ecosystems that promote innovation, entrepreneurship and economic growth. Governments should establish collaboration with businesses, and other relevant stakeholders to shape and realize the potential of the digital transformation. This will translate into a holistic policy framework -- focused on investment, supporting open competitive markets, innovation and creativity, and inclusive participation -- which is essential to maximize the opportunities while mitigating potential risks.

In order to guarantee availability of key resources and digital inclusion, to foster the development of digital enablers and to ensure a sustainable and equal digital growth, there are multiple topics that governments should consider including digital Skills, Industry 4.0, global connectivity, digitalization of MSMEs, digital trade, Fintech and cybersecurity. In this paper, the B20 - representing the global business community - present their common understanding and view on how these selected key topics can be addressed by the G20 leaders, advancing the global digital economy for the benefit of all.

BASELINE RECOMMENDATION

In order to approach the mentioned challenges, businesses call on governments to develop holistic, enabling policy frameworks that address the issues as one. These frameworks need to be consistent across sectors and policies, integrated across government and across society and aimed at achieving sustained investment, inclusive economic growth, and societal well-being. To fulfill these objectives, they need to consider:

- The interdependence of economic, socio-cultural, technological, and governance factors.
- The needs of the different stakeholder communities (business, technical, civil society, and governments).
- Grounding the analysis and policy recommendations in evidence.
- Ensuring an integrated focus on enabling sustained investment.

TOPIC 1: HELP WORKFORCE DEVELOP THE NECESSARY DIGITAL SKILLS

Digital skills refer to the ability to access, manage, understand, integrate, communicate, evaluate and create relevant information safely and appropriately through digital devices and networked technologies for participation in economic, social and civic life.[10, 11] Along with basic digital skills, we also address on these sections the technical digital skills (i.e., those deeper, more specific skills needed to make the digital economy thrive). This includes competencies that are referred to as computer, ICT, information, and media literacy. It also includes knowledge of hardware and software (including data management), communication and collaboration, digital content creation (including programming / coding), data analysis, digital safety and cybersecurity, critical thinking and career-related competencies.

Digitalization, automation and other technologies are fundamentally changing the nature of work and the nature of jobs. Ever-increasing computing power, big data, the penetration of the Internet, artificial intelligence (AI), robotics, the Internet-of-Things (IoT) and online applications are among developments that are radically changing the skills required for the jobs of the future and how, where and by whom they will be done. Some tasks will become redundant, whereas others will continually emerge and new skills and adaptability will be required. For example, AI is predicted to create 2.3 million jobs in 2020.[12] The overall effect of automation can be disruptive: on average, across 32 OECD countries, 14 percent of jobs are highly automatable (with a probability of being automated of more than 70%).[13] Already, many aspects of routine jobs can be automated irrespective of the skill level.[14] At the same time, emerging and new jobs will involve new tasks and require new skills. By 2020, 30 percent of tech jobs will be unfilled owing to digital talent shortfalls.[15]

A comprehensive framework measuring digital skills on an international level is needed to align perspectives on what abilities need to be measured at a country level, to set clear expectations on what skills need to be taught in educational institutions and to help the labor market define priorities on what competencies are most relevant. Many stakeholders, including the UNESCO[16], call on the G20 for the development of such a framework, consisting of:

- Adoption of a standardized, multi-dimensional definition of digital literacy.
- Production of a multi-dimensional Digital Literacy Index.
- Alignment on a data collection strategy informed by a representative sampling.[17]

[10] UNESCO, *A Global Framework to Measure Digital Literacy* (2018), accessed April 12, 2018, http://uis.unesco.org/en/blog/global-framework-measure-digital-literacy

[11] Similar definitions can be found on OECD, *Working Party on Measurement and Analysis of the Digital Economy* (2015), accessed May 21, 2018, http://www.oecd.org/officialdocuments/publicdisplaydocu-mentpdf/?cote=DSTI/ICCP/IIS(2015)10/FINAL

[12] Gardner, *Predicts 2018: AI and the Future of Work* (2018), accessed February 26, 2018, https://www.gart-ner.com/doc/3833572/predicts--ai-future-work

[13] OECD, *Automation, Skill Use and Training* (2018), accessed March 10, 2018, https://www.oecd-ilibrary.org/fr/em-ployment/automation-skills-use-and-training_2e2f4eea-en

[14] OECD, *Skills Outlook 2013: First Results from the Survey of Adult Skills*, accessed February 26, 2018, http://www.oecd-ilibrary.org/education/oecd-skills-outlook-2013_9789264204256-en

[15] The Boston Consulting Group (2017), op. cit.

[16] UNESCO, *A Global* Framework to Measure Digital Literacy (2018), accessed April 12, 2018, http://uis.unesco.org/en/blog/global-framework-measure-digital-literacy

[17] G 20 Insights, Bridging *the Digital Divide - Measuring Digital Literacy* (2017), accessed April 18, 2018, http://www.g20-insights.org/policy_briefs/bridging-digital-divide-measuring-digital-liter

The B20 explicitly supports these efforts as a basis for national policies and national skills gaps forecasts (as detailed in recommendation 1.1 below).

Exhibit 1 | Basic Digital Skills among Citizens of EU Member States in 2017
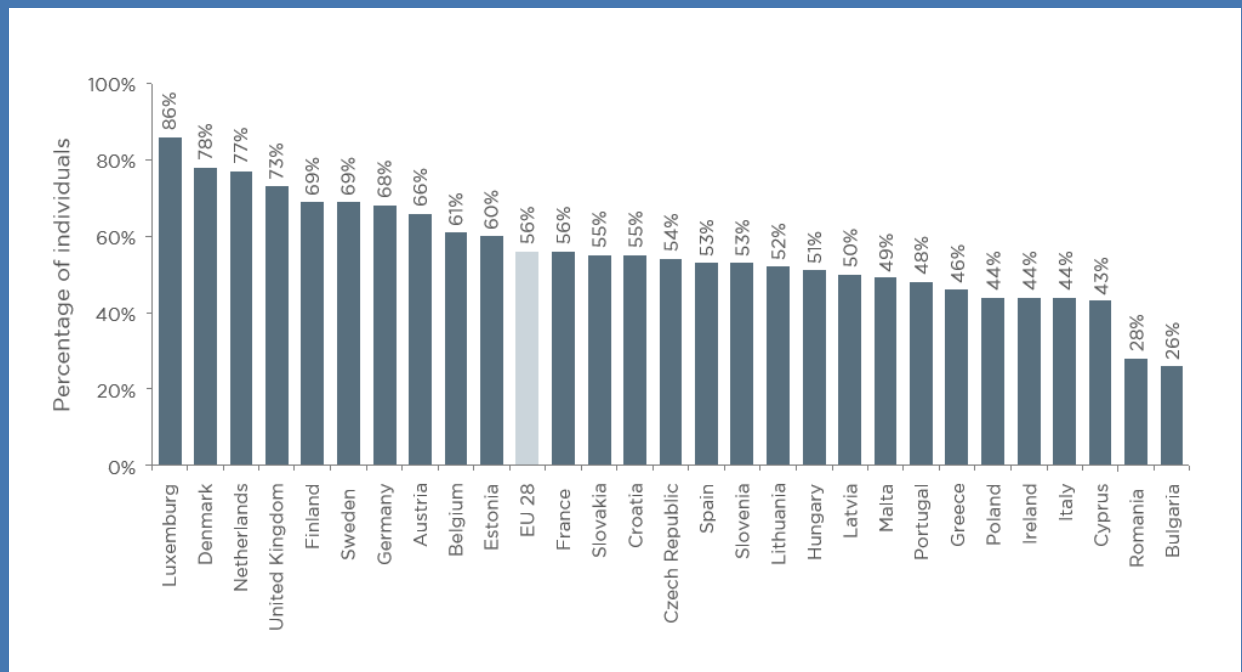
Source European Commission, The Digital Skills Gap in Europe (2017), accessed April 12, 2018, https://ec.europa.eu/digital-single-market/en/news/digital-skills-gap-europe.

Given the importance of developing digital skills and the relative low level of such skills across the globe as shown above, it is essential that governments and businesses focus on investments in human capital and education to prepare the workforce for the future of work. Policies should encourage lifelong learning, upskilling, and job retraining - including digital skills training to help workers take advantage of new technologies. Businesses and governments should work together on developing a sustainable talent pipeline.

Exhibit 2 | Digital Literacy across Countries in 2017
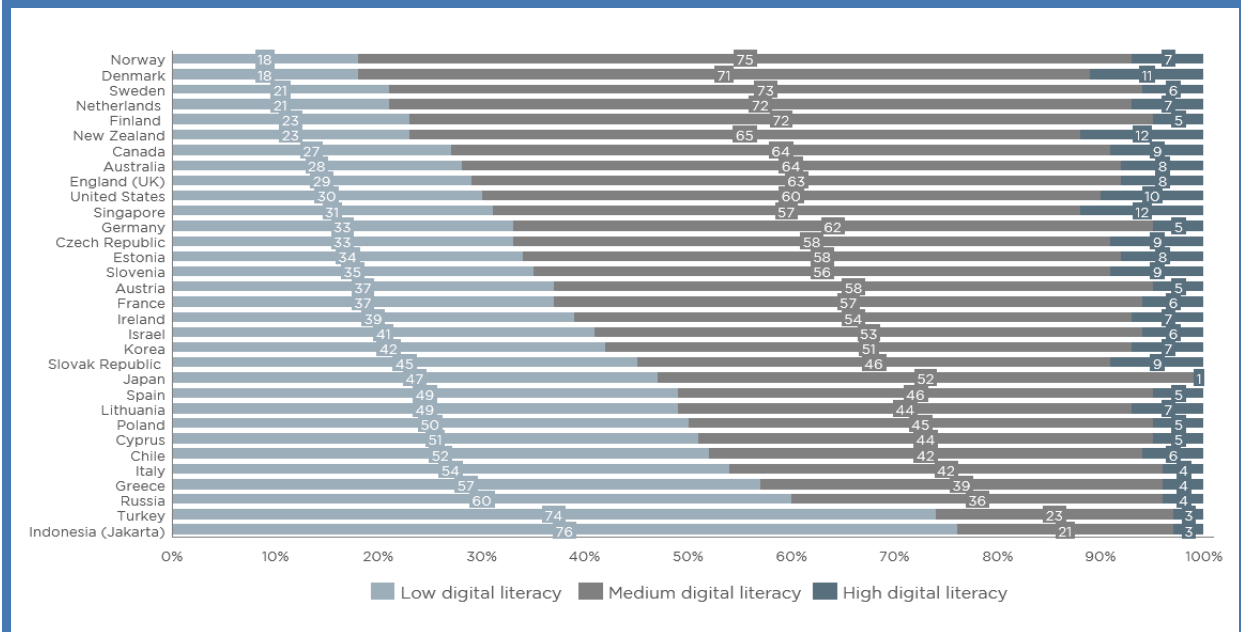
Source OECD, Programme for the International Assessment of Adult Competencies (PIAACC), http://www.oecd.org/skills/piaac/

Source Institute for Adult Learning Singapore, Developing a digital literacy scale & measuring digital divide using PIAAC data (2017), accessed April 12, 2018, https://www.ial.edu.sg

RECOMMENDATION 1: UNDERSTAND THE CURRENT AND FUTURE DIGITAL SKILLS GAP WITH RELIABLE, SUBSTANTIATED AND REGULARLY UPDATED FORECASTS ON DEMANDS OF JOBS AND COMPETENCIES

Rationale

In order to effectively tailor education, vocational training and job counselling it is of paramount importance to understand the profiles and qualifications needed in the job market. Governments need to work together with businesses, job seekers and educational institutions to shift the overall approach to the demand and supply of digital employment towards a focus on skills. Rather than to start qualifying when certain needs arise, education, training and respective policies should proactively address the competency profiles of tomorrow. Growing computing power and large amounts of data are increasingly making it possible to understand and anticipate changes in labor markets in near real-time, and to re-shape education and training policies in a timelier manner to address skill imbalances.[18]

---

[18] World Economic Forum, *Future of Jobs* (2016), accessed February 26, 2018, www3.weforum.org/docs/WEF_Future_of_Jobs.pdf

Exhibit 3 | Digital Skills Needed in the Future
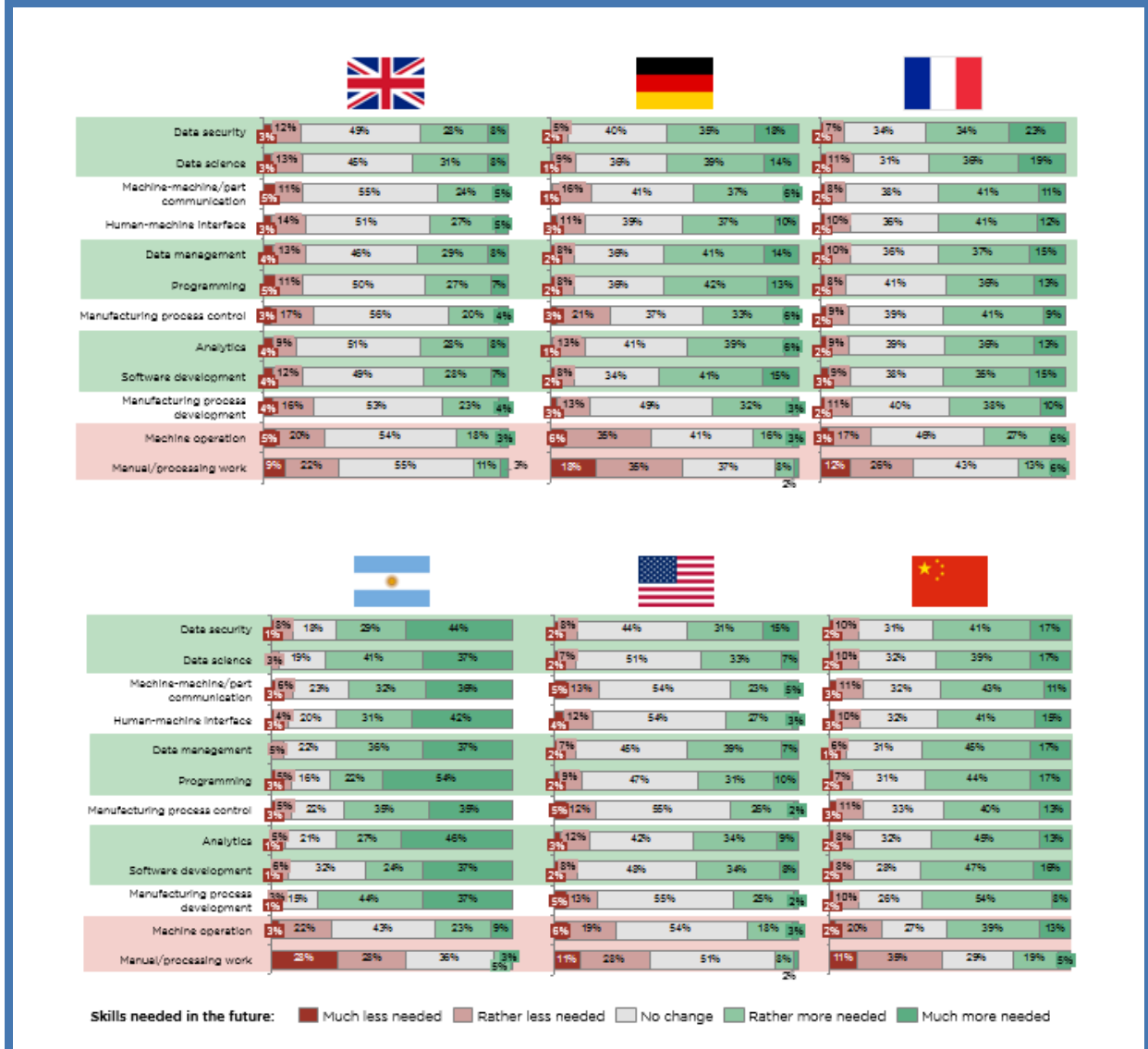
Source BCG Anonymous survey to managers of industrial companies (322 in the UK, 312 in Germany, 322 in France, 78 in Argentina, 315 in the US, 258 in China)

Although the specific digital skills needed and their respective gap need to be determined at a national and possibly industry-specific level, there are some common trends. A recent survey among managers of industrial companies in the US, UK, Germany, France, Argentina and China conducted by The Boston Consulting Group showed an increasing need for skills related to: (1) data security & science; (2) data management and programming; and (3) analytics and software development.

Skills needed in Artificial Intelligence fields are complementary with the aforementioned digital skills, such as programming, data management, and analytics.

A recent survey from the Boston Consulting Group found that more than one in four (27%) companies have already increased the number of employees dedicated to AI, and that a significant share of them (47%) expects this number to increase in the

years ahead.[19] This need to hire and retain skilled workers will be complemented by people with the ability to manage teams of data scientists and integrate AI insights and capabilities into companies' processes.

POLICY ACTIONS

1.1: **Lead the governance of skills anticipation systems, and organize skills councils, inter-ministerial working groups and industry-specific strategic foresight groups for evaluating skills demand.** These forecasts should be carried out on a regional level and specify the needed profiles and competencies. Systematic tracking and consistency are key, so that forecasts are less subject to discretion from one administration to the other and able to spot trends.

1.2: **Foster the development and use of open and standardized skill and occupational taxonomies** that can rapidly consider and integrate new labor market information, developed through manual and programmatic inputs, which should serve as the common language for collaboration from government, business and academic partners, and for labor market analysis.

1.3: **On a yearly basis, industry (association) representatives, labor market experts, data analysts and government representatives, among others, should join efforts and expertise to agree on a forecast.** Possible tools could be, among others, employer surveys, labor demand forecasting models based on previous economic performance and needs, and real-time information through big data analysis.

RECOMMENDATION 2: MINIMIZE THE SKILLS GAP IN THE FUTURE BY INVESTING IN DIGITAL EDUCATION PROGRAMS TODAY

Rationale

Governments should ensure digital skills are an integral part of the curriculum of all schools, from elementary level through all levels of education. No matter what job, what position or what industry today's children will be working on, they will require a certain level of digital skills and digital literacy. This knowledge is not just a requirement for future jobs, it acts as an enabler to participate in society and to make an informed decision about possible careers.

---

[19] The Boston Consulting Group (BCG), *AI in the Factory of the Future* (2018), accessed May 15, 2018, https://www.bcg.com/publications/2018/artificial-intelligence-factory-future.aspx

POLICY ACTIONS

2.1: Increase access to and popularity of STEM (Science, Technology, Engineering and Mathematics) and computer sciences from elementary to tertiary education, including vocational training by providing funding, improving teacher training or adjusting mandatory subject choices. Both academic education and vocational training should continuously align their curricula with the advancement in digital technologies, such as app-assisted measuring technologies for craftsmen, cloud-based IoT-technologies enabling predictive maintenance, or a better understanding of digital technologies among aspiring accountants.

2.2: Teach computer programming and coding skills to children and young people. Include coding in national school curricula; outside-school coding clubs; competitions and campaigns; and subsidized distribution of low-cost computers with access to courses and applications.

2.3: Foster "soft" and "complementary" digital skills and skills that are uniquely human – adaptability, empathy, critical thinking, and collaboration.[20] Incorporate "twenty-first century skills" into national curricula; develop and promote practical programs that aim to inform and safeguard digital safety; implications of online activities; inclusion of digital financial literacy in financial education programs, knowledge of digital rights; and awareness of how digital technology, big data and algorithms shape society. AI and automation will increase the importance of creative thinking skills.[21] These should be taught and encouraged.

