

Insight Report

Our Shared Digital Future Building an Inclusive, Trustworthy and Sustainable Digital Society

December 2018



World Economic Forum
91-93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland
Tel.: +41 (0)22 869 1212
Fax: +41 (0)22 786 2744
Email: contact@weforum.org
www.weforum.org

© 2018 World Economic Forum. All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, including photocopying and recording, or by any information storage and retrieval system.

Contents

| | |
|--|----|
| Foreword | 5 |
| Introduction: Digital Stewardship | 8 |
| Shared Goal 1: Leave No Person Behind | 12 |
| Shared Goal 2: Empower Users through Good Digital Identities | 17 |
| Shared Goal 3: Make Business Work for People | 22 |
| Shared Goal 4: Keep Everyone Safe and Secure | 27 |
| Shared Goal 5: Build new rules for a new game | 32 |
| Shared Goal 6: Break through the data barrier | 40 |
| Conclusion: The work starts today | 46 |
| Contributors | 47 |
| Endnotes | 48 |

Foreword

Jim Smith, Chief Executive Officer, Thomson Reuters, Co-Chair, World Economic Forum System Initiative on Digital Economy and Society

Lynn St Amour, Chair, Multistakeholder Advisory Group, UN Internet Governance Forum (IGF), Co-Chair, World Economic Forum System Initiative on Digital Economy and Society

Derek O'Halloran, Head, System Initiative on Shaping the Future of Digital Economy and Society, Member of the Executive Committee, World Economic Forum

The Fourth Industrial Revolution has the power to reduce inequalities across the world. Doing so depends on empowering everyone – regardless of geography, income, age or gender – and it requires concerted action and greater collaboration across all players.

Each time we sign in, log on or connect a person or device to the digital world we exponentially grow the next great technological revolution. More than a decade after the first iPhone® was introduced as the “breakthrough internet communicator”, a brave new digital world powered by big data, artificial intelligence (AI), the internet of things (IoT), mobile and the cloud promises to profoundly change the way we live, work and interact.

As the world sprints towards bringing virtually all things online – to be captured, analysed and actioned in an instant – we must ensure we are working towards the digital future that will benefit all. As we mark the milestone of bringing half the world online, we must redouble our efforts to ensure access for the remaining 50%. Stewardship of a global, inclusive society is everyone’s responsibility.

It is important to consider the geopolitical and social context we face today, as it both shapes the development of technology and will be dramatically affected by technology. The rise of nationalism and the proliferation of echo chambers have created fissures in the economic and political interdependence that we once took for granted, as well as in the social constructs that underpin so many of our daily activities.

There is a growing and profound lack of trust between individuals and institutions of all kinds; less than 50% of those connected today trust that technology will improve their lives. Social media continues to bring disparate communities closer together yet polarizes them at the same time. We are reminded daily of the alarming ease with which news and personal information can be abused and used to prop up less-than-virtuous enterprises.

Our existing institutions, mechanisms and models are struggling to respond effectively to the pace of change and its distributed nature. New collaborative efforts are emerging across the world – processes that aim to build on both traditional strengths of host institutions but also draw in the expertise of other sectors – whether that be business, governments, civil society or academia.

It is imperative that we do more to align, support and accelerate existing efforts where they exist and to address gaps where they do not.

The following paper speaks to the urgency many of us feel about the need to work together, make sense of the complexity, build on our common strengths and take agency in designing the collaborative principles and models that will lead to a more empowered world.

Successful long-term stewardship is dependent on supporting everyone – irrespective of geography, income, age or gender – in shaping and benefitting from the digital environment we all now share.

We hope that you will join us in this journey.

Perspectives from our stewards

“Over half of the global population is connected to the internet and has growing access to the sum total of human knowledge at their fingertips. The internet will increasingly bring about ever more transformational changes for human civilization. However, some of these changes will also bring unpredictable costs. We are just now beginning to better understand this ‘Faustian bargain’.”

– **Al Gore**, Co-Founder and Chairman, Generation Investment Management

“Digitalization is the most powerful force in our world today. It can bring profound benefits and empowerment, but only if handled with care and responsibility. The shared vision and action plan proposed in our report shows a path to meeting this future with confidence.”