2.4: Build on cybersecurity education and awareness. Average users remain the weakest link in security. For example, some studies have shown that more than 90 percent of cyber-attacks start with an average user being tricked by a phishing email.[22] It is an easy attack vector with users opening approximately 30 percent of phishing emails.[23] Education and awareness of cybersecurity should therefore be an integral part of digital skills initiatives.[24]

Exhibit 4 | Case Studies

mydigitalmaker - Malaysia[25]

The Malaysian government partnered with industry and universities to launch the "mydigitalmaker" initiative aiming at cultivating interest and skills in digital innovation and creativity among Malaysian youth; encouraging students to study STEM subjects

---

[20] Manpower Group, *A Skills Revolution* (2017), accessed March 20, 2018, https://www.manpower-group.com/wps/wcm/connect/5943478f-69d4-4512-83d8-36bfa6308f1b/MG_Skills_Revolu-tion_lores.pdf?MOD=AJPERES&CACHEID=5943478f-69d4-4512-83d8-36bfa6308f1b

[21] Accenture, *Reworking the Revolution - Future Workforce* (2018), accessed March 7, 2018, https://www.accen-ture.com/be-en/company-reworking-the-revolution-future-workforce

[22] Coense, *Enterprise Phishing Susceptibility and Resiliency Report* (2016), accessed March 16, 2018, https://cofense.com/enterprise-phishing-susceptibility-report?utm_source=earnedmedia%20&utm_me-dium=newsarticle&utm_campaign=2016_Website_Form_New_Susceptibility_Report

[23] Verizon, *2017 Data Breach Investigations Report*, accessed March 16, 2018, http://www.verizonenter-prise.com/verizon-insights-lab/dbir/2017/

[24] UNESCO: *Working Group on Education - Digital skills for life and work* (2017), 4 / 5, accessed February 26, 2018, http://unesdoc.unesco.org/images/0025/002590/259013e.pdf

[25] #mydigitalmaker, *Programmes,* accessed February 25, 2018, https://www.mydigitalmaker.com/

and transforming Malaysian youth from being consumers to producers and innovators of digital technology. A revised ICT curriculum for primary schools and a new computer science curriculum for secondary schools were deployed across Malaysia and benchmarked against other international curricula. The "maker" ecosystem includes co-curricular activities offered through digital technology clubs at schools, which are structured to provide digital skills to members and encourage them to create their own digital inventions and submit them to competitions. To date, more than 30,000 students were reported to have participated in digital co-curricular or extra-curricular activities.

MY World 360° - Germany, India, United States[26]

The United Nations SDG Action Campaign, Digital Promise Global (an education NGO) and virtual reality company Oculus formed a new partnership and they launched MY World 360° project. The partnership reflects a shared commitment to the idea that immersive technologies like virtual reality hold potential for experiential storytelling that spurs learning and action. MY World 360° invites young people worldwide to develop digital skills and create 360° media as a way to share their perspectives and advance positive action toward the UN's Sustainable Development Goals (SDGs).

ReDI School – Germany[27]

The Facebook Digital Learning School and ReDI School of Digital Integration (ReDI), a non-profit school for technology-interested refugees, provide students with training in coding and opportunities to work with start-ups and technology companies. They offer 3-month IT-programs, workshops, corporate training for businesses projects as well as short-term summer courses. They also specifically target female refugees now living in Germany. Their aim is to provide students with valuable digital skills and a strong network of tech leaders, students and alumni to help create new opportunities for all.

Codo a Codo - Argentina[28]

In Buenos Aires the Ministries of Education and Modernization of the City started an initiative to train adults in programming to improve their employment perspectives or enable them to develop their own enterprise. The goal is to provide state of the art and job-related skills. Courses are conducted under virtual and/or face-to-face modalities and last months.

STEM+A – Turkey

The Turkish Industry & Business Association has been implementing the Project since 2014 with a 360-degree perspective for popularizing STEM+A education in Turkey aiming to reach teachers, students and the public at large via 5 pillars: Empowering science and mathematics teachers with STEM+A education perspective; devising a coding kit to develop coding skills of students and teachers; organizing "STEM Days" to bring students, teachers and industry professionals together and organizing

---

26 UN SDG, *United Nations SDG Action Campaign*, accessed February 26, 2018, https://sdgaction-campaign.org/category/my-world-2030/

27 ReDI School of Digital Integration, *About,* accessed March 5, 2018, https://www.redi-school.org/

28 Buenos Aires Ciudad, *Codo a codo,* accessed March 3, 2018, http://www.buenosaires.gob.ar/educacion/codo-codo/el-programa

lab/factory visits; broadcasting popular animated videos promoting the concept of STEM+A for preschool children and advocating for STEM+A based curriculum with conferences and reports.

The Ferdinand Porsche Institute - Argentina

The FPI is an initiative undertaken jointly by Volkswagen Argentina, the National Technological University (UTN) and the Argentinean Government. It enabled the creation of the careers of Automotive Engineer and Technician, which feed the industry's labor market with qualified professionals as well as a specific Research & Development Center to promote technological innovations across the value chain. Today, more than 400 students are studying the courses whose curricula have been developed by the three parties.

RECOMMENDATION 3: BRIDGE THE DIGITAL SKILLS GAP BY RE- AND UPSKILLING THE EXISTING WORKFORCE

Rationale

Stakeholders of the private and public sector should work together to build a robust and inclusive ecosystem for adult reskilling and upskilling, fostering continuous education. Devising policy solutions that reduce barriers to training and encourage employers to provide training more widely is a crucial step in preventing further increases in inequality. Policies to get people back to work and social protection measures should be updated to help people face disruptive changes and facilitate labor mobility. An effective activation framework should motivate jobseekers to actively pursue employment, improve their employability (e.g., through training) and expand the set of opportunities to find and keep appropriate jobs (e.g., through job-search assistance). Consideration should be given to the idea that engaging in the on-demand economy may be a way to bridge the transition between traditional jobs and may change the way people work, either by choice or necessity. Activation measures should be proactive, taking into account changing job profiles in different sectors and providing workers with adequate information on employability outlooks and re-employment support ahead of potential job losses (e.g., during the notice period prior to a mass redundancy).[29] Any framework or policy on adult reskilling and upskilling should be based on the aforementioned forecast of digital skills gap.

Reskilling and upskilling efforts should reach those who need it most, MSMEs (Micro, Small and Medium Enterprises), unemployed, low-skilled adults and those living in rural areas with little access to digital skills. Particular attention should be given to developing tools, products and services that promote access for the elderly and those with disabilities.[30] Paradoxically, the low skilled are the most likely to be affected by the ongoing changes, but also the least likely to receive training. In fact, they typically encounter additional barriers to training due to their higher risk aversion, more severe credit constraints and reduced access to information. Possible

---

[29] OECD, *Employment Outlook (2017)*, accessed February 26, 2018, https://www.oecd-forum.org/users/62601-andrea-salvatori-and-paolo-falco/posts/19894-poles-apart-how-technology-globalisation-have-affected-the-global-workforce

[30] International Chamber of Commerce (ICC), *ICT; Policy and Sustainable Economic Development (2017)*, accessed March 20, 2018, https://cdn.iccwbo.org/content/uploads/sites/3/2017/06/icc-ict-policy-and-sustainable-economic-development-2017.pdf

instruments are targeted career and training counselling, provision of trainings (e.g., via vouchers or other incentive mechanisms) and combining social benefits with mandatory trainings. Additionally, technology tools and applications may make training more accessible to a broader population.

POLICY ACTIONS

3.1: Define digital core competencies and create common taxonomy of skills that can help guide education, training, and workforce systems: the dialogue about jobs must be transformed into one about skills – and the experience and training that are required.

3.2: Co-fund adult digital learning opportunities and create financial incentives for burden-sharing on the part of businesses and individuals through diverse instruments (e.g., tax reductions, training vouchers).

3.3: Encourage companies to provide a minimum amount or time of training, depending on the job characteristics through fiscal incentives (tax concessions, financial aid), cooperation with public colleges and universities, training partnerships between large and smaller companies, sectoral or regional outreach activities to provide companies with information or support, presentation of positive "business cases" of developing / improving digital skills or public recognition of employers that provide training.[31]

3.4: Redesign education courses to offer more short-term and highly specific courses aligned with specific digital skill demands.

3.5: Encourage companies to rethink how they assess qualifications and credentials so that they are willing to offer jobs to people on the basis of short-term/specific courses, rather than solely looking for traditional degrees.

3.6: Support the provision of online-learning platforms and the access to free courses at "open" universities, which have no entry requirements.

3.7: Offer labor market information as well as career guidance services.

3.8: Make government financial aid available to pay for high-quality programs as well as for degree-granting institutions.

3.9: Provide train-the-trainer inductions to enable the multiplication of reskilling and upskilling in different locations, including web-based training.

3.10: Encourage innovative approaches to identifying and training for needed skills, portable and stackable credentials, connecting available skills with opportunities.

3.11: Facilitate the development of digital skills needed to enter ICT professions, introduce national employability strategies; enhanced Technical and Vocational Education and Training (TVET) courses[32]; support of boot camps and other forms of rapid skills development; and "digital livelihoods" provision.

---

[31] UK Commission for Employment and Skills, Encouraging small firms to invest in training, accessed March 27, 2018, https://core.ac.uk/download/pdf/4151307.pdf
[32] TAFENSW, *Courses,* accessed March 10, 2018, https://www.tafensw.edu.au/study/types-courses/tvet

Exhibit 5 | Case Studies

Freeformers - Europe[33]

Freeformers, a workforce technology and transformation company, and Facebook have partnered to implement a large-scale digital skills program in the UK, France, Germany, Poland, Italy, and Spain with the goal of upskilling 300,000 people over the next two years. The Facebook Community Boost program will enable Freeformers to deploy its Future Workforce Model, a set of measurable, learnable attributes that are key to being able to thrive in a digital future. Trainings will be offered in-person by local skills training providers in each market, in part targeting potential learners from disadvantaged backgrounds from ages 18-30.

RECOMMENDATION 4: FACILITATE JOB TRANSITION BY ADDRESSING THE LACK OF FLEXIBILITY

Rationale

Governments should review and modernize social safety nets to give workers flexibility to get new skills, change jobs, and move to new opportunities securely. Periods of unemployment should be used as opportunities for upskilling and reskilling jobseekers.

POLICY ACTIONS

4.1: Support workers who have been affected by changing skills needs by one or some of the following initiatives: tailored career counselling, workforce development measures, trainings, access to work opportunities that can fit around trainings, transitional income support, and possibly financial help.

4.2: Make proven job search technologies from the private sector available within government employment programs (e.g., in 2017, the US state of Utah ran a pilot where unemployment insurance claimants undertook a network-based job search via an existing online job platform. Incidence of benefits exhaustion were much lower for pilot participants who created strong professional profiles, downloaded and used mobile apps for job search and added professional connections). In order to facilitate the best re-employment outcomes, we encourage government employment programs to adopt modern job search tools and technology and train staff on their availability and use.

4.3: Equalize rights and benefits for employees and self-employed which would incentivize entrepreneurship and provide personalized pathways through the social protection system rather than offering distinct protections for different types of labor.[34]

---

[33] Freeformers, *Freeformers partners with Facebook to offer training to 300,00 people,* accessed June 10, 2018, https://freeformers.com/media/blog/freeformers-partners-with-facebook/
[34] WEF, *The Global Risks Report* (2017); 38, accessed February 26, 2018, http://www3.weforum.org/docs/GRR17_Report_web.pdf

4.4: Attach benefits, rights and obligations to a person, rather than to the employer. This will be increasingly important given the changing nature of work through the on-demand economy, especially for people working outside traditional employment relationships.

RECOMMENDATION 5: ENSURE ACCESS OF WOMEN AND GIRLS TO DIGITAL EDUCATION

Rationale

Governments need to ensure that programs fostering digital skills are equally attractive and accessible to both genders. The B20 supports efforts like the #eSkills4Girls initiative, and calls on G20 governments to ensure that programs that foster digital skills in vocational education and training are equally attractive and accessible to both genders. In developing countries, men are 2.7 times more likely than women to work in the digital sector and 7.6 times more likely than women to hold occupations that require specific ICT skills.[35] This is also true for women entrepreneurs. The start-up scene in most countries is largely dominated by men, and women find it more difficult to make contact with key players and obtain funding. In a survey conducted in the US, among 869 founders, 83 percent were male.[36] Increasing participation of women in the digital economy would have an important positive impact on GDP. A study published by the European Commission found that allowing more women to enter the digital jobs market can create an annual EUR 9 billion GDP boost in the EU area.[37]

POLICY ACTIONS

5.1: Create educational opportunities for digital literacy and skills targeting women and girls, both in and outside of the formal education system. Young girls are often not aware of the opportunities STEM careers can bring.

5.2: Include STEM training starting in the first years of primary education. In many countries, the percentage of girls that continue into secondary education is low, which makes it paramount that digital literacy should be acquired in primary school, and develop scholarship programs for STEM courses aimed specifically at women.

5.3: Launch public awareness campaigns. Parents hold an influential role in their daughters' education and career choices, yet lack information about career options.[38] Therefore, public awareness campaigns, launched and run by civil society, companies and public institutions can challenge existing stereotypes and inform girls and their parents about the opportunities of STEM careers.

---

[35] World Bank (WB), *World Development Report 2016: Digital Dividends* (2016), p106, accessed February 26, 2018, http://documents.worldbank.org/curated/en/896971468194972881/pdf/102725-PUB-Replacement-PUBLIC.pdf
[36] First Round, *State of Startups* (2017); accessed February 26, 2018, http://stateofstartups.firstround.com/2017/
[37] European Commission (EC), *Women active in the ICT sector* (2013), 2, accessed February 26, 2017, https://publications.europa.eu/en/publication-detail/-/publication/bfa34291-3dd5-4e2a-a977-0b659f593a4d/language-en
[38] Accenture, *Attracting More Young Women Into STEM* (2017), accessed March 6, 2018, https://newsroom.accenture.com/news/accenture-finds-girls-take-up-of-stem-subjects-is-held-back-by-stereotypes-negative-perceptions-and-poor-understanding-of-career-options.htm

Exhibit 6 | Case Studies

She will Connect - Sub-Saharan Africa[39]

NGOs, business and government partnered to help women acquire digital skills and become more aware of the benefits of connectivity and technology across Kenya, Nigeria, and South Africa. A free, basic digital literacy curriculum is combined with resources women can use during and after training, including information about accessing learning websites that are available for free without data charge. Initially, face-to-face training was completed at community centers, but many women in rural areas were not able to travel to attend the sessions. In response, two new delivery models were added: An ICT lab in a mobile caravan and a "digital classroom" kit in a hardened, water-resistant, lockable case that can reach women in areas where the caravan cannot go, containing 40 tablets, headphones, and relevant local and international content. Additionally, a peer-network and mentoring sessions for women are offered. By 2020, 5 million women in Sub-Saharan Africa will be reached through the program.

Women@Security – South Korea[40]

In South Korea, women leaders from Microsoft Corp., Microsoft Korea, and Korean Center for Women in Science, Engineering and Technology (WISET) joined forces to launch a new initiative to promote the role of women in security. On March 23, 2018, these groups hosted a pilot event in Seoul, Women@Security: Digital Transformation and Career Opportunities for Women in Cybersecurity conference. The event had two primary objectives: raise awareness among female students and professionals about the growing importance of cybersecurity, and challenge and encourage female students pursuing diverse academic disciplines other than computer or engineering to consider cybersecurity as a career option. The event brought together female college students, career-interrupted women, and women security professionals to discuss key issues related to developing career paths in cybersecurity. Important governing bodies including the Ministry of Science and ICT, the Ministry of Family and Gender Equality, Korea Internet & Security Agency, the Korea Association of Chief Information Security Officers, and the US Embassy Seoul have also joined this effort as key partners to help better understand the issues and create opportunities to implement systemic changes.

---

[39] Intel, *She will connect; an Intel program,* accessed June 20, 2018, https://shewillconnect.intel.com/en/
[40] Korea Center for Women in Science, Engineering and Technology, *Programs*, http://www.wiset.or.kr/contents/in-formation_view.jsp?sc_page=4&pk_seq=27756&sc_type=1&sc_tab=1&sc_cond=1&page=1

TOPIC 2: FOSTER THE DEVELOPMENT AND UPTAKE OF INDUSTRY 4.0 TECHNOLOGIES

After steam power in the nineteenth century, electricity in the twentieth and large-scale computerization in the 1970s, industry is facing a fourth revolution that will have at least as profound an impact on economy and society as the previous ones did.

Industry 4.0 combines production methods with state-of-the-art information and communication technology. The driving force behind this development is the rapidly increasing digitization of the economy and society. The technological foundation is provided by intelligent, digitally networked systems that will make largely self-managing production processes possible: In the world of Industry 4.0, people, machines, equipment, logistics systems and products communicate and cooperate with each other directly. Production and logistics processes are integrated intelligently across company boundaries to make manufacturing more efficient and flexible.[41] A qualitatively different working environment will result from these changes: no longer will it be a scenario in which humans operate machines, but one in which machines and humans work side by side, collaborating to perform different tasks of a same process.

In this phenomenon, manufacturing practices will be transformed by the use of digital technologies such as digital representations of products and production (so-called digital twins) for simulation, user-friendly engineering tools including advanced user interfaces (e.g., with augmented reality) and cloud connectivity to enable data analytics and machine learning.[42] Additionally, new manufacturing technologies such as additive manufacturing and advanced robots will play a major role in industrial production (see Exhibit 4). Blockchain is already playing a disrupting role in supply chain management, but other industrial applications like settlements, auditing and permissions, or digital ID could be disrupted by this technology. A holistic approach on Industry 4.0 will make it possible to gather and analyze data across machines, enabling faster, more flexible and more efficient processes to produce higher-quality goods at reduced costs for manufacturers and customers. This in turn will increase manufacturing productivity, shift economics, foster industrial growth, and modify the profile of the workforce—ultimately changing the competitiveness of companies and regions.

Artificial Intelligence (AI) is a key enabler for Industry 4.0 technologies and many consumer applications to thrive. One type of AI, deep learning, leverages mathematical models called artificial neural networks that are inspired by the human brain. AI has led to massive improvements in image and voice recognition and natural language processing (NLP).

---

[41] Federal Ministry for Economic Affairs and Energy, *Plattform-i40, What is Industrie 4.0?*, accessed May 18, 2018, https://www.plattform-i40.de/I40/Navigation/EN/Industrie40/WhatIsIndustrie40/what-is-industrie40.html
[42] The Boston Consulting Group (BCG), *Is UK Industry ready for the Fourth Industrial Revolution?* (2017), accessed May 13, 2018, https://media-publications.bcg.com/Is-UK-Industry-Ready-for-the-Fourth-Industrial-Revolu-tion.pdf

Exhibit 7 | Nine Technologies are Transforming Industrial Production

Source BCG Perspectives, Five Lessons from the Frontlines of Industry 4.0 (2017), accessed February 26, 2018, https://www.bcg.com/publications/2017/industry-4.0-lean-manufacturing-five-lessons-frontlines.aspx.

Comment Additive Manufacturing refers to the process of joining materials to make objects from 3D model data, usually layer upon layer (i.e., 3D printing).

There have been three milestone events that made the general public aware of AI. The first one was the defeat of a Chess champion by Deep Blue, a computer developed by IBM. The second event was Watson's victory over humans, while excelling in speech recognition, natural-language processing and search. The third and latest event was Google's demonstration of a self-driving car.[43]

In the future, AI will be ubiquitous in factories, fostering Industry 4.0 enhancements in a broad range of aspects of production such as machines, vehicles, design, quality defects, predicting future demand or quality issues. Given AI will increasingly impact not only how we work, but also how we live, the development of society trust in the use of this technology will become a must for realizing its potential. Key will be to put humans at the center of the development, application and governance of such technology, so that they are empowered and enabled. This includes addressing potential concerns about the accountability, transparency and explainability of algorithm powering decision making and the need to ensure safety and security around automated processes, in particular clarifying responsibility and liability if an automated process goes wrong. Business, governments and societal interests will need to collaborate to support the right public debate around technology and to promote governance frameworks that support the responsible use of this technology.

---

[43] The Boston Consulting Group (BCG), *Competing in the age of artificial intelligence* (2017), accessed May 21, 2018, https://www.bcg.com/publications/2017/competing-in-age-artificial-intelligence.aspx

Exhibit 8 | Adoption Status of Industry 4.0 Technologies
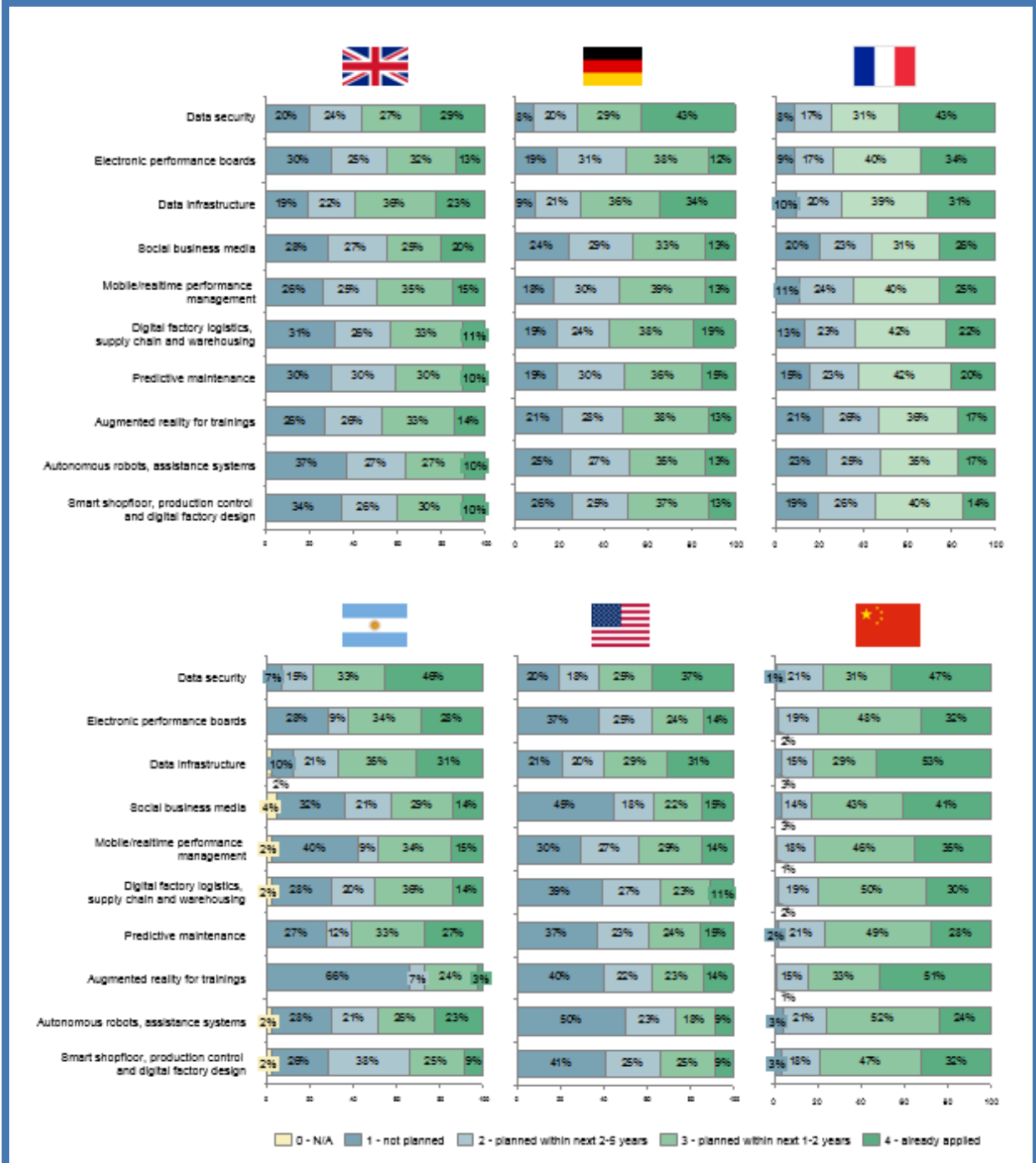
The level of implementation of Industry 4.0 technologies needs to be determined at a national and industry-specific level, but initial assessments show some common trends among some G20 countries: a recent survey among managers of industrial companies in the US, UK, Germany, France, Argentina and China conducted by The Boston Consulting Group shows that Data Security is the most developed among

Industry 4.0 technologies while smart factories (i.e., smart shop floor, production control and digital factory design) and autonomous robots are among the least developed.

Exhibit 9 | Shared Examples of the Potential Impact of Industry 4.0[44]

- Maserati, an Italian car manufacturer, shortened development time by 30 percent and the overall time-to-market time from 30 to 16 months and increased the manufacturing output by a factor of three by deploying end-to-end digital technologies.
- Siemens's electronics manufacturing plant in Amberg, Germany is working at an automation rate of about 75 percent and has increased its output by factor 10 with a consistent number of employees (by elevating their skillset so they are able to do more strategic tasks). 1,200 different products are built on the same production line in very small lot sizes and production quality is at 11.5 defects per million.
- Bausch+Ströbel, which builds and sells packaging and production systems, no longer constructs models in wood, but rather creates digital models, which can be adjusted in-time reducing engineering time by 30 percent.
- Heller Maschinenfabrik GmbH is using IoT and big data to understand customers' needs and to price renting out of machine tool equipment better.
- Thyssenkrupp, a German steel manufacturer, is working on MAX, a predictive maintenance service for lifts that connects thousands of elevators via Internet of Things. By improving the forecast of maintenance works, the reliability and availability of elevators can be significantly enhanced leading to improved comfort for users.
- The Mexican Income Revenue Service (SAT) operates a robust e-invoicing system based on cloud-based solutions. This allows for less implementation time, higher storage capacity and flexibility, while saving costs in data centers.
- Ping An Group, an insurance player, has developed an in-house system to recognize faces better than commercial alternatives and verified more than 300 million faces in various uses, complementing Ping An's cognitive systems such as voice recognition.[45]
- Maersk, a Copenhagen based container shipping company, together with IBM are to save up to us$300 per container and speed up the process of shipping by using blockchain technology in supply chain management. The use of blockchain will also enhance product assurance related to it.

In order to participate fully and equally in the advantages Industry 4.0 brings, G20 members will need to set the correct incentives for companies to develop and use Industry 4.0 technologies to boost industrial productivity by fostering best practices and use cases sharing, enabling collaboration between public and private institutions, and encouraging innovation.

---

[44] Examples and data provided by Siemens, Federation of German Industries, USCIB and BCG research
[45] The Boston Consulting Group (BCG), *Putting artificial intelligence to work* (2017), accessed May 21, 2018, https://www.bcg.com/publications/2017/technology-digital-strategy-putting-artificial-intelligence-work.aspx

Through a coherent Industry 4.0 strategy and the respective policies, countries may strengthen their industrial competitiveness and modernization and ensure the sustainable growth of their manufacturing sector. Governments must plan this strategy in coordination with all actors across the value chain to ensure everyone benefits from it. Additionally, they might better and specifically address social and environmental issues. As with all revolutions, Industry 4.0 will not be free of costs. For example, jobs will have to be converted and people retrained.

In this regard, establishing new regulations, institutions and processes need to be justified in general and their necessity should be corroborated in a case-by-case approach. Since over-regulation and too much bureaucracy could hamper innovation and new business models - and thereby the competitiveness of companies and countries - regulatory parsimony and stakeholder consultations are recommended before further legislative steps are taken.

RECOMMENDATION 6: SUPPORT THE CREATION OF AN ECOSYSTEM FOSTERING THE DEVELOPMENT AND IMPLEMENTATION OF INDUSTRY 4.0 TECHNOLOGIES

Rationale

Governments should support the creation of an Industry 4.0 ecosystem to foster best practices and use cases sharing, enable collaboration between public and private institutions and encourage innovation. To build and develop such an ecosystem, governments should aim to create an environment that brings together all relevant stakeholders, that is, business, academia, the technical community and civil society. Jointly, these stakeholders should aim to identify all relevant trends and developments in the manufacturing sector and to combine them to produce a common overall understanding of Industry 4.0, develop awareness and draw up recommendations for action. The role of governments in this regard is to bring the various players together, to create better alignment between industry needs and academia, to match new technology users and suppliers, to equip initiatives with greater public weight and support them financially and, last but not least, to bundle and support targets of Industry 4.0 with laws, standards and international agreements.

Expenditures on Research and Development (R&D) are an indicator of efforts of technological innovations in nations. In spite of the importance of R&D expenditure to transform the economic structure of countries, not all states invest significantly promoting innovations in their country. On the one hand, developed countries tend to spend at least more than 1 percent of GDP in R&D, while developing nations invest mainly less than 1 percent of GDP.[46] Government policies to foster an "Industry 4.0 agenda" could ensure combined incentives such as financial assistance and training. The promotion of clear incentives for the private sector to invest significantly in technology and innovate in products, processes, business models, ways of connecting to consumers and suppliers would help developing nations to close the productivity gap versus developed countries.

Industry driven approaches (or bottom-up participation) – instead of applying a top-

---

[46] World Trade Organization (WTO), *World Employment Social Outlook. "Innovation in Enterprises and the Results in the Labor Market"* (2017), Geneve, Switzerland, accessed 23 May, 2018, http://www.ilo.org/global/publications/books/WCMS_579893/lang--en/index.htm

down governance approach – giving a greater say to involved stakeholders – can better ensure the more active involvement of industry stakeholders.[47] This multi-stakeholder environment should support the creation of knowledge, standards and examples, mobilize businesses and MSMEs, promote global networking and ensure the practical operation of Industry 4.0. A thriving multi-stakeholder environment on national, regional, and global levels will enable deeper collaboration between countries – for example, sharing best practices, developing joint initiatives for specific sectors.

POLICY ACTIONS

6.1: **Establish and run an online platform for all stakeholders** to become involved, provide input, exchange best practices and use cases on the implementation of Industry 4.0 technologies.

6.2: **Initiate, fund and support research and company-led projects and test-beds and competence centers** for the piloting of production systems.

6.3: **Create and fund dedicated centers of excellence or research projects driving innovation and adoption of digital manufacturing technologies and addressing major scientific challenges.** Governments should support cooperation between academia, other R&D institutions and industry to foster such initiatives.

6.4: **Foster the participation of MSMEs on the aforementioned initiatives,** which could especially benefit, given their limited financial, technological and human resources. Applied research projects might demonstrate to MSMEs how Industry 4.0 technologies can be integrated in practice. Possible actions could be:

- The development of tools which can provide guidance on investment returns and help draw conclusions about viability of Industry 4.0 technologies.
- Best practices for the MSME sector to facilitate adaptation processes based on transferable solutions.
- Deployment strategies and recommendations for the implementation of organizational changes. These are to be provided as handouts, checklists and model procedures that deliver assistance in as concrete a manner as possible.
- Strengthening joint research and development in new technologies, such as AI (Artificial Intelligence) or Additive Manufacturing through test-beds and competence centers to lower the bar for entry, facilitate innovation and promote accessibility to participants in the ecosystem.

6.5: **Assess the operating legal frameworks to determine whether they truly enable the creation of an Industry 4.0 environment** or whether they are outdated and create restrictions and obligations that work against the creation of this environment.

6.6: **Governments of developing countries should actively promote investment in R&D,** as well as create more incentives to encourage R&D expenditures in the private sector.

---

[47] Examples include the European Commission's Digitizing European Industry Initiative (https://ec.europa.eu/digital-single-market/en/policies/digitising-european-industry)

Exhibit 10 | Case Studies

Basque Innovation Hub

The Basque Country has created a network that fosters public-private cooperation and provides industrial enterprises, especially SMEs, with the technological capabilities needed to meet the challenges of industry 4.0. This network has been called "Basque Digital Innovation Hub."[48] It links, digitally, R&D infrastructures, pilot plants and specialized know-how in different areas of advanced manufacturing.

Hybrid Labs

Also fostered by the Basque Country, "Hybrid labs" are initiatives where leading companies (key players in specific industries) enable an innovation space (lab) for digital start-ups to develop Industry 4.0 technologies in close collaboration with key people from the leading company. These are smaller collaborative networks created within large companies where they provide mentoring and open spaces for coworking. An Example of such Hybrid Lab is the initiative taken by GNF called InnovaHub.[49]

Labs Network Industry 4.0[50]

Labs Network Industrie 4.0 was founded by companies related to the Plattform Industrie 4.0 in cooperation with leading Industry Associations like VDMA (German Machine Builders Association). It aims at supporting the German and European mid-sized sector in taking a leading role in the global digitalization. In LNI 4.0 SME can experience and test new technologies, innovations, and business models in test centers in the environment of Industry 4.0 and review their economic feasibility prior to their market launch. Furthermore, LNI 4.0 acts as a facilitator between SME, large industry, academia and the government to start new projects and propose sources of funding. Today LNI 4.0 established successfully test beds in the area of new production methods, augmented reality, big data analysis and digital reference architectures to name a few.

RECOMMENDATION 7: ENCOURAGE THE DEVELOPMENT OF INTERNATIONAL STANDARDS AND DEFINITIONS FOR INDUSTRY 4.0 TECHNOLOGIES

Rationale

Industry 4.0 requires an unprecedented degree of system integration across domain borders, hierarchy borders and life cycle phases. It will involve networking and integration of several different companies and systems through value networks. This collaborative partnership will only be possible if market-driven, open, consensus-

---

[48] Business Development Agency of the Basque Government (SPRI), *Basque Industry 4.0 Digital Innovation Hub,* accessed May 15, 2018,http://www.spri.eus/en/basque-industry-comunicacion-en/basque-industry-4-0-digital-innovation-hub/

[49] Based upon Gas Natural Fenosa, *InnovaHub,* accessed May 21, 2018, http://innovahub.gasnatu-ralfenosa.com/programas/

[50] Labs Network Industrie 4.0 (LNI 4.0), *Ready for the digital economic miracle?,* accessed May 18, 2018, https://lni40.de/?lang=en

based and voluntary standards can be developed. In the field of industrial automation there is a large number of existing standards which have proven their worth in practice. The new requirements of the Industry 4.0 landscape are, however, expected to make extensions and upgrading necessary.

The field of IT security is especially crucial for standardization, and the principle of security by design must be taken into account in those standardization efforts. This is due to the requirement for real-time capability, direct communication between machines without the opportunity for operators to intervene every single communication unless a problem arises, security during transmission of sensitive manufacturing data and, last but not least, aspects of data protection, taking into consideration that non-personal data should not be regulated in the same way as personal data. Domain-specific IT security standards in areas such as IoT, smart logistics and smart manufacturing are needed to supplement existing standards on basic IT security technology. All standards and specifications need to be technology-neutral, developed through inclusive and transparent processes, based on consensus, and market-driven. They should serve as a reference, be voluntary and support appropriate technological advancement. Close cooperation between researchers, industry and the standardization bodies is required to create the necessary conditions. The coordination, however, does not stop on a national level; it is also critical at an international level. The users, operating globally, expect to be able to source products and systems everywhere in the world. In many instances, this can be accomplished through international harmonization of standards that facilitate this global usability and cross-system consistency.

POLICY ACTIONS

7.1: Encourage the relevant stakeholders to work together and develop relevant and appropriate definitions and standards. It is critical that these standards are developed within private sector bodies in cooperation with governments, as opposed to through government mandates. If industrial support, research, testing and standardization go hand in hand, they are able to create the necessary conditions for innovation: methodical soundness and functionality, sharing of best practices and lessons learned, stability and security of investments, practicability and market relevance.

7.2: Foster the development and use of globally interoperable standards and specifications by supporting industry-led multi-stakeholder cooperation and market driven standardization initiatives. Formal standardization bodies should collaborate with open, voluntary, consensus-based standardization bodies as well as with industry forums from different sectors to establish new and align existing standards, such as ISO, IEC, ISO/IEC JTC 1 (ISO/IEC Joint Technical Committee for Information Technology), W3C (World Wide Web Consortium), OPC Foundation ITU-T and IEEE (Institute of Electrical and Electronics Engineers).[51]

---

[51] DIN/DKE, *German Standardization Roadmap - Industry 4.0* (2016), 21, accessed February 26, 2018, https://www.din.de/blob/65354/f5252239daa596d8c4d1f24b40e4486d/roadmap-i4-0-e-data.pdf

RECOMMENDATION 8: ENCOURAGE DEVELOPMENT & ROLL-OUT OF INDUSTRY 4.0 TECHNOLOGIES

Rationale

Public support plays an important role in accelerating the development and implementation of Industry 4.0 technologies, both in funding and initiative development. Especially innovative and close-to-market funding instruments, for example, business loans, in-kind contributions and tax incentives may be considered. While public funding is essential to aid the development of cutting-edge technologies, private co-financing of Industry 4.0 technologies should always be the priority. Similarly, the leverage effect of public investments that can elevate the impact of policies should be considered to overcome the challenges to monetize R&D outcomes in viable commercial applications. A reasonable degree of co-financing from industry actors is desirable to increase the sustainability of the initiatives.

However, support may come in other ways besides financially. To foster development in Industry 4.0 topics and bring together the various players, governments can also facilitate the relations and meetings between large companies and start-ups. This relations are a win-win situation for both large companies looking for specialized suppliers and growing companies seeking for commercial partners.

POLICY ACTIONS

8.1: Foresee policy approaches that are focused on motivating sustainable private financing of Industry 4.0 initiatives – in a voluntary form.

8.2: Set clear priorities on what aspects of Industry 4.0 must be supported.

8.3: Engage MSMEs on Industry 4.0 initiatives. This often requires a more customized approach, for example, the provision of loans, other funding instruments specifically for MSMEs or creating specific spaces to bridge the gap between start-ups and large companies. Making funding available and introducing supporting measures targeting MSMEs to ensure these can participate in the developments around Industry 4.0 and integrate into emerging (global) value chains and production networks. This includes awareness-raising, improving access to finance, supporting regional clusters and partnerships.

8.4: Generate forums and spaces where interactions between large companies and MSMEs may lead to commercial links that foster the development of start-ups engaged in Industry 4.0 fields.

8.5: Foster the development of start-ups as suppliers of Industry 4.0 technologies for public-owned companies.

TOPIC 3: PROMOTE GLOBAL CONNECTIVITY & INFRASTRUCTURE DEVELOPMENT

Connectivity is a prerequisite for digitalization, a strong digital economy and the development of Industry 4.0. Investment in ICT has played a key role among countries that are rapidly improving their connectivity indicators.[52] The number of people that are "online" (the ITU defines Internet users or people "online" as those using the Internet from any device, including mobile phones, in the last 12 months[53]) has been increasing yearly and is estimated to reach fifty percent of the world by the end of 2019; in other words, 3.8 billion people will still be "offline".[54] An increasing number of these connections are through mobile broadband subscriptions which are expected to reach 8.5 billion in 2023.[55]

Exhibit 11 | Internet Penetration Rate by Region for 2017

1: ITU, on of the most reliable estimates analyze "The Americas" as a joint region and shows a 65.9 percent penetration rate. Other estimates, such as E-marketer, disclose more granularity (showing a separated Internet penetration for North America, 83.5%, and for South and Central America, 57.9%)

Note Estimates. Penetration rates in this chart refer to the number of people using the Internet, as a percentage of the total population. CIS refers to the Commonwealth of Independent States. Information for Arab States (43.7%) and Commonwealth of Independent States (67.7%) not included.

Source International Telecommunication Union (ITU), *ICT Facts and Figures 2017* (2018)

Quality of mobile subscription is determined by the share of 4G or 5G (high quality) connections over total subscriptions. Exhibit 12 shows how this share varies significantly across regions, with North America and Northeast Asia leading the adoption of high quality technology, both regions with more than 70 percent of

---

[52] GSMA, *Embracing the Digital Revolution: Policies for Building the Digital Economy*, 2017
[53] ITU, *Definitions of World Telecommunication / ICT Indicators* (2010), accessed April 13, 2018, https://www.itu.int/ITU-D/ict/material/telecomict_indicators_definition_march2010_for_web.pdf
[54] ITU, *UN Broadband Commission sets global broadband targets to bring online the world's 3.8 billion not connected to the Internet*, accessed February 25, 2018, https://www.itu.int/en/mediacentre/Pages/2018-PR01.aspx
[55] Ericsson, *Ericsson Mobility Report (November 2017),* accessed March 21, 2018, https://www.ericsson.com/en/mobility-report/reports/november-2017/key-figures

connections with 4G/5G technology and India, Middle East and Africa as the most challenged.

Share of mobile subscription by technology as a % of total subscriptions
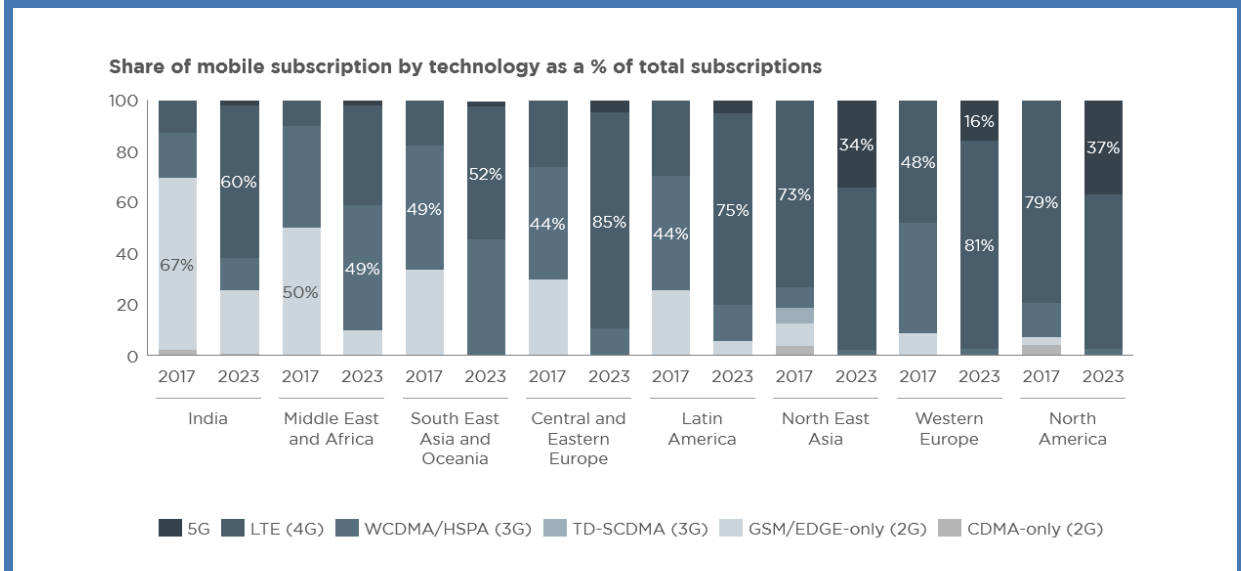
Source Ericsson, Mobility Report (2017), accessed April 13, 2018, https://www.ericsson.com/en/mobility-report/reports/november-2017/mobile-subscriptions-worldwide-by-region

Academic literature on the subject consistently agrees that improving connectivity has a positive impact on a country's gross domestic product (GDP). Most studies focus on quantifying the effect on GDP of increasing broadband penetration by 10 percent, which range from 0.25 percent to 2.8 percent.[56, 57, 58]

Literature also shows that each additional dollar invested in ICT in infrastructure in 2016 could add up to five additional dollars in GDP growth by 2025.[59, 60] Given the huge impact that ICT investment can have, it represents an imperative topic in every policy-maker agenda. G20 members trying to capture this value should promote a transparent and competitive environment while enabling long-term investments.

Studies like the BCG e-Intensity Index show that connectivity dimensions have a positive correlation with GDP per capita (although this does not imply causality as previously cited studies).[61] To achieve the desired impacts, investments in infrastructure that enable ICTs (e.g., efficient electricity networks) should be strengthened as the backbone for digital inclusion. Besides GDP impact, ICT growth

---

[56] For more detail on Studies see WEF, *Internet for All: A framework for accelerating Internet access and adoption* (2016)
[57] For more detail see Imperial College London, *How important are mobile broadband networks for global economic development?* (2017), accessed March 21, 2018, https://spiral.imperial.ac.uk/handle/10044/1/46208
[58] World Bank (WB), *Exploring the relationship between broadband and economic growth* (2016), accessed May 14, 2018, http://pubdocs.worldbank.org/en/391452529895999/WDR16-BP-Exploring-the-Relationship-between-Broadband-and-Economic-Growth-Minges.pdf
[59] Huawei, *Global Connectivity Index* (2017), accessed on February 14, 2018, http://www.huawei.com/minisite/gci/files/gci_2017_whitepaper_en.pdf?v=20171115
[60] Upcoming reports by the World Economic Forum (WEF) present consistent figures for ICT Investment impact
[61] The Boston Consulting Group (BCG), *e-Intensity Index* (2017)

enables global supply chains, which can drive further economic growth and/ or improve living standards.

There is consensus that promoting connectivity is a priority, both in developing and developed countries (even if their current status are heterogeneous) and many institutions are advocating towards the same objective. For instance, the United Nations promotes ICT Infrastructure investments (Subgoal of SDG 9[62]) and access to ICT technology as one of their Sustainable Development Goals (SDG) which, according to many stakeholders, plays a significant goal in realizing the rest of the global goals.[63]

The cited benefits suggest that governments around the globe have an important role to play to encourage more people to go online and benefit from the digital economy. In this regard, governments should implement policies that encourage investment, innovation and new ways of bringing services to all components of the Internet economy. It is critical that governments focus on both the supply and demand side, and on the promotion of innovative content, applications and services, as well as infrastructure. While focusing on the development of these new services, governments should recognize different technical and functional characteristics that differentiate market actors while avoiding to apply outmoded regulation. This should be achieved through deregulating these services for all types of providers.

RECOMMENDATION 9: ENCOURAGE AND FACILITATE PRIVATE INVESTMENTS IN INFRASTRUCTURE TO EXPAND COVERAGE, EVEN IN LESS PROFITABLE AREAS

Rationale

One of the key enablers for digitalization is infrastructure.[64] For connections, data flows and the value-creating Internet economy to take place, infrastructure is needed.[65] While there are exceptions, such as the Australian National Broadband Network[66], most modern ICT infrastructure is deployed by private companies, unlike other sectors where governments provide most of the infrastructure. The high cost of deployment, high operating costs, declining average revenue per user (ARPU) and outdated legal and regulatory barriers are deterrents to expansion, particularly in rural and remote regions (e.g., difficult access areas due to physical and geographical barriers) where most of the unconnected population in the world resides. Companies are currently subject to challenging returns on investment due to price and tax pressure, regulatory demands and deployment costs that can arise from bureaucracy or opposition from local communities.[67]

There are specific challenged regions (e.g., Africa, Latin America, SEA countries) where there is a lack of associated infrastructure (15% of people in developing

---

[62] United Nations (UN), *SDG Goals: #9, Industry, innovation and Infrastructure*, accessed February 19, 2018, http://www.un.org/sustainabledevelopment/sustainable-development-goals/

[63] ICC (2017), op. cit.

[64] GSMA, *Delivering the Digital Revolution: Will mobile infrastructure keep up with rising demand?* (2018), accessed May 21, 2018, https://www.gsma.com/publicpolicy/wp-content/uploads/2018/02/GSMA_DigitalTransformation_Delivering-the-Digital-Revolution.pdf

[65] GSMA (2018), op. cit.

[66] Australian "National Broadband Network" is an exceptional public-funded project to build and operate Australia's new fast local access broadband network, bridge the digital divide and ensure all Australians have access to fast broadband

[67] For more detail on Telco payback of ~15 years see: ITU, State of Broadband 2014: *Broadband for all (2014)*, accessed April 13, 2018, http://www.broadbandcommission.org/Documents/reports/bb-annualreport2014.pdf

countries do not even have access to electricity[68]) and may need additional effort by the authorities to enable a sustainable and inclusive growth from the digital economy.

The discussion on how to foster infrastructure investment revolves around three dimensions: coverage (which share of the population is covered); quality (speed, latency and reliability); and affordability. Currently 95 percent of the World's population is covered by at least a 2G network[69], and 84 percent is covered by a 3G or better connectivity and 53 percent live within coverage of 4G networks.[70] Unfortunately, 2G is not sufficient to enable broad-scale digitalization and reap the associated benefits.

G20 members should seek to create policy environments that enable industry players to offer affordable, high quality services to as many people as possible. Simple and transparent regulatory frameworks should be promoted so that new technologies can be deployed and adopted without unnecessary administrative barriers.

Exhibit 13 | Forecast of Growth of Mobile Data Traffic from 2016 to 2021
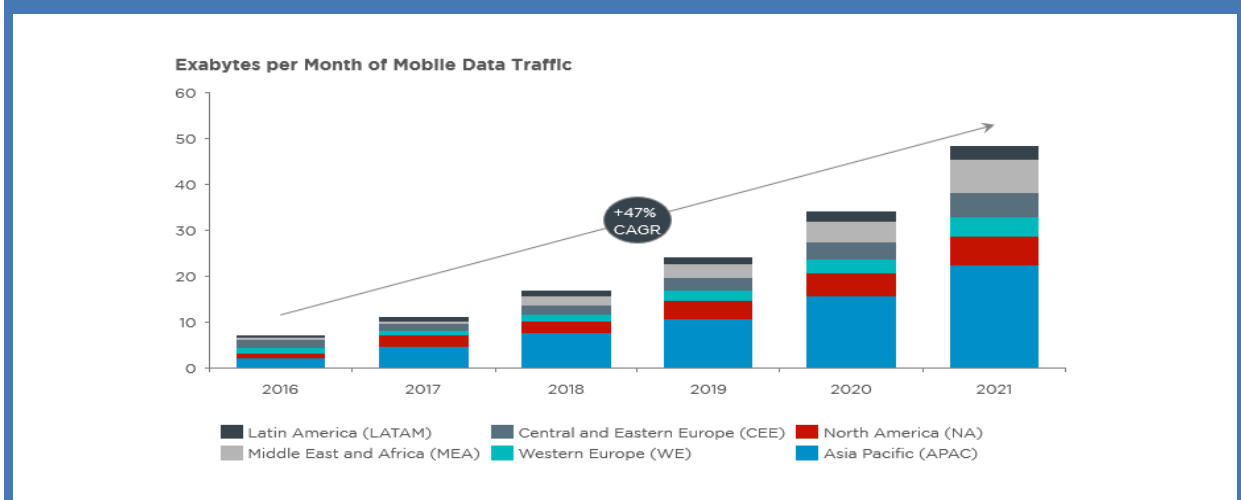
Source Cisco, *Visual Networking Index (VNI) Mobile* (March 2017), accessed February 28, 2018, https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.html

The aforementioned infrastructure investments may be undertaken by private partnerships or as a public-private partnership (PPP) between governments and private companies.

Policy-makers should aim to lower the costs of providing service and increase the investment incentives, especially in big cities, which will need an increase in capacity in the following years to avoid opening a gap with forecasted data-traffic demand

[68] WEF, *Internet for All: A framework for accelerating Internet access and adoption* (2016), accessed February 15, 2018, http://www3.weforum.org/docs/WEF_Internet_for_All_Framework_Accelerating_Internet_Access_Adoption_report_2016.pdf
[69] GSMA, *Embracing the Digital Revolution: Policies for Building the Digital Economy* (2017), accessed February 27,2018, https://www.gsma.com/publicpolicy/wp-content/uploads/2017/02/GSMA_DigitalTransformationReport2017_Web.pdf
[70] ITU, *Connecting the Unconnected (2017),* accessed June 6th, 2018, http://broadbandcommission.org/Documents/ITU_discussion-paper_Davos2017.pdf

from consumers (Exhibit 13). Investment incentives should be aligned with the biggest welfare impact for society.

POLICY ACTIONS

9.1: Undertake assessment of availability, quality and cost of infrastructure to determine the appropriate policies.

9.2: Commit to comprehensive digital agendas and broadband plans (with verifiable milestones) while establishing supportive policy environments.

9.3: Create a policy environment that is simple and transparent to enable industry players and support them to avoid administrative barriers.

9.4: Facilitate ICT infrastructure deployment by consolidating parties (administrative, local and regional policy-makers, regulators, etc.) that private companies need to deal with (e.g., one government representative vs. each county through which, for example, fiber will be deployed), providing a consistent (i.e., avoiding patchwork) set of regulatory requirements.

9.5: Ease access to public rights of way, including securing the right to attach equipment to public facilities, compliance with permitting and zoning rules, and/or negotiating colocation agreements with owners of existing private infrastructure and balancing the city planning and providers' efficiency. In the same line establishing rights of way for cables, conduits and other infrastructure can present an unnecessarily expensive and time-consuming impediment to expanding network connectivity in many parts of the world. Encourage local authorities to include expediting review and approval of applications for rights of way and improving utilization of existing infrastructure to ensure that network providers have easier access to poles, roads, bridges, and other rights of way. The fees for these public facilities should only be sufficient to cover the cost of maintaining them.

9.6: Adopt "dig once, build once" approach to encourage broadband providers to share and save in the costs of deploying and maintaining passive infrastructure.

9.7: Approach partnerships seeking to invest in ICT infrastructure in a way that will maximize the investments made in infrastructure.

9.8: Explore alternatives for providing access in low density / low take-rate areas, including co-financing and infrastructure sharing and provide the financial incentives for companies to invest in areas where "last-mile issue" is present with no business cases, but that may be government development priorities.

9.9: Consider the second-order effects on those for whom affordability is an issue (e.g., minimum bandwidth requirements that may reduce availability of cheaper options for low income users). Lack of a market environment that fosters competition while driving investments can result in poor service and higher prices for consumers. The same tradeoff exists with the rest of the QoS (Quality of Service) obligations that can result in higher prices when constrained. Governments should work together with broadband providers to improve the service instead and keep these obligations proportionate, particularly in areas previously uncovered by broadband services.

9.10: **Establish digital strategies in line with the Connect 2020 Agenda** to drive availability, affordability and adoption of broadband Internet service. All of this with the objective of improving coverage to underserved individuals and with the aim of lowering the cost of providing the service, ensuring access to high-quality spectrum, with buildout requirements that are both timely and ensure sufficient coverage. These strategies should foster a balanced competition except in remote or hard-to-reach areas where governments should provide the private sector with the right incentives (e.g., subsidies or access to valued resources such as spectrum).

9.11: **Consider the flipside of expensive spectrum auctions - sooner or later end users will pay for them.** As investment resources are limited, there is a trade-off among those devoted to spectrum and to network deployment; profitability of business cases for network deployment can be maintained while resources are transferred from spectrum costs to network upgrade and coverage expansion in less profitable areas. Therefore, spectrum allocation auctions should bear in mind that the objective is to provide high quality service with a mechanism carefully designed to be fair, transparent and aligned with an efficient allocation of resources. These regulations should have the view of reaching underserved geographic areas and ensure an abundant supply of spectrum.

9.12: **Address infrastructure quality enhancements** since ultra-fast network speeds and other evolutions associated with 5G technologies can only be realized through significant infrastructure deployment and investment, which require regulatory predictability and stability.

Exhibit 14 | Case Studies

India's public sector initiatives: the BharatNet program

Public sector initiatives in areas not served by commercial providers can have a significant role improving access to connectivity. For example, India has leading initiatives like the "Bharat Broadband Network Limited", where the government aims to achieve connectivity in 239,000 Gram Panchayats (village level administrative units) and deploy one million kilometers of optical fiber network.[71] Bharatnet's program target was becoming the world"s largest rural broadband connectivity project using optical fiber and had infrastructure missions such as: providing 100 Mbps Broadband connectivity to all the Gram Panchayats.[72, 73]

---

[71] QZ, *India"s plan to connect thousands of its villages to the Internet is finally moving up a gear*, accessed March 2, 2018, https://qz.com/1127650/bharatnet-indias-plan-to-connect-thousands-of-its-villages-to-the-Internet-is-finally-moving-up-a-gear/

[72] For more detail on PPP see Rwanda government case in which a 25-year plan was set to deploy high-speed mobile broadband (the government would contribute the backbone network, national data center and spectrum holding while the private party, Korea Telecom (KT) would contribute through network- related investments) at International Telecommunication Union (ITU) report, *Achieving universal and affordable Internet in the least developed countries* (2018), accessed February 26, 2018, https://www.itu.int/en/ITU-D/LDCs/Pages/ICTs-for-SDGs-in-LDCs-Report.aspx

[73] For more detail see WEF, *Beyond the equity efficiency trade-off: Practical ideas for inclusive growth and competitiveness in Europe*, accessed March 21, 2018, http://www3.weforum.org/docs/WEF_EUROPE-LAB.pdf

Rwanda public-private partnership (PPP)

Since 2007, the Rwandan government and Korea Telecom have undertaken several projects. These two stakeholders established a joint-venture to deploy ICT infrastructure, called KTRN (KT-Rwanda Networks). Focus of these projects was 4G LTE wholesale business, building a nationwide 4G broadband network in Rwanda.[74]

RECOMMENDATION 10: PROMOTE AFFORDABILITY BY FACILITATING ACCESS TO DEVICES AND CONNECTIVITY, ESPECIALLY IN DEVELOPING COUNTRIES

Rationale

According to World Bank estimates, approximately 10 percent of the world's population was living below the international poverty line in 2015 (set at us$1.9 a day by the World Bank).[75] Therefore, a great determinant |of how many people can access connectivity is the cost.

Affordability is defined by the Alliance for Affordable Internet as "1GB of data for no more than 2 percent of income".[76] Only 19 out of the 58 countries from the study achieved the desired goal which is an additional reason for policy-makers to undertake initiatives that address affordability.[77]

Exhibit 15 | Average Price of a 1 GB Broadband Plan as a Percentage of GNI per capita, by Region, from 2013 to 2015
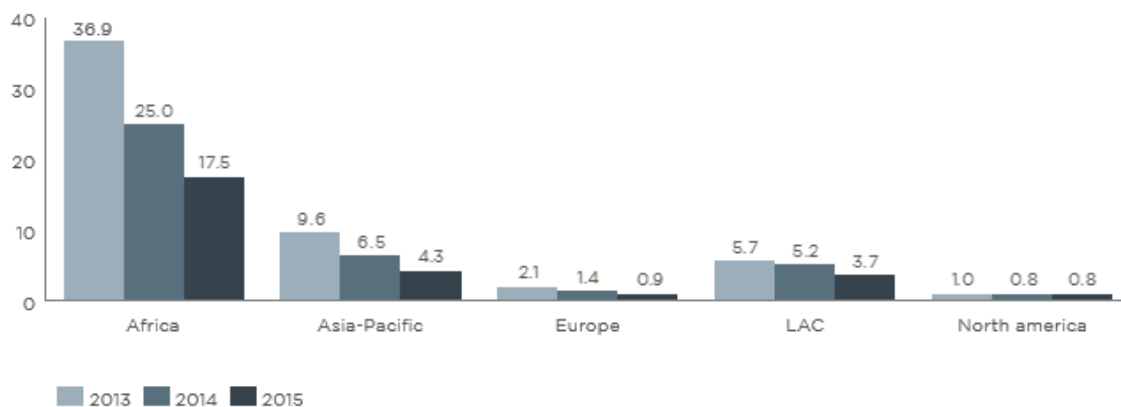
Source: a4ai, *2017 Affordability Report (2017), accessed April 13, 2018, http://a4ai.org/affordability-report/report/2017/*

---

[74] KT Rwanda networks (KTRn), *About us*, accessed June 10, 2018, https://www.ktrn.rw/

[75] World Bank (WB), Global Monitoring Report 2015/2016 (2016), accessed February 7, 2018, http://pubdocs.worldbank.org/en/503001444058224597/Global-Monitoring-Report-2015.pdf

[76] Gross National Income (GNI) per capita

[77] Alliance for affordable Internet (a4ai), Affordability report (2017), accessed April 13, 2018, http://1e8q3q16vyc81g8l3h3md6q5f5e.wpengine.netdna-cdn.com/wp-content/uploads/2017/02/A4AI-2017-Affordability-Report.pdf

The price of devices (especially smartphones) have gradually declined in recent years. The average selling price of smartphones will likely continue to decrease, according to estimates, from us\$337 in 2010 to us\$215 in 2019.[78] This will enable more non-users to start going mobile and experience its benefits. Many low-cost devices have been developed by new companies, especially in Asia, and are providing smartphones which are sold from us\$50 to us\$100.[79, 80]

Once devices are available, affordable connectivity becomes the next hurdle (as the content, once potential demand exists, becomes available). To foster affordability, governments should consider initiatives beside the continuous investment in capacity building.

POLICY ACTIONS

10.1: Avoid imposing restrictions for device manufacturers to enter the market.

10.2: Consider the negative effects of taxes (e.g., hefty import duties).

10.3: Foster availability of as many connectivity choices as possible (not limiting private initiatives unnecessarily) and considering deployment in public spaces to act not only as opportunities to connect but as entry points to drive further adoption.[81]

10.4: Engage in efforts to improve affordable connectivity across companies apart from individuals.

RECOMMENDATION 11: PROMOTE BROAD SPECTRUM USAGE

Rationale

Spectrum is essential to expanding broadband connectivity. Policy-makers should develop strategies (e.g., one best practice includes releasing more harmonized licensed spectrum for mobile) for spectrum allocation that include ensuring an abundant and timely availability of a mix of auction-based licensed spectrum, shared and license-exempt spectrum in low, mid and high bands.

The appropriate allocation between licensed and unlicensed spectrum depends on utilization, deployment, device availability and user adoption. Solutions for connectivity on rural areas where traditional networks are limited should include a balanced strategy of protected licensed spectrum, shared spectrum and unlicensed or lightly licensed access. Specifically on spectrum sharing, there is a tradeoff that governments should consider: on one hand, it helps to increase the usage of spectrum, but on the other one, it might not ensure spectrum availability all the time and interferences could be generated (as opposed to licensed spectrum which is more protected against this), and it could hinder incentives to invest in infrastructure

---

[78] Statista, *Global average selling prices of smartphones from 2010 to 2019*, accessed February 20, 2018, https://www.statista.com/statistics/484583/global-average-selling-price-smartphones/
[79] Smartphones in Indonesia ranging from us\$55-us\$60 and us\$40 in Myanmar. In India us\$33 phones have been launched and a us\$29 phone by Nokia. WEF (2016)
[80] While this is the range for Smartphones, the lowest cost range for data-capable 4G handset can be slightly lower
[81] Alliance for affordable Internet (a4ai) (2017), op. cit.

if incentives are not aligned.

Moreover, significant economic value can be created through alternatives to typical licensing. For instance, technologies operating in unlicensed spectrum, such as Wi-Fi and Bluetooth, contributed towards an ecosystem which contributed us$6.7 billion[82] to the US GDP, and the figure may be much larger when looking globally or taking into account other alternatives such as License Assisted Access (LAA). There has been extensive buildout of Wi-Fi Internet access by companies that are not traditional telecom carriers.

Spectrum regulation, then, should be aligned with a tax system that promotes competition and investment, and minimizes regulatory burden to operators, service providers and new entrants. To minimize the regulatory burden, G20 members should review whether existing regulations are fit for this purpose, consistent, transparent, and conducive to investments.[83]

POLICY ACTIONS

11.1: Take a "balanced spectrum policy" approach, leveraging and utilizing as much spectrum as possible to enable broadband Internet access, including protected licensed spectrum, shared spectrum and unlicensed or lightly licensed access.

11.2: Allow and encourage a variety of technologies to build and deploy networks and ensure broader coverage.

11.3: Discuss spectrum sharing among governments and private sector to reach consensus on its scope and where to implement it.

11.4: Design a coherent and consistent tax system to provide incentives for spectrum investments.

11.5: Adopt market-based spectrum pricing that finds the right balance between revenue from licenses and the availability of spectrum, agreeing on lower tender prices that allow ICT companies to have a surplus for capacity building through specific investments[84] (e.g., setting a specific target for coverage, especially when licensing lower frequency bands where this can be achieved without imposing a large burden on operators). These reasonable coverage targets or obligations can be included as a whole in private license spectrum auctions.[85]

11.6: Support additional licensed and unlicensed allocations.

11.7: Consider smart use of databases that make it possible for devices transmitting on a given frequency to register their activity such that others can see if the spectrum is in use or not.

---

[82] Federal communications commission (FCC), *Federal communications commission frees up airwaves to ease Wi-Fi congestion across the country,* accessed March 7, 2018, https://apps.fcc.gov/edocs_public/attach-match/DOC-326341A2.pdf

[83] B20, *Digitalization Policy paper* (2017), accessed on January 3, 2018, https://www.b20germany.org/filead-min/user_upload/documents/B20/B20_Digitalization_Policy_Paper_2017.pdf

[84] Companies and public sector who usually have the spectrum ownership can make contracts specifying terms for specific infrastructure investments

[85] For more detail on the example of the Brazilian National Telecom Agency (ANATEL) which had the obligation to cover a specific percentage of cities in Brazil see: WEF, Internet for All: A framework for accelerating Internet access and adoption (2016)

RECOMMENDATION 12: PROMOTE THE CREATION OF CONTENT AND SERVICES THAT FOSTER DEMAND

Rationale

Two other important barriers to Internet adoption are the lack of awareness and the low perceived value of Internet in parts of society, often related to the low availability of relevant local content and services.

Above all, public policies must help foster the use, adoption and creation of multiple types of content, platforms, applications, online services, and other user communication tools by third parties, which will generate social and economic welfare and avoid deepening the digital divide. This policy efforts take a major relevance where infrastructure has already been deployed or is expected to be deployed; by 2022 the global 3G population coverage will reach 95 percent and global 4G population will reach 80 percent.[86]

Content is one of the critical facets of a robust Internet ecosystem together with ubiquitous and affordable Internet access. Thus it would benefit governments to incentivize the extent of locally relevant content in local language.

Local Content refers to the availability of Internet content in the local language(s), while relevant content refers to the availability of applications, services and contents such as news, finance, health, entertainment and business information, which users find useful, as well as e- government services.

To illustrate the lack of awareness and/or relevant content, a survey for the United States showed that 34 percent of non-users "do not go online because they had no interest in doing so or did not think the Internet was relevant to their lives."[87] This is an even bigger issue in developing countries like Brazil where Internet non-users increasingly cite lack of need and interest as one of the main reasons for remaining "offline." Other cases in developing countries include India, where lack of need drives 53 percent of the non-users to remain "offline".[88] The crucial part is that these countries are not the exception.[89]

A key to facilitating Internet adoption and thereby enabling global expansion of the Internet's benefits is encouraging the production of local content that users want to engage with. The contribution of these contents to the digital economy could be massive globally in the years to come. In addition, higher demand for content will create an increase in demand for broadband networks, acting as a "virtuous cycle" that fuels increased access to the Internet. Demand for and adoption of broadband services help to drive investment in broadband infrastructure and results in lower prices, which then facilitates even greater adoption.

These digital interactions are ways for governments to promote the demand and adoption of connectivity services. It is important to note that there are many factors

[86] Ericsson, *Ericsson Mobility Report* (June 2017), accessed March 21, 2018 https://www.ericsson.com/assets/local/mobility-report/documents/2017/ericsson-mobility-report-june-2017.pdf
[87] Pew Research Center, *11% of Americans don't use the Internet. Who are they?*, accessed March 6, 2018, http://www.pewresearch.org/fact-tank/2018/03/05/some-americans-dont-use-the-Internetinternet-who-are-they/
[88] WEF (2016), op. cit.
[89] For more detail refer to: Malaysian Communications and Multimedia Commission (MCMC), Internet Users Survey (2017)

that contribute to an environment that encourages the creation and distribution of locally relevant content, one of which is having an enabling policy environment which includes freedom of expression, appropriate privacy and intellectual property protections for users and creators, consumer protection infrastructure, and secure payment platforms. All of these factors are needed to ensure that both creators and users benefit from the value of the content.

POLICY ACTIONS

12.1: **Encourage third parties to develop new and innovative Internet services.**

12.2: **Adopt regulations only where they are necessary to prevent unreasonable, discriminatory or harmful practices,** and limiting overly burdensome reporting requirements that can stifle investment.

12.3: **Avoid unnecessary regulation of Internet content, services and applications.**

12.4: **Incentivize digital interactions with citizens** and lead by example encouraging citizens to be online and aware of the benefits in the digital economy.[90]

---

[90] The Boston Consulting Group (BCG), *E-gov: Digital Government Services Survey* (2016), accessed March 6, 2018, https://www.bcg.com/publications/2017/government-digital-services-by-numbers.aspx

TOPIC 4: FOSTER DIGITALIZATION OF MSMES

Currently MSMEs are the predominant form of enterprise across the world. In surveyed countries across the world, they account for approximately 67 percent or two thirds of existing jobs.[91] They represent a significant share of all the countries' economies and need, therefore, to represent a priority for policy-makers.

Exhibit 16 | Workforce Employed in MSMEs

% of people employed by type of company in a given country
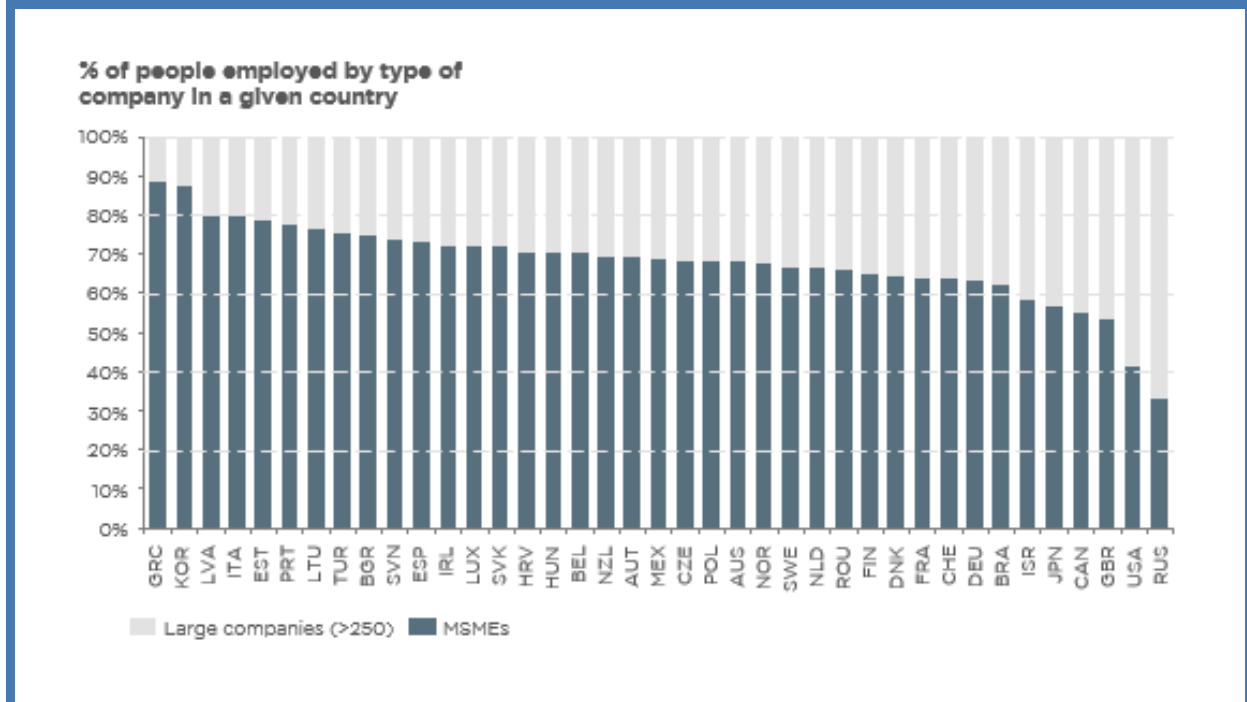
Source OECD, Enhancing the contributions of SMEs in a global and digitalized economy (2017), accessed February 27, 2018, https://www.oecd.org/mcm/documents/C-MIN-2017-8-EN.pdf.

OECD studies[92] show that MSMEs are lagging behind the average enterprise in the adoption of technologies such as cloud computing or the introduction of Enterprise resource planning (ERP) software, which has been adopted by more than 75 percent of large companies while MSMEs adoption is less than 20 percent. Leveraging digital technologies (e.g., in supply chain payments) could open business opportunities, drive efficiency gains for MSMEs, making them more competitive. Additionally, data analytics can enhance the understanding of their business environment.

MSMEs usually leverage online services such as e-commerce websites to run their business and therefore, they make "e-commerce" adoption (e.g., e-commerce sales as a percentage of retail) as a relevant measure of the degree of digitalization within these companies.[93] Success cases were found in MSMEs survey across 5 countries,

---

[91] WTO (2016), op. cit.
[92] OECD (2017) *op. cit.*
[93] European Commission (EC), *Integration of Digital Technology* (2017), accessed March 6, 2018, http://ec.europa.eu/newsroom/document.cfm?doc_id=44392

which confirmed that enterprises using cloud technologies grew jobs faster than those not in the cloud.[94]

Participation in global markets is heterogeneous across the MSMEs population some born global" and others only embedded as suppliers of exporters).[95] MSMEs usually have their access to finance hindered[96] because of their inherent small collateral and credit history. These companies also often present a gap in financial reporting skills needed to participate in capital markets.[97] This exacerbates the lack of access to innovative technologies that require minimum levels of investment. The adoption of digital payments allows MSMEs to build transaction history that could be leveraged for credit scoring facilitating access to much needed financing.

In this context, G20 members should communicate MSMEs about the possibility to reap these digital benefits and engage them strongly in digitalization.

RECOMMENDATION 13: CREATE AWARENESS AND SHARE INFORMATION ON CUTTING-EDGE TECHNOLOGIES AND BEST PRACTICES

Rationale

One of the reasons for MSMEs not adopting innovative technologies is that they are simply not aware of their existence. As a first step in fostering MSMEs digitalization, G20 members should encourage information sharing on these technologies and their respective business cases. This should be in an easy-to-understand way that engage all relevant stakeholders, facilitating informed investment decisions.

One way to share this information is through online platforms which could serve as tools for MSMEs to stay up-to-date on best practices and information about potential business partners. Moreover, these new technologies could be an opportunity to improve their performance in terms of reliability and security, taking advantage of software as a service initiatives to increase their competitiveness without needing a big investment to achieve it.

---

[94] Boston Consulting Group (BCG), *Lessons on Technology and Growth from Small-Business Leaders* (2013), accessed may 4th, 2018, https://www.bcg.com/publications/2013/technology-software-globalization-ahead-curve-lessons-technology-growth-small-business-leaders.aspx
[95] OECD (2017) *op. cit.*
[96] Federal Reserve Banks of New York, Atlanta, Boston, Cleveland, Philadelphia, Richmond, St. Louis, *Small business credit survey* (2015), accessed March 6, 2018, https://www.clevelandfed.org/~/media/content/community%20development/smallbusiness/sbcs%202015%20report.pdf?la=en
[97] European Commission (EC), *Fostering SMEs' growth through digital transformation* (2015), accessed March 3, 2018, http://s3platform.jrc.ec.europa.eu/~/fostering-smes-growth-through-digital-transformation?inheritRedirect=true

POLICY ACTIONS

13.1: **Spread success stories** in which the adoption of cutting-edge technologies which had a positive impact to peers from the industry together with their business cases.

13.2: **Foster discussion forums / platforms between larger companies and smaller ones** for all players from the sector.

13.3: **Set the right incentive scheme for big corporations to share their knowledge with MSMEs.**

Exhibit 17 | Case Studies

India's public sector initiatives: the BharatNet program

Efforts in this line have been done in countries like India where the "India Stack" has been implemented. This is an online platform with a "set of APIs which allow governments, businesses, startups and developers to utilize a unique digital infrastructure" to solve the countries' problems and aims to reduce paper and cash use.[98]

RECOMMENDATION 14: FOSTER INTERACTIONS WITH GOVERNMENTS SERVICES THROUGH DIGITAL CHANNELS

Rationale

Governments should encourage MSMEs to get connected, which can improve MSMEs participation on the digital economy. Most authorities have unavoidable interactions (e.g., tax filings, reporting, payments) with MSMEs that can be done completely digitally. Through digitizing these processes on MSMEs, governments will be encouraging them to embrace digitalization while creating savings for governments by reducing leakage in tax collection and public spending.

POLICY ACTIONS

14.1: **Increase the digital services offered to MSMEs.**

14.2: **Enable wider access by encouraging MSMEs to interact mainly on digital channels.**

RECOMMENDATION 15: IMPROVE SUPPORT FOR REGULATORY

---

[98] India Stack, *What is India Stack?,* accessed April 12, 2018, http://indiastack.org/about/

COMPLIANCE FOR MSMES PARTICIPATING IN GVCS

Rationale

In order to participate in GVCs, MSMEs often need to comply with complex regulations and compliance requirements in different countries, such as data security and data protection. This aspect not only constitutes an obstacle for their participation in GVCs but is also a factor for MSMEs to remain informal in many countries. MSMEs often spend their resources paying for external advisors' expertise or invest in specific resources to comply with multiple countries' regulations. Support in this area will drive a positive impact on the standards of the participation of MSMEs in value chains. This support can come in the form of official mentoring from online governments' channels or mentoring from experienced teams.

POLICY ACTIONS

15.1:   Provide advice and support on international, commercial partner's regulation compliance for MSMEs[99] including companies from all sectors and activities. (e.g., Agro, Fintech).

---

[99] For more detail refer to Trade facilitation committees: WTO, *WTO members share experiences, best practices on setting up trade facilitation committees,* accessed March 6, 2018, https://www.wto.org/english/news_e/news16_e/fac_11jun16_e.htm

TOPIC 5: ENABLE DIGITAL TRADE AND INTERNATIONAL DATA FLOWS

Digital trade has become an engine of economic growth for large and small businesses around the world. To define and frame digital trade, three dimensions have to be considered: the nature of the transaction, the product or service and the actors involved.[100] In particular the nature of transactions is key for the definition: a transaction is considered to be "digital" when it is digitally ordered, platform enabled, or digitally delivered. Regarding the "product" dimension, cross-border digital transactions consider traditional products such as goods and services but also information or data (e.g., video streaming). International trade is traditionally considered to take place between enterprises (business-to-business, or B2B), but new technologies provide individuals and households with much greater possibilities to purchase goods and services from foreign suppliers or sell online. It is also important to clarify that while cross-border ecommerce is an important part of digital trade, the latter is much broader and the two concepts should not be confused.

Without data, there can be no trade in goods or services and the growth of data flows is only set to grow further. Already today, approximately 50 percent of all traded services are enabled by information and communication technologies.[101] For example, more than half of US services exports are now delivered digitally.[102] Data flows are also key enablers for businesses to operate internationally and obtain the benefits of new technologies, for example, Internet of Things, 3-D printing and machine-to-machine communications. Intracompany and business-to-business data transfers are critical for these new commercial applications. Policies that enable efficient and free flows of cross-border data in these categories can help drive economic growth.

However, some countries have taken steps to limit the cross-border flow of information, such as data localization requirements and discriminatory digital tax measures. These measures threaten the ability of businesses to use digital tools and services to reach a global customer base. In order to promote sustainable economic growth, G20 governments should facilitate increased digital trade by accelerating capacity building, restricting limitations on cross-border flows of data, encouraging implementation of robust, future-proof, common, inter-operable and non-discriminatory e-commerce-related policies; removing existing market access barriers; and strengthening the rules of the road for digital trade through trade negotiations.

Government policy-makers should strive to set favorable conditions for the digital economy and encourage data-driven innovation while at the same time taking into account the interest of individuals and businesses alike in the protection of their personal data regardless of where it is stored, processed or transferred.

---

[100] OECD, *Measuring Digital Trade - Towards a Conceptual Framework* (2017), 3, accessed April 10, 2018, http://www.oecd.org/officialdocuments/publicdisplaydocu-mentpdf/?cote=STD/CSSP/WPTGS(2017)3&docLanguage=En
[101] UNCTAD (2017), op. cit.
[102] Congressional Research Service, *Digital trade and U.S. Trade Policy* (2017), accessed May 14, 2018, https://fas.org/sgp/crs/misc/R44565.pdf

Exhibit 18 | Used Cross-Border Bandwidth
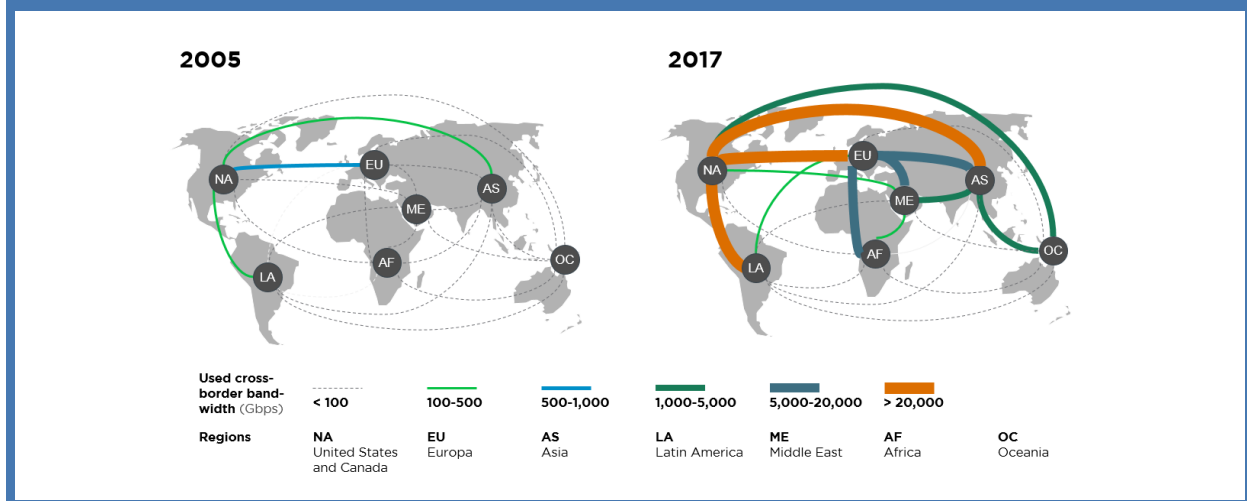
Note Lines represent interregional bandwidth (e.g., between Europe and Asia) but exclude intraregional cross-border bandwidth (e.g., connecting European nations with one another).

Source Global Internet Geography, *Capacity and Traffic Trends* (2017), 4.

RECOMMENDATION 16: IMPLEMENT ROBUST, FUTURE PROOF, COMMON, INTER-OPERABLE AND NONDISCRIMINATORY E-COMMERCE POLICIES ACROSS BORDERS

Rationale

International e-commerce is growing and is expected to reach us$424 billion by 2021, making up 15 percent of total ecommerce.[103] Contradictory and conflicting national policy approaches present a risk to cross-border e-commerce and cause fragmentation in the Internet ecosystem that limits market access and harms companies of all sizes, especially MSMEs with limited resources. While there may always be different national approaches and philosophies, they should be coordinated by agreeing on general principles and by developing interoperable mechanisms and cross-border protocols.

POLICY ACTIONS

16.1: **Coordinate cross-border aspects of Internet taxation, payment systems, data security and consumer protection.**

16.2: **Foster interoperable and technologically neutral global approaches to authentication.**

---

[103] Forrester, *Global cross-border e-commerce* (2016), accessed May 14, 2018, https://go.forrester.com/

16.3: **Establish dialogues on e-commerce related policies among G20 members and also with other countries.**

16.4: **Ensure all e-commerce related policies are aligned with existing international standards and guidelines,** such as the General Agreement on Trades in Services (GATS).

RECOMMENDATION 17: ENCOURAGE NEGOTIATIONS ON DIGITAL TRADE WITHIN THE WTO AND OTHER TRADE ORGANIZATIONS

Rationale

WTO law and other trade and investment agreements should provide a complete and up-to-date legal framework encompassing digital trade rules applicable to all sectors, including the Technical Barriers to Trade (TBT) principles. International trade organizations offer an enormous opportunity for governments, businesses, and citizens to establish strong global standards on free cross-border data flows, trade in digital products and services (including cross-border Wide Area Networks and other networking services), trade facilitation, regulatory coherence, and other identified legal gaps should be addressed. When resumed, TiSA (Trade in Services Agreement) negotiations should be used to reinforce such standards. Trade in services that complement digital trade and GVCs, such as law, accountancy and finance, should also be further liberalized.

POLICY ACTIONS

17.1: **Encourage a dialogue aiming at continuous negotiations on digital trade with the WTO and other trade organizations** such as APEC, MERCOSUR, Pacific Alliance, ASEAN and in their own trade agreement negotiations.

RECOMMENDATION 18: WORK TOWARDS CONSISTENT TAX RULES

Rationale

The digitalization of the economy has challenged existing tax systems, which were largely based on physical presence and not designed to cope with changing business models driven primarily by the growing digitalization of all industries. These challenges are being addressed by the G20 in the OECD-led project on Base Erosion and Profit Shifting (BEPS) which is currently being implemented and is scheduled to conclude in 2020. The BEPS process has led to significant changes in tax rules in many countries. Those changes are still underway, and it is still early to take stock of the results.

Members of the OECD Inclusive Framework are considering a reallocation of taxing rights from the countries where value is created to the ones where goods and services are consumed. Any agreement should be consensus-based, applied to the entire economy, and clearly define which taxing rights each government may assert and which taxing rights it is giving up.

POLICY ACTIONS   -53-

18.1: **Do not rush to enact new measures** until the effects of implementation of BEPS process are fully realized.

18.2: **Refrain from unilateral actions or interim measures** that could lead to double taxation, create significant uncertainty and negatively impact investment, innovation and growth, as policy-makers seek to adapt their tax frameworks to the continued digitalization of all industries.

18.3: **Continue to work together through the Inclusive Framework at the OECD to develop consistent and sustainable tax rules** that do not discriminate against any industry or specific group of companies. When determining the appropriate level of taxes on the digital ecosystem, governments should take into account taxes paid by companies in other jurisdictions as well as their own since double taxation discourages the introduction of new technology.

RECOMMENDATION 19: FOSTER INTEROPERABLE DATA PROTECTION AND PRIVACY PROTECTION STANDARDS

Rationale

Governments should develop frameworks for privacy and data protection with a clear and specific mission: to promote trust in data-driven technologies and ensure that organizations can use data in new ways that benefit people. The best way to achieve these goals is through principles-based frameworks that encourage companies to achieve certain outcomes (e.g., transparency around data processing, compliance with data protection rules) without prescribing the mechanisms or processes through which these outcomes should be pursued. A modern privacy framework should strive for interoperability and focus on developing incentives for responsible and accountable organizations, rather than on establishing blanket ex-ante prohibitions to the processing of information and to global data flows. Interoperability of data protection regimes is crucial. Only a mutual recognition of privacy standards will enable the cross-border flow of data required for an inclusive digital economy. Given the increasing number of data transactions in which individuals engage every day, privacy and data protection frameworks should recognize that consent is often not the best guarantor of privacy protections; constant requests for people's consent for data processing can actually undermine privacy by causing people to ignore important information about their data.

POLICY ACTIONS   -54-

19.1: Develop frameworks for privacy and data protection using as a reference the Privacy Guidelines provided by OECD.[104]

19.2: Seek to establish cross-border data transfer mechanisms wherever possible, to encourage the free flow of data while respecting privacy and data protection norms.

19.3: Foster portability of data (i.e., data transferred from one stakeholder to the next) which is key for the success of a data-driven economy and key to prevent lock-in effects.

RECOMMENDATION 20: AVOID DATA LOCALIZATION REQUIREMENTS, PROMOTE EFFICIENT DATA TRANSFER MECHANISMS AND REDUCE BARRIERS ON DIGITAL TRADE

Rationale

In a digital economy in which businesses leverage increasing amounts of data, it is vital to build resilience on cyber-attacks, then national policies that restrict cross-border data flows may have great impact in security. Big data and machine learning have the potential to drive improvements in our understanding of cyber-threats as well as innovative defensive technologies and strategies. However, when data are confined to a local environment, they cannot be aggregated and used to analyze the behavior or tools of malicious actors. As a result, organizations that operate across borders may not be able to take advantage of scale to improve the security of their products and services, and groups of organizations, such as within a sector, will be limited in leveraging cross-border information sharing and in pursuing coordination on defense.

Given the nature of today's globally interconnected economy, national policies that increase data processing and storing costs may also have a severe economic impact, as many sectors of the economy rely on digitally supplied services and goods. Manufacturing, agriculture and other exports sectors are dependent on having access to a broad range of services at competitive prices – such as logistics, retail distribution, finance or professional services – which in turn are heavily dependent on secure, cost-efficient and real time access to data across borders. When data must be confined and stored within a country, it does not merely affect social networks and email services, but potentially any business that uses the Internet to produce, deliver, and receive payments for their work, or to pay their salaries and taxes. The idea that data should be stored only within one country falls apart as soon as a business representative or citizen crosses a border and finds that they no longer have continuous access to their data.

---

[104] OECD, *OECD Privacy Guidelines* (2013), accessed May 21, 2018, http://www.oecd.org/sti/ieconomy/privacy-guidelines.htm

POLICY ACTIONS   -55-

20.1: Keep requirements to store data within a particular jurisdiction or locate computing facilities locally to a minimum, given that they present a significant obstacle to cross-border data flows and trade in services. Moreover, those requirements should be thoroughly justified and subject to challenge before this organism/institution if disguised as a restriction on trade.

20.2: Promote efficient transfer mechanisms of all forms of data across borders. Governments should favor interoperable mechanisms and standards for promoting privacy and security, as opposed to conflicting or unilateral restrictions which make it more difficult to protect data on a global basis.

20.3: Favor a level playing field among sectors and add new regulations only when there is a legitimate public policy objective and observed market failure. In addition, as set out in the OECD Internet Policy-making Principles, IP protection and enforcement and appropriate limitations of liability for intermediaries are important elements of a balanced policy framework that advances creativity and innovation.

20.4: Remove unnecessary barriers to cross-border law enforcement requests. Governments should focus on efforts to legitimate requests for digital evidence from foreign law authorities in light of the critical role that such evidence plays in law enforcement investigations, with clear rules for companies to provide digital evidence to governments where there are lawful needs, and in a manner that protects the rights of users; for example, by continuing to respect the Mutual Legal Assistance Treaty (MLAT) system while also improving its speed and effectiveness.

TOPIC 6: SUPPORT INNOVATION IN FINANCIAL TECHNOLOGY

Digitalization comes along with disruption and innovation across many industries and sectors, financial services is clearly one of them. New digital technologies are changing the way companies deliver financial services and, by driving efficiency gains that allow companies to cut costs and enabling a wider financial offer, improve traditional methods to promote financial inclusion. Financial inclusion is defined by the World Bank (WB) as "individuals and businesses having access to useful and affordable financial products and services that meet their needs - transactions, payments, savings, credit and insurance - delivered in a responsible and sustainable way." The WB's most recent data indicates that approximately 31 percent of the population across the world do not have a bank account, even though the Findex Database shows that almost all citizens are interested in having a bank account and being a part of the financial system (only 3% of survey respondents said "that the only reason for not having one is that they do not need one").[105, 106] This financial inclusion gap is unevenly distributed between developed and developing countries (in the latter, the unbanked are 37% of the population). This gap is even larger when studying the financial gender gap, supported by the difference in account ownership between men (72% of men own a bank account) and women (65% of women do).[107]

Not only unbanked people but also underbanked are part of the financial inclusion issue and represent a larger group that includes those currently owning a bank account but with restricted access to other financial products (e.g., credits[108]). This population group is also the target of Fintech and will have more access to certain advisory or services currently only available for high net worth individuals.

Fintech is defined as innovative, reinvented or enhanced financial services, delivered mainly over mobile and Internet. It has the potential to dramatically increase financial inclusion, especially in emerging markets; create financial efficiencies for SMEs, corporations, and governments; and create a stronger, more transparent financial ecosystem, particularly through the reduction of cash usage. Mobile phones, computers, or cards used over point-of-sale (POS) devices connect individuals and businesses to a digitized national payments infrastructure, enabling seamless transactions across all parties; this has a huge impact in terms of inclusion.

It is important to define Fintech activities broadly to ensure all of the following services are included:

- All types of financial services, such as payments; savings accounts; debit, credit or prepaid cards; insurance; credit; asset management and other financial products including both front-end and back-end activities.
- All types of users, including individuals at all income levels, businesses of all sizes, government entities at all levels and associations (e.g., NGOs).
- All types of providers of financial services, including banks, payments providers, insurers, other financial institutions, technology companies, start-ups and retailers.

---

[105] World Bank (2018), op. cit.
[106] World Bank (2018), op. cit.
[107] World Bank (2018), op. cit.
[108] For more detail on how can Fintech companies enhance access to financial products refer to: MIT, Filling the gap, How technology enables access to Finance for Small- and Medium - Sized Enterprises, accessed March 6, 2018, https://www.mitpressjournals.org/doi/pdf/10.1162/inov_a_00239

The adoption of these financial services can help improve economic performance and overall prosperity. As an example, some companies have successfully provided payment solutions for developing countries such as Kenya and Tanzania through mobile money, allowing poor people to engage in the financial system in a cheaper way. There are totally new ways to store and transfer money in safer ways than cash that Fintech activities can help develop. Another example could be the use of advanced analytics and Artificial Intelligence to complement traditional sources of information about customers in order to provide credit to unbanked people. New technologies are increasing the range of options and bringing new ways of approaching financial services. Investment in Fintech activities is expected to keep growing, reaching us$46 billion worldwide in 2020.[109] Given the positive effect that financial inclusion has on both people's welfare and GDP[110] and that Fintech activities have the potential to deeply affect how financial services are used by the population, we support the G20 authorities' work to ensure it is developed in the soundest manner, including eliminating current barriers for its adoption by all kind of players.

Exhibit 19 | Value of Global Fintech Investments in Billions U.S. dollars, from 2008 to 2020

Value of global Fin-tech investments in billions U.S. dollars
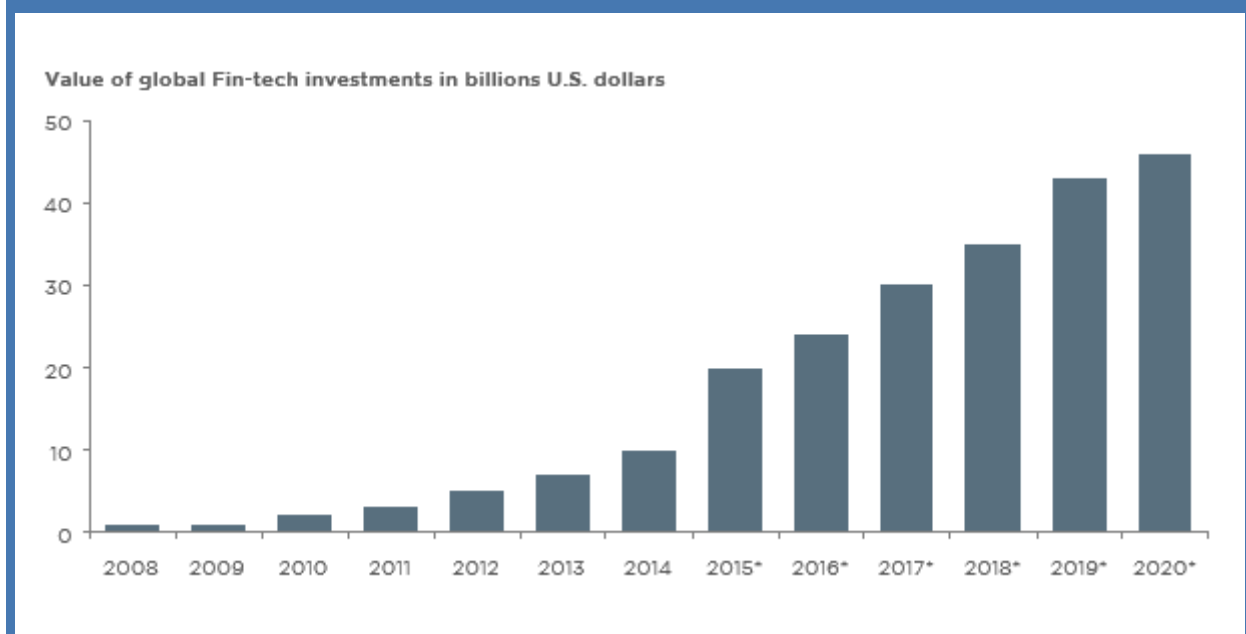
Note Years with "*" are forecasted

Note Statista, *Value of Fintech investments globally 2008-2020*, accessed February 28, 2018, https://www.statista.com/statistics/502378/value-of-fintech-investments-globally/.

---

[109] Statista, *Value of Fintech investments globally 2008-2020*, accessed February 28, 2018, https://www.statista.com/statistics/502378/value-of-fintech-investments-globally/

[110] IMF, *Identifying constraints to Financial Inclusion and Their Impact on GDP and Inequality: A structural framework for Policy* (2015), accessed February 27, 2018, https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Identifying-Constraints-to-Financial-Inclusion-and-Their-Impact-on-GDP-and-Inequality-A-42649

RECOMMENDATION 21: ADOPT FLEXIBLE POLICY FRAMEWORKS THAT ENABLE FINANCIAL TECHNOLOGY SERVICES BY PLAYERS FROM DIFFERENT SECTORS

Rationale

Governments should establish a framework that allows innovation to thrive. These regulatory frameworks should consider innovation, consumer protection and financial stability and integrity together with cybersecurity.

The Fintech ecosystem must allow all players involved to innovate. Collaboration among them is key for a balanced development of the ecosystem and it should be fostered. The regulatory framework should not be a barrier for this.

There are many different financial services that a company can provide (either directly by itself or through a large variety of partnership models, and different level of risk exposure). Consequently, if governments consider that Fintech activities should be regulated, then they must ensure that those policy frameworks (e.g., licenses to operate) are flexible enough to be aligned with services provided and the risk exposure, vis-à-vis the consumers, financial stability and integrity.

Regulatory framework definition must achieve a balance between opportunities of innovation and risk management by considering the funding source for each business model, isolating and differentiating risks for depositors and risks taken by companies' capital. They should also avoid stifling innovation and ensure regulated entities can continue partnerships with platforms to provide access to financial services for a wide variety of consumers. Current financial services regulatory and supervisory framework should be updated to meet innovation and greater financial inclusion.
In addition, Know Your Customer (KYC) rules should also be flexible (e.g., tiered KYC) for the ecosystem and modernized (e.g., video KYC in the Philippines, Germany or Spain). A tiered approach to KYC would allow governments to distinguish between lower risk and higher risk scenarios, and allow flexible options in line with the specific risks posed by different types of customers and transactions.

POLICY ACTIONS

21.1: Focus on promoting competition within all levels of the financial service value chain in order to avoid stifling innovation.

21.2: Update regulation in order to best meet innovation in financial services (e.g., digital AML based on risk, use of cloud infrastructure, digital onboarding, digital prevention methods, etc.).

21.3: Weigh heavily financial inclusion when designing the tiered approach to KYC given national and international goals around inclusion.

21.4: Promote and support innovative financial services by educating on how to use these kinds of services, helping to tackle potential trust concerns and promoting financial services benefits among the population.

RECOMMENDATION 22: HELP INDIVIDUALS CREATE A VALID DIGITAL IDENTITY

Rationale

One of the problems that Fintech activities face is the lack of a secure digital identity in a quick way. Companies providing these services need to cover this gap on their own, which is very costly especially in the case of start-ups and MSMEs, and very inefficient if all players need to repeat it.

To solve this, G20 members should promote a digital identity for their citizens that is valid throughout the country and, eventually, across G20 nations. This will also allow many citizens and consumers to engage in multiple services that require to validate identity both online and offline.

As a side benefit, this recommendation could potentially help address the problem that 1.1 billion people have regarding access to an ID (which has a disproportionate share of women and girls)[111], being thus aligned with the Sustainable Development Goals (SDG)[112].

The digital identity should allow individuals to sign digital documentation and provide personal information in a secure and rapid manner. Electronic identification and authentication together with digital on-boarding tools are two of the key enablers for digital interactions, including e-commerce. Technologies such as blockchain can support the security of digital identities.[113]

POLICY ACTIONS

22.1: **Promote public-private sector collaboration** since it is necessary to ensure interoperability.

22.2: **Educate consumers to appropriately manage their digital footprint and raise awareness on the consequences of a bad management of their personal data,** especially - but not limited to - in financial services.

---

[111] GSMA, *Understanding the identity gender gap: Insights and opportunities for mobile operators to help close the divide*, accessed March 16, 2018, https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2017/08/Understanding-the-Identity-Gender-Gap.pdf

[112] SDG 5: "Achieve gender equality and empower all women and girls"; SDG 16.9 "By 2030, provide legal identity for all, including birth registration"

[113] For more detail on how blockchain technology can enhance Digital Identity see: ID 2020 Alliance, *Strategic roadmap,* accessed March 6, 2018, https://id2020.org/

Exhibit 20 | Case Studies

Digital Identity initiatives: Aadhaar in India

In this respect, initiatives that enable the cross-border recognition of electronic means of identification and authentication should also be supported. Examples in this line involve the Indian government with the Aadhaar initiative for granting individuals digital ID that enables access to financial services. It consists in a number provided by the government and matched with biometric identification. As of 2018, Aadhaar has been used for more than 1.2bn identification numbers.[114]

RECOMMENDATION 23: FOSTER THE DEVELOPMENT OF ENABLING ARCHITECTURE AND COMMON STANDARDS

Rationale

Multiple legacy platforms coexist with new technologies and not always in the most efficient way. Regulatory coordination is key to avoid regulatory overlap and fragmentation. Fintech activities, have the ability to operate cross-borders and need a consistent framework consistent with innovation.

Market-led policies for interoperable wallet and payments ecosystem are positive to promote Fintech development and provide users with choice.

Another important piece of the architecture needed in Fintech is to successfully develop the capacity for customers to make fast, real-time payments and real-time cash in / cash out options. Governments should provide the policy framework flexibility to allow companies to offer such solutions.

Regulatory Sandboxes can be an additional tool to foster the development of the Fintech ecosystem. These are controlled environments that allow firms to test innovative products or services in a live market environment while ensuring that appropriate safeguards are in place. In this sense, the sandbox provides some tools to their participants; for example, restricted authorization, individual guidance, informal steers, waivers and no enforcement action letters.

One of the main advantages of a sandbox is that supervisors actively participate in them alongside companies, closely overseeing the innovation process. In this sense, sandboxes can be a very powerful tool at the service of both the private sector and regulators as they allow mutual learning about the risks and opportunities of applying new technologies while at the same time benefiting consumers and society in general. In order to better leverage sandboxes' benefits, governments should ensure all companies can participate and avoid transforming this useful tool into a bottleneck for innovation.

Regulatory tools could be helpful for both new financial entrants and established firms in order to foster innovation and collaboration among innovative businesses and financial authorities, thus helping them acquire a better understanding of

---

[114] Government of India, *Your Aadhaar*, accessed May 7, 2018, https://uidai.gov.in/your-aadhaar.html

innovative business models and market developments at an early stage.
Digital innovation should be fostered, driving the development of those technologies that pose clear benefits for consumers. Currently, companies spend money and time on workarounds for Fintech solutions to coexist with old technology that does not provide clear advantages to citizens.

POLICY ACTIONS

23.1: Promote regulation that does not imply the usage of a specific technology or solution.

23.2: Encourage companies to provide environments for cooperation such as Application programming interfaces (APIs) which allow the Fintech ecosystem to facilitate testing and connectivity to current systems which will accelerate cooperation, facilitating Fintech growth.

23.3: Consider regulatory tools such as sandboxes to foster innovation and collaboration with a consistent approach between different regulatory sandboxes.

23.4: Discourage technology that interferes with innovation such as checks or cash, incentivizing new digital payments option to thrive.

Exhibit 21 | Case Studies

Sandboxes' implementation in UK

Several authorities have already developed regulatory sandboxes as experimentation frameworks for innovative firms such as the Financial Conduct Authority (FCA) in UK, who launched its first sandbox in 2016. According to the FCA, indications suggest the sandbox is providing the benefits it set out to achieve with evidence of the sandbox enabling new products to be tested, reducing time and cost of getting innovative ideas to market, improving access to finance for innovators, and ensuring appropriate safeguards are built into new products and services. Additionally, FCA states that "at least 40 percent of the firms that completed testing in cohort 1, received investment during or following their sandbox, test."[115]

---

[115] FCA, *Global Sandbox* (2018), accessed May 20th, 2018, https://www.fca.org.uk/firms/regulatory-sandbox/global-sandbox

TOPIC 7: IMPROVE CYBERSECURITY

In this era of digitalization, where an increasing amount of information is shared among users, devices and machines, keeping the relevant data safe is of vital concern and a big challenge. Today, governments and industries are experiencing the benefits of integrating advanced technologies; meanwhile, they are also being affected by cyber intrusions and attacks, resulting in data breaches and disruptions to services. Thus, cybersecurity becomes one of the most relevant topics in the modern, digital world, and cyber-threats and cyber-attacks represent an important source of concern for G20 policy-makers.

International organizations (e.g., United Nations and the Group of Government Experts; United Nations Internet Governance Forum, IMF) have also expressed their concerns with cyber risks. For instance, cyber-crime had an economic impact of as much as us$600 billion in 2017[116] and according to estimates, this value will keep growing in the years to come.[117]

We as B20 address cybersecurity in the context of the discussion of each of the six topics detailed in sections 1 to 6 of this Paper.

Achieving a high degree of cybersecurity is key to strengthening confidence and trust in the benefits of digital transformation. Policy-makers should define perspectives and consolidate agreements to recognize and mitigate the risks derived from growth of digital activities.

RECOMMENDATION 24: PARTNER WITH INDUSTRY TO PROMOTE HOLISTIC CYBERSECURITY AND CYBER-RISK MANAGEMENT AND ALIGN ON CYBERSECURITY AND CYBER-RISK FRAMEWORKS

Rationale

As digital economy and Industry 4.0 systems leverage ICT for more functions and as suppliers are increasingly interconnected, governments should partner with industry to work towards making the digital ecosystem more resilient to cyber-attacks to ensure the protection of critical infrastructures, essential services, intellectual property and other sensitive data as well as uninterrupted business operations. Governments and businesses have a joint responsibility to protect and empower people globally, to partner with others and increase the security of our technology to assure cybersecurity and to combat offensive cyber capabilities by criminals, terrorists, and other threats, avoiding damaging trust in the online environment. As an example of such a partnership, 34 global companies recently committed to protect and empower civilians online and to improve the security, stability and resilience of cyberspace. In this ''Cybersecurity Tech Accord'' they agreed to defend all customers everywhere from malicious attacks.[118]

Moreover, and as highlighted in last year's B20 policy paper on the topic of digitalization, governments must continue to recognize the importance of aligning

---

[116] McAfee, *Economic Impact of Cybercrime Report* (2017) ,accessed May 2, 2018, https://www.mcafee.com/us/solutions/lp/economics-cybercrime.html

[117] Cybersecurity ventures, *Annual Cybercrime Report* (2017), accessed May 2, 2018, https://cybersecurityventures.com/hackerpocalypse-cybercrime-report-2016/

[118] Cybersecurity Tech Accord, *Signing pledge to fight cyberattacks, 34 leading companies promise equal protection for customers worldwide*, accessed May 25, 2018, https://cybertechaccord.org/?utm_source=t.co&utm_medium=referral

cybersecurity baseline frameworks across sectors and geographies since it is essential to avoid regulatory fragmentation.

A first important step would be an explicit commitment to promote the alignment between companies and governments on a globally accepted risk-based, principles-based framework for cyber-risks that enhances the cyber resilience and stability of the different industries.[119]

Together, governments and industry should promote holistic cybersecurity risk management, encouraging organizations to: identify their digital infrastructure and assess potential risks to it; protect their data, networks, systems, and services; put in place technologies and processes to detect anomalies that should be further investigated; and prepare to respond to and recover from incidents. People and citizens should be included in this holistic approach to engage all the relevant stakeholders.

Around the world, as governments develop cybersecurity policies, laws, and regulation to drive the use of baseline cybersecurity measures, they should work with industry to promote holistic cybersecurity risk management, fostering a focus on continuous improvement in a dynamic ecosystem (e.g., Global trade and commerce, business relations, global digital supply chain).The responsibility among the ecosystem is very vital for the adoption of baseline cybersecurity measures. In addition, it is critical that the cybersecurity frameworks and measures resulting from such efforts are interoperable globally and across sectors, ensuring that all companies, including MSMEs, can integrate into the global economy, leverage the most effective cybersecurity solutions, and advance through shared learning based on a common baseline. Cyber-threats threaten infrastructure and businesses globally, thus requiring standards as common as possible. The use of international standards can facilitate the development and implementation of cybersecurity frameworks and measures that are interoperable globally and across sectors, which will advance global security and enable MSME market access beyond their national ecosystem.

Given the cross-border and cross-sector nature of cyber-threats, coherent frameworks and common standards would:

- Reduce and lessen future competing regulatory and compliance burdens, offering the private sector increased regulatory predictability, vital for investments in cybersecurity.
- Enable more effective internationally-coordinated incident responses, and support increased multilateral legal cooperation.
- Avoid regulatory fragmentation among countries.
- Allow global organizations to develop a holistic, forward-looking and meaningful view of the threat landscape.
- Facilitate a streamlined regulatory approach and the breakdown of supervisory silos, across borders and sectors, to accommodate better management of cyber and privacy risks.

---

[119] Other examples include the COBIT framework or recent cybersecurity recommendations done by the European Union

POLICY ACTIONS

24.1: Hedge the impact of cyber-crime and create a common basis of trust across globalized markets with all stakeholders to work together.

24.2: Take responsibility at the highest levels of government and industry, which has to be reflected by clear targets and measures in the respective organizations.

24.3: Deepen common understanding among stakeholders (technical community, academy and policy-makers) of cybersecurity requirements and ensure that modern rules and standards required to continuously develop and adapt technologies in the field of cybersecurity are established and adhered to.[120]

24.4: Develop a coherent cyber-threat testing framework for significant market participants and infrastructures.

24.5: Start building this baseline to set a starting point for involved countries from where they should commit to engage in increasingly ambitious frameworks, especially in a context of an increasing Internet penetration rate.

Exhibit 22 | Case Studies

ISO/IEC standards

Examples of standards suggested are the ISO/IEC 27103, "Cybersecurity and ISO and IEC Standards," is a recently published document, developed through ISO/IEC JTC 1 that integrates a holistic approach to cybersecurity risk management as well as a range of international standards with detailed guidance.[121] Governments can leverage ISO/IEC 27103 as a guide or reference as they develop cybersecurity policies, laws, and regulation to drive the use of baseline cybersecurity measures, fostering continuous improvement and supporting market interoperability.

RECOMMENDATION 25: WORK TOWARDS A PLATFORM TO SHARE INFORMATION ON CYBERSECURITY GLOBALLY AND ACROSS SECTORS

Rationale

One of the key pillars in strengthening global cybersecurity is the timely and efficient exchange of information relevant to cybersecurity between stakeholders and across sectors. This must be done, recognizing the existent information sharing efforts, both nationally and industry-specific (e.g., Computer Emergency Response Team for the

---

[120] Siemens, together with partners from industry, government, and society announced at the Munich Security Conference in February 2018 a "Charter of Trust" (www.charter-of-trust.com) detailing this topic
[121] ISO, *Information technology -- Security techniques -- Cybersecurity and ISO and IEC Standards* (2018),accessed May 7, https://www.iso.org/standard/72437.html;%20https://webstore.iec.ch/publica-tion/62742.%20ISO/IEC%2027103

EU[122], Cyber Threat Alliance, Open Threat Exchange, etc.).[123] Currently, there are barriers to information sharing on cyber-threats due to confidentiality issues and legal constraints (such as regulatory consequences, penalties and exposure to legal actions) that should be addressed by governments. All models should be scalable for sharing data without compromising sources and methods (in the case of government-provided threat intelligence) or privacy (in the case of private-sector-provided intelligence). According to the World Economic Forum, the key questions and trade-offs to be answered are[124]:

- Who is involved in an intelligence-sharing relationship?
- What will be shared (i.e., raw data or analyzed intelligence)?
- How will information be shared and through which tool/platform?
- Is sharing mandated?

For effective information sharing networks, for example, appropriate protections from public disclosure under Freedom of Information legislation or other national transparency laws.

POLICY ACTIONS

25.1: Encourage research, data and intelligence sharing among stakeholders from the private and public sector (especially governments, critical infrastructure providers, and technology providers) by providing adequate exchange platforms and releasing select intelligence on cyber-threats.

25.2: Work with industry to identify changes in regulations or policies that would encourage companies to more freely share information regarding cyber incidents and their risk management practices.

Exhibit 23 | Case Studies

Automated Indicator Sharing (AIS) of the US Department of Homeland Security (DHS)

This is a voluntary and automated cyber-threat sharing program to facilitate collaboration between the public and private sectors.[125] AIS is automated such that threats at network speed can be addressed almost as quickly as they materialize. It addresses privacy and confidentiality concerns by providing a limited safe harbor and requiring review for and removal of irrelevant personally identifiable information prior to sharing threat intelligence. One lesson learned from the AIS is the difficulty of obtaining traction for any voluntary threat intelligence sharing program which can be supported by an active contribution from the public sector which might lead to

---

[122] EASA, *What is CERT-EU, what is its role?*, accessed June 7th, 2018https://www.easa.europa.eu/faq/24266
[123] Cyber Threat Alliance (CTA), *What is the cyber threat alliance?*, accessed May 18, 2018, https://www.cyber-threatalliance.org/
[124] WEF, *Cyber Resilience - Playbook for Public-Private Collaboration* (2018), accessed March 20, 2018, http://www3.weforum.org/docs/WEF_Cyber_Resilience_Playbook.pdf
[125] U.S. Department of Homeland Security, *Automated Indicator Sharing* (2017), accessed March 20, 2018, https://www.dhs.gov/ais

a broader acceptance of the platform, thus creating incentive for more and more stakeholders to join.

RECOMMENDATION 26: COMMIT TO PROMOTING RESPONSIBLE NATION STATE BEHAVIOR IN CYBERSPACE

Rationale

The G20 should work to reduce threats and support global connectivity by working to clarify international norms surrounding the responsible behavior of states in cyberspace. The development of recognized international norms in cyberspace that promote a stable ecosystem that protects cross-border data flows and free expression can build on previous agreements reached by the G20, as well as by the UN Group of Government Experts (UNGGE). In 2015, the UNGGE established voluntary guidelines to govern state behavior in cyberspace that could, over time, develop into customary international law. In the same year, the G20 Leaders' Communiqué established that existing international law applies to government activity in cyberspace.

Despite previous support for international norms and the application of international law, cyber-crimes continue escalating every year. In 2017, cyber-attacks were prominent, including during the Wannacry ransomware attack that affected hundreds of thousands of computers, disrupted businesses across 150 different countries and led to total estimated damage of us$4 billion.[126] This all underscores the need for the G20 to support the resumption of discussions leading towards an improved understanding of, and consensus regarding, the ways in which existing international law govern state behavior online.

POLICY ACTIONS

26.1: **Promote a reinvigorated international dialogue on the best ways to promote responsible state behavior online,** in a multi stakeholder way that includes participation from industry, civil society, academia, and the technical community.

26.2: **Leverage previous agreements on norms,** which the G20 was instrumental in establishing, providing a roadmap for future discussions and the establishment of more specific standards.

---

[126] Cybersecurity Ventures, *Ransomware Damage Report* (2017), accessed March 20, 2018, https://cybersecuri-tyventures.com/ransomware-damage-report-2017-5-billion/; CBS News, *Wannacry ransomware attack losses could reach us$ 4 Bn* (2017), accessed March 20, 2018, https://www.cbsnews.com/news/wannacry-ransomware-attacks-wannacry-virus-losses/

RECOMMENDATION 27: AGREE ON A MINIMUM SET OF PRINCIPLES TO REDUCE CYBER-RISK AND PROTECT CITIZEN INFORMATION

Rationale

In addition to assuring the integrity of citizens and companies' data, G20 countries should commit to protecting the confidentiality of their data regardless of the company that provides them a service. Examples of these data are the Personally Identifiable Information (PII),[127] which represent a sensitive set of information for most of the population. The importance of protecting it takes relevance in a digitized world with large amounts of data.

In addition, confidentiality is meaningful determinant for some businesses such as the value of the financial data (e.g., leaked information may impact the value of financial instruments).

POLICY ACTIONS

27.1: Promote coordination between the private (both traditional and innovative companies) and public sector since it will benefit both consumers, companies and regulators.

27.2: Seek to engage in more ambitious cybersecurity policies while supporting the private sector in complying with them, especially in the cases which might represent a burden (small companies) to avoid deterring innovation while ensuring that the required level of cybersecurity is proportional to the information handled by each company.

---

[127]"The term "personally identifiable information" refers to information which can be used to distinguish or trace an individual's identity, such as their name, social security number, biometric records, etc. alone, or when combined with other personal or identifying information which is linked or linkable to a specific individual, such as date and place of birth, mother's maiden name, etc." (Office of Management and Budget, Memorandum for the heads of executive departments and agencies (2007), accessed March 22, 2018, https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/memoranda/2007/m07-16.pdf

ANNEX

SCHEDULE OF TASK FORCE EXCHANGES

#	Date	Location	Theme
1	February 12th, 2018	Teleconference	Task Force Kick-Off: topic selection based on survey results
2	March 12th, 2018	Bilbao, Spain	1st in person meeting: discuss first draft
3	April 26th, 2018	Teleconference	2nd call: review 1st iteration cycle and 2nd draft
4	May 28th, 2018	Paris, France	Joint Task Force Meeting: discuss 3rd draft
5	June 21st, 2018	Teleconference	3rd call: close final draft
6	July 30th, 2018	Buenos Aires, Argentina	G20/B20 Digital Economy Summit: 1st advocacy meeting
7	October 5th, 2018	Buenos Aires, Argentina	B20 Summit: 2nd advocacy meeting

TASK FORCE MEMBERSHIP LIST

Name	Company/Organization	Country	Deputy

COORDINATION GROUP

Name	Company/Organization	Country	Deputy
Chair			
Marcos Galperín	MERCADOLIBRE	ARGENTINA	Jacobo Cohen Imach
Co-Chairs			
Pierre Nanterme	ACCENTURE	FRANCE	Laurence Morvan
Flavia Alves	FACEBOOK	UNITED STATES	Paula Vargas
Rory MacFarquhar	GOOGLE	UNITED STATES	
Jan Mrosik	SIEMENS AG / DIGITAL FACTORY DIVISION	GERMANY	Adrian Alejandro Magra
Carlos Moltini	TELECOM ARGENTINA	ARGENTINA	Pedro Lopez Matheu
Deep Kapuria	THE HI - TECH GROUP	INDIA	Pranav Kumar
Pablo Di Si	VOLKSWAGEN SAM REGION	GERMANY	Hernán Vázquez
B20 Sherpa			
Fernando Landa	BUSINESS 20	INTERNATIONAL	Pilar Toyos
Knowledge Partner			
Jorge Becerra	THE BOSTON CONSULTING GROUP	UNITED STATES	Joaquin Drewanz
Rodrigo Rivera	THE BOSTON CONSULTING GROUP	UNITED STATES	
Hernan Nicolas Veitman	THE BOSTON CONSULTING GROUP	UNITED STATES	
Jorge Becerra	THE BOSTON CONSULTING GROUP	UNITED STATES	Joaquin Drewanz
Rodrigo Rivera	THE BOSTON CONSULTING GROUP	UNITED STATES	
Concept Partner			
Agustin Javier Saenz Fernandez	TECNALIA RESEARCH AND INNOVATION	SPAIN	
Network Partner			
Nicole Primmer	BUSINESS AT THE OECD	INTERNATIONAL	
Sebastien Louvet	GLOBAL BUSINESS COALITION (GBC)	INTERNATIONAL	
Members			
Matias Fernandez Diaz	MERCADO LIBRE	ARGENTINA	
Pablo Casey	TELECOM ARGENTINA	ARGENTINA	
Christoph Steck	TELEFÓNICA SA	SPAIN	Gonzalo Lopez-Barajas Huder
Tomás Canosa	UNIÓN INDUSTRIAL ARGENTINA	ARGENTINA	
María Angela Stelzer	VOLKSWAGEN ARGENTINA SA	GERMANY	
Víctor Dosoretz	CÁMARA ARGENTINA COMERCIO Y SERVICIOS (CACS)	ARGENTINA	Maria Laura Sluga

Name	Company/Organization	Country	Deputy
TASK FORCE MEMBERS			
David Fares	21ST CENTURY FOX	UNITED STATES	
Gonzalo Santamarina	ABECEB	ARGENTINA	
Sergio Kaufman	ACCENTURE	ARGENTINA	Camila Aisenberg
Juan Piano	ADEBA	ARGENTINA	
Eduardo Lapiduz	AFARTE	ARGENTINA	
Isaac Aggrey	AFRICAN SOCIAL ENTREPRENEURS NETWORK	SOUTH AFRICA	
Ariel Esteban Cagigal	AGCO DO BRASIL SOLUÇÕES AGRÍCOLAS	BRAZIL	
Josefina Hernández Gascón	AMERICAN TOWER	ARGENTINA	Gabriel Speratti
María de los Ángeles Yanez Acosta	AMIS AMIS ASOCIACIÓN MEXICANA DE INSTITUCIONES DE SEGUROS	MEXICO	
Mehfooz Ali	AMP CAPITAL INVESTORS	AUSTRALIA	
Sandeep Dixit	APTRI, RESEARCH & PERFORMANCE CONSULTING ARM OF ADANI POWER LTD.	INDIA	
Fabian Bensabath	ARCELORMITTAL	ARGENTINA	
Mercedes Galinidez	ARGENTINE CHAMBER OF BIOTECHNOLOGY	ARGENTINA	
Daniel Dessein	ASOCIACIÓN DE ENTIDADES PERIODÍSTICAS ARGENTINAS - ADEPA	ARGENTINA	
Fernando Rodríguez Canedo	ASOCIACION DE FABRICANTES DE AUTOMOTORES	ARGENTINA	Hernan Bardi
Silvio Zurzolo	ASOCIACIÓN DE INDUSTRIALES DE LA PROVINCIA DE BUENOS AIRES ADIBA	ARGENTINA	
Damian Altgelt	ASOCIACIÓN EMPRESARIA ARGENTINA	ARGENTINA	
Gonzalo Navarro	ASOCIACIÓN LATINOAMERICANA DE INTERNET (ALAI)	LATAM	Adela Goberna
Kevin Heidenreich	ASSOCIATION OF GERMAN CHAMBERS OF INDUSTRY AND COMMERCE (DIHK)	GERMANY	
María Juana Torresin	ASTILLERO COSERENA	ARGENTINA	

Saurabh Jindal	AUROUS PARTNERS CONSULTING PRIVATE LIMITED	INDIA	
Giacchi	AUSTRALIAN TRADE AND INVEST-MENT COMMISSION (AUSTRADE)	AUSTRALIA	
Louise McGrath	AUSTRALIAN INDUSTRY GROUP (AIG)	AUSTRALIA	
Marisa Andrea Lupi	BANCO SANTANDER RIO	SPAIN	Maximiliano Ureta Tomas
Jaya Vohra	BARCLAYS BANK PLC	UNITED KINGDOM	
María Llorente	BBVA	SPAIN	Álvaro Martín
Martín Ezequiel Zarich	BBVA FRANCÉS	SPAIN	
Zhen Liu	BEIJING BYTEDANCE TECHNOLOGY CO., LTD.	CHINA	Fuping Zhang
He Sun	BEIJING MOBIKE TECHNOLOGY LTD.	CHINA	
Olga Kayayan	BONISWA CORPORATE SOLUTUIONS	SOUTH AFRICA	
Fabio Almeida Ribeiro de Castro	BRASKEM SA	BRAZIL	
María Etienne Baigorri	BRIDGESTONE	UNITED STATES	
Juan Ignacio Diddi	BRISTOL MYERS SQUIBB	ARGENTINA	
Thomas Whitehead	BT	UNITED KINGDOM	Tilmann Kupfer
Pablo Hernan Orlando	BUENOS AIRES STOCK EXCHANGE	ARGENTINA	Maria Laura Or-lando
Eduardo Gruneisen	CÁMARA ARGENTINA COMERCIO Y SERVICIOS	ARGENTINA	Sebastian Ferrari
Francisco Amato	CÁMARA ARGENTINA COMERCIO Y SERVICIOS JÓVEN	ARGENTINA	
Gustavo Sambucetti	CÁMARA ARGENTINA DE COMERCIO ELECTRÓNICO	ARGENTINA	
Ariel Graizer	CÁMARA ARGENTINA DE INTERNET (CABASE)	ARGENTINA	
Martín Fraguío	CÁMARA DE COMERCIO ARGENTINO BRITÁNICA	UNITED KINGDOM	
Guillermo Ignacio Gerth	CÁMARA DE COMERCIO ARGEN-TINO-ÁRABE	ARGENTINA	
Alberto Rodriguez	CAMARA DE LA INDUSTRIA ACEI-TERA DE LA REPUBLICA ARGENTINA (CIARA)	ARGENTINA	

Melero Manuel	CÁMARA NACIONAL DE COMERCIO	ARGENTINA	María Ignacia Rodríguez
Andres German Ciambotti	CARLOS BOERO SRL	ARGENTINA	
Daniel Mendelberg	CARVAJAL TECNOLOGÍA Y SERVICIOS SRL	ARGENTINA	
Rafael Fonseca	CATERPILLAR BRAZIL	BRAZIL	Jerson Dotti
Pierre Goguet	CCI FRANCE	FRANCE	Alain Di Crescenzo
Fei Yu	CHINA CHAMBER OF INTERNATIONAL COMMERCE	CHINA	
Yuan Zhang	CHINA COUNCIL FOR THE PROMOTION OF INTERNATIONAL TRADE	CHINA	
Hao Ping	CHINA NATIONAL MACHINERY INDUSTRY CORPORATION (SINOMACH)	CHINA	Li Nan
Hu Bin	CHINASECURITIES (INTERNATIONAL) FINANCE HOLDING COMPANY LIMITED	CHINA	
Norberto Capellan	CICOMRA - CÁMARA DE INFORMÁTICA Y COMUNICACIONES DE LA REPÚBLICA ARGENTINA	ARGENTINA	
Jennifer Smtih	CITI	UNITED STATES	
Leonardo Bracco	CLOUDHESIVE LATAM	ARGENTINA	
Daniel Afione	COMITE MIXTO EMPRESARIAL ARGENTINO JAPONÉS	ARGENTINA	
Christian Borggreen	COMPUTER & COMMUNICATIONS INDUSTRY ASSOCIATION	UNITED STATES	Rachael Stelly
Juan Pablo Bazan	CONFEDERACION ARGENTINA DE LA MEDIANA EMPRESA (CAME)	ARGENTINA	
Amin Anchondo Alvarez	COPARMEX	MEXICO	
Gianluigi Carlo Viscardi	COSBERG S.P.A.	ITALY	Valentina Carlini
Chen Yuqing Chen	DAHUA TECHNOLOGY CO.,LTD	CHINA	
Paige Fetzer	DELL TECHNOLOGIES	UNITED STATES	
Diego Casali	DICSYS	ARGENTINA	
Chengjun Pang	DIDI CHUXING	CHINA	Jian Xiong
Francisco Barreto	DIRECTV	UNITED STATES	

Marcos Anzorreguy	DIRECTV / AT&T	UNITED STATES	
Nicola Altobelli	ECEPLAST / CONFINDUSTRIA	ITALY	
Felipe Ignacio Weiss	ELEPRINT SA	ARGENTINA	
Andres Lawson	EMPORIOCOMMERCE | MERCADO-PRESTA | VC INVESTOR	ARGENTINA	
Rene Summer	ERICSSON	SWEDEN	Facundo Fernandez Begni
Alexander Kulitz	ESTA APPARATEBAU GMBH&CO.KG	GERMANY	
Eric Lenoir	EULER HERMES FRANCE	FRANCE	Nazur Yamil
Lingwu Xia	EVERBRIGHT YUNFU INTERNET CO.,LTD	CHINA	Bing Han
Gustavo Rousseaux	EY	UNITED KINGDOM	
Dieter Kempf	FEDERATION OF GERMAN INDUSTRIES (BDI)	GERMANY	Thomas Koenen
Stormy-Annika Mildner	FEDERATION OF GERMAN INDUSTRIES (BDI)	GERMANY	Lea Spörcke
Chi-Sung Eom	FEDERATION OF KOREAN INDUSTRIES	SOUTH KOREA	
Kin Wa Kwok	FOREMOSTAR (NANCHANG) PROPERTY DEVELOPMENT LIMITED	CHINA	
Gabriela Cannatelli	FRESENIUS MEDICAL CARE ARGENTINA SA	ARGENTINA	
Loreto Leyton	FUNDACIÓN CHILENA DEL PACÍ FICO	CHILE	Mauricio Rodriguez
Alejandro Bongiovanni	FUNDACIÓN LIBERTAD	ARGENTINA	
Jinjie Xu	FUTONG GROUP CO., LTD.	CHINA	
Alejandra Fehrmann	GA GRUPO ASSA	ARGENTINA	
Federico Ovejero Federico	GENERAL MOTORS	UNITED STATES	Leonardo Pomeranchik
Indra Hadeler	GESAMTMETALL	GERMANY	Robert Thurm
Samuel Salloum	GLOBAL COALITION FOR EFFICIENT LOGISTICS	INTERNATIONAL	Vadlamani Bhatt
Dolores Cortés	GOBIERNO DE LA CIUDAD DE BUENOS AIRES - MINISTERIO DE MODERNIZACIÓN	ARGENTINA	
Mark Minevich	GOING GLOBAL VENTURES INC. / US	UNITED STATES	

	COUNCIL ON COMPETITIVENESS / UNOPS/ GEM		
Rodrígo Perez Graziano	GROUPE PSA - PEUGEOT CITROËN ARGENTINA S.A.	FRANCE	Diego Kukulanski
Martín Etchevers	GRUPO CLARÍN	ARGENTINA	Nicolás de Anchorena
Magdalena Gruneisen	GRUPO IHLSA	ARGENTINA	Eduardo Gruneisen
Graciela Ciccia	GRUPO INSUD	ARGENTINA	
Luis Galli	GRUPO NEWSAN	ARGENTINA	Juan Moine
Gabriela Macagni	GRUPO SUPERVIELLE - WOMEN CORPORATE DIRECTORS	FRANCE	
Alejandro Sebastian Gentile	GRUPO TECHINT	ARGENTINA	Tadeo Vazquez
Sebastian Martín Cabello	GSMA	ARGENTINA	Paloma Szerman
Cui Genliang	HENGTONG GROUP CO., LTD	CHINA	
Andres De La Cadena	HONEYWELL	COLOMBIA	
Yafei Jiang	HUAWEI TECHNOLOGIES CO., LTD.	CHINA	Tao Huang
Carlos Gasco	IBERDROLA	SPAIN	Celia Roldan
Roberto Alexander	IBM	UNITED STATES	Marcos Melis
Carlos Pan	INDUSTRIAS GUIDI	ARGENTINA	
Mariano Javier Luna	INNOVALIA GROUP	SPAIN	
Antonio Burinato	INNOVAWAY	ITALY	Francesca Schiavone
Sergio Arzeni	INSME - INTERNATIONAL NETWORK FOR SME	ITALY	
Rocio Restaino	INTERBRAND	ARGENTINA	
Elizabeth Thomas-Raynaud	INTERNATIONAL CHAMBER OF COMMERCE	INTERNATIONAL	Sophie Tomlinson
Juan Pedro Córica	INTI	ARGENTINA	
Mouataz Zreika	ITECH MANAGEMENT CONSULTANCY	AUSTRALIA	
Ashley Friedman	ITI	UNITED STATES	Cody Ankeny
Hui Zhang	JIANGSU MAN YUN SOFTWARE TECHNOLOGY CO., LTD(YMM)	CHINA	Qiang Xu
Alejandro Mestre	JLM INDUSTRIA S.A.	ARGENTINA	

Inés Chediack	JOSE J CHEDIACK SA	ARGENTINA	
HongXiang Lu	JUMORE E-COMMERCE CO,.LTD	CHINA	
Gustavo D Adamo	KAESER COMPRESORES DE ARGEN-TINA S.R.L:	GERMANY	
Naoko Ogawa	KEIDANREN (JAPAN BUSINESS FED-ERATION)	JAPAN	
Tamer Saka	KIBAR HOLDING	TURKEY	
Chang-Gyu Hwang	KOREA TELECOM	KOREA, REPUBLIC OF	Sun Joo Lee
Clara Cardinal	KORN FERRY	UNITED STATES	
Jacob Ninan	KOTTACKAL BUSINESS SOLUTIONS PVT. LTD.	INDIA	
Walter Risi	KPMG	NETHERLANDS	Nicolas Manavella
Wei Lixin	LENOVO GROUP	CHINA	
Patricia Eydallin	LIAG ARGENTINA	ARGENTINA	
Jose A. Llorente	LLORENTE & CUENCA	SPAIN	
Marcelo Roitman	MANPOWERGROUP ARGENTINA	ARGENTINA	
Sahra English	MASTERCARD	UNITED STATES	
Oliver Yaros	MAYER BROWN INTERNATIONAL LLP	UNITED KINGDOM	
Vanessa de Saint Blan-quat	MEDEF	FRANCE	Fiquemont Pauline
Maike Becker-Krüger	MERCK	GERMANY	
Carolyn Nguyen	MICROSOFT	UNITED STATES	Ezequiel Glinsky
Gus Ogunlowo	MINDS IN TECH	NIGERIA	
Cecilia Inciarte	MONSANTO	UNITED STATES	
Germán Greco	MOTOROLA MOBILITY OF ARGEN-TINA	UNITED STATES	Martín Errante
Guo Fu Xi	NARI GROUP COR. PORATION	CHINA	Li
Vinicius Fornari	NATIONAL CONFEDERATION OF IN-DUSTRY	BRAZIL	
Boris Pastukhov	NATIONAL MEDICAL COMPANY	RUSSIAN FEDERA-TION	
Jose Papo	NIKE INC.	UNITED STATES	

Celedonio von Wuthe-nau	NOKIA	FINLAND	
Keynes C Li Li	NU SKIN (CHINA) DAILY-USE & HEALTH PRODUCTS CO., LTD.	CHINA	Wei Xiong
Molly Lesher	OECD	INTERNATIONAL	Raffaella Centurelli
Christopher Sherwood	OLX GROUP (PART OF NASPERS)	SOUTH AFRICA	
Petillault Pierre	ORANGE	FRANCE	Allaire Martine
Feng Jianfeng	OSELL CHINA	CHINA	
Deborah Biber	PACIFIC BASIN ECONOMIC COUNCIL	HONG KONG	
Usman Ahmed	PAYPAL INC.	UNITED STATES	
Cassandra Kelly	POTTINGER	AUSTRALIA	John Sheehy
Diego Maffeo	PRISMA MEDIOS DE PAGO	ARGENTINA	Juan Francisco Roza Alconada
Fabio De Felice	PROTOM GROUP S.P.A.	ITALY	
Andrea Cotrufo	QUANTUM INVESTMENTS	ITALY	
Andrea Alicia Avila	RANDSTAD	NETHERLANDS	
Maximiliano Schellhas	RANDSTAD	NETHERLANDS	
Alistair Tebbit	RELX GROUP	UNITED KINGDOM	
Hernan Maria Bardi	RENAULT ARGENTINA S.A.	FRANCE	
Fernando Alonso de la Vega	REPSOL, S.A.	SPAIN	Marta Camacho Parejo
Marcelo Tarkieltaub	ROCKWELL AUTOMATION	ARGENTINA	Luciano Marrazzo
Luis Rossano	RPC CONSULTING GROUP	MEXICO	
Evgeny Melnikov	RUSSIAN UNION OF INDUSTRIALISTS AND ENTREPRENEURS	RUSSIAN FEDERA-TION	
Meral Eredenk Kurdas	SABANCÄ3 HOLDING	TURKEY	
Sebastien Philippe De-larive	SANOFI	FRANCE	
Tegge Andreas	SAP SE	GERMANY	
Jon Lezamiz	SIEMENS GAMESA RENEWABLE EN-ERGY	SPAIN	Claudia Grotz
Fernando Lobos	SINERGIUM BIOTECH S.A.	ARGENTINA	

			Maria Esperanza Frio Alconcel
Janet Ang	SINGAPORE BUSINESS FEDERATION	SINGAPORE	Maria Esperanza Frio Alconcel
Horacio Luis Fernan-dez Delpech	SKYONLINE	ARGENTINA	
Simon Janin	SOCIÉTÉ GÉNÉRALE	FRANCE	
Ziyavudin Magomedov	SUMMA GROUP	RUSSIAN FEDERA-TION	Leyla Mammadzada
Carlos López Blanco	TELEFÓNICA SA	SPAIN	Christoph Steck
Pablo Andres Recalt	TELESPAZIO ARGENTINA	ARGENTINA	
André Körtgen	THALES DEUTSCHLAND	GERMANY	
Sarp Kalkan	THE UNION OF CHAMBERS AND COMMODITY EXCHANGES OF TUR-KEY (TOBB)	TURKEY	Irfan Demiroren
Ellen Blackler	THE WALT DISNEY COMPANY	UNITED STATES	Michael Lebovich
José Félix Domínguez	THOMSON REUTERS	ARGENTINA	
Nursen Numanoglu	TURKISH INDUSTRY AND BUSINESS ASSOCIATION (TUSIAD)	TURKEY	
Barbara Wanner	U.S. COUNCIL FOR INTERNATIONAL BUSINESS	UNITED STATES	Erin Breitenbucher
Matthew Devlin	UBER	UNITED STATES	Mariano Otero
Diego Coatz	UNIÓN INDUSTRIAL ARGENTINA (UIA)	ARGENTINA	Fernando García Díaz
Tidhar Wald	UNITED NATIONS/BETTER THAN CASH ALLIANCE	INTERNATIONAL	Marjolaine Chain-treau
Kara Sutton	US CHAMBER OF COMMERCE	UNITED STATES	Sean Heather
Gabriela Renaudo	VISA	UNITED STATES	Alejandro Hansen
Veronica Beatriz Binaghi	VISTEON SA	ARGENTINA	
Ines Leopoldo	YPF	ARGENTINA	
Alexandr Smolensky	ZYFRA	RUSSIAN FEDERA-TION	
Diego Maffeo	PRISMA MEDIOS DE PAGO	ARGENTINA	Juan Francisco Roza Alconada
Fabio De Felice	PROTOM GROUP S.P.A.	ITALY	
Andrea Cotrufo	QUANTUM INVESTMENTS	ITALY	

Andrea Alicia Avila	RANDSTAD	NETHERLANDS	
Maximiliano Schellhas	RANDSTAD	NETHERLANDS	
Alistair Tebbit	RELX GROUP	UNITED KINGDOM	
Hernan Maria Bardi	RENAULT ARGENTINA S.A.	FRANCE	
Fernando Alonso de la Vega	REPSOL, S.A.	SPAIN	Marta Camacho Parejo
Marcelo Tarkieltaub	ROCKWELL AUTOMATION	ARGENTINA	Luciano Marrazzo
Luis Rossano	RPC CONSULTING GROUP	MEXICO	
Evgeny Melnikov	RUSSIAN UNION OF INDUSTRIALISTS AND ENTREPRENEURS	RUSSIAN FEDERA-TION	
Meral Eredenk Kurdas	SABANCÄ3 HOLDING	TURKEY	
Sebastien Philippe De-larive	SANOFI	FRANCE	
Tegge Andreas	SAP SE	GERMANY	
Jon Lezamiz	SIEMENS GAMESA RENEWABLE EN-ERGY	SPAIN	Claudia Grotz
Fernando Lobos	SINERGIUM BIOTECH S.A.	ARGENTINA	
Janet Ang	SINGAPORE BUSINESS FEDERATION	SINGAPORE	Maria Esperanza Frio Alconcel
Horacio Luis Fernan-dez Delpech	SKYONLINE	ARGENTINA	
Simon Janin	SOCIÉTÉ GÉNÉRALE	FRANCE	
Ziyavudin Magomedov	SUMMA GROUP	RUSSIAN FEDERA-TION	Leyla Mammadzada
Carlos López Blanco	TELEFÓNICA SA	SPAIN	Christoph Steck
Pablo Andres Recalt	TELESPAZIO ARGENTINA	ARGENTINA	
André Körtgen	THALES DEUTSCHLAND	GERMANY	
Sarp Kalkan	THE UNION OF CHAMBERS AND COMMODITY EXCHANGES OF TUR-KEY (TOBB)	TURKEY	Irfan Demiroren
Ellen Blackler	THE WALT DISNEY COMPANY	UNITED STATES	Michael Lebovich
José Félix Domínguez	THOMSON REUTERS	ARGENTINA	
Nursen Numanoglu	TURKISH INDUSTRY AND BUSINESS ASSOCIATION (TUSIAD)	TURKEY	

Barbara Wanner	U.S. COUNCIL FOR INTERNATIONAL BUSINESS	UNITED STATES	Erin Breitenbucher
Matthew Devlin	UBER	UNITED STATES	Mariano Otero
Diego Coatz	UNIÓN INDUSTRIAL ARGENTINA (UIA)	ARGENTINA	Fernando García Díaz
Tidhar Wald	UNITED NATIONS/BETTER THAN CASH ALLIANCE	INTERNATIONAL	Marjolaine Chain-treau
Kara Sutton	US CHAMBER OF COMMERCE	UNITED STATES	Sean Heather
Gabriela Renaudo	VISA	UNITED STATES	Alejandro Hansen
Veronica Beatriz Binaghi	VISTEON SA	ARGENTINA	
Ines Leopoldo	YPF	ARGENTINA	
Alexandr Smolensky	ZYFRA	RUSSIAN FEDERATION	