– **Mario Greco**, Group Chief Executive Officer, Zurich Insurance Group

“The internet is one of the greatest innovations in history, improving our access to information, commerce and each other in a way that we’ve never been able to before. It continues to hold revolutionary promise for improving the lives of people in even the most inaccessible parts of the world. This report makes clear how the stewards of the Internet’s development are helping to make sure it lives up to its promise.”

– **Matthew Prince**, Co-Founder and CEO, Cloudflare

“We are at a crossroads. More than half of the world’s population will be online by the end of 2018. Now is the time to redouble our collective efforts to leave no one offline, and this timely report outlines shared goals for an inclusive, trusted and sustainable digital future.”

– **Houlin Zhao**, Secretary-General, ITU

“By building on our national data and digital consultations, our government is identifying a path forward to create an inclusive and trustful digital economy where our full innovation potential can be unleashed. However, building an inclusive, trustworthy and sustainable digital society is truly global in scope. That’s why through our work on AI with our G7 counterparts, we will continue to collaborate with international partners to advance these important goals.”

– **Navdeep Bains**, Minister of Innovation, Science and Economic Development of Canada

“We need to maximize the benefits of digitalization to create an inclusive economy, close the inequality gap and improve income distribution globally.”

– **Rudiantara**, Minister of Communication and Information Technology of Indonesia

“The breadth of digital’s impact shows that this is not merely a challenge to be delegated to chief digital officers and others. It represents more than a commercial opportunity. The Fourth Industrial Revolution demands that CEOs take responsibility for the massive transformation of their businesses and for the extraordinary impact that this transformation will have on wider society.”

– **Pierre Nanterme**, Chairman and Chief Executive Officer, Accenture

“Governance frameworks need to allow enough flexibility to learn and to adapt in the face of rapid innovation, while not leaving anyone behind.”

– **Doris Leuthard**, Federal Councillor for the Environment, Transport, Energy and Communications of Switzerland

“It is time we retire the term ‘digital economy’. There is only one economy, which is digitizing at varying speed. Therefore, special regulatory regimes for digital businesses don’t make sense. We must develop agile and consistent policies that apply to all actors in a changed market reality where technology and data are omnipresent.”

– **Gillian Tans**, Chief Executive Officer, Booking.com

“It is imperative that we bring broadband to all those who are not yet connected – and fast. In parallel, the technology, business and regulatory ecosystems must all be aligned in order to accelerate adoption of the ‘industrial internet’ and deliver the benefits of digital automation to a wide range of enterprises. This, done right, can provide an immense productivity boost to economies.”

– **Rajeev Suri**, President and Chief Executive Officer, Nokia

“We want everyone to thrive in the digital world - no one should be left behind. That means educating everyone on how to keep themselves and their data safe online, which is something that we at Barclays are very passionate about. But it also means ensuring universal access to a safe, secure and easy to use digital identity, so that everyone can confidently unlock the benefits of the digital economy in the end.

– **Jes Staley**, Barclays Group CEO

Introduction: Digital Stewardship

The case no longer needs to be made that technology is changing the very fabric of our society.

A dazzling array of new technologies holds the promise of a future, a near-future or a present that until recently existed only in science fiction. The possibilities seem to be limited only by our imagination. New technologies to sense, process and act upon information at scale can drive economic growth and inclusion, empower individuals, spark innovation and entrepreneurship, improve health outcomes for all and enable a step change in our ability to tackle shared societal challenges such as the Sustainable Development Goals (SDGs). The potential to raise billions of people out of poverty and into inclusive sustainable markets is within our grasp.

As is becoming increasingly apparent, however, with opportunity comes risk. In 2018, concerns related to cyberthreats, privacy, abuse of personal information, market dominance, employment, fake news and manipulation of democratic processes have increased.

The opportunity is clear. The risks are becoming clearer. However, while technology is the engine for these changes, we are in the driving seat. Our collective decisions and actions steer us towards a future that we have the power to shape.

Taking these as the starting point, three critical questions emerge.

Question 1: What kind of society do we want?

Technological developments have traditionally been associated with enhancing efficiencies. In a world of scarcity, and material gains wrought only through labour, technology has been a means of advancing us along the path of human progress, liberating more individuals from precarious lives of subsistence or necessity.

We have a long way to go to provide for the basic needs of all of our fellow human beings. In almost every domain, we are seeing that digital technologies can provide a step change in our ability to achieve this. Yet if technology causes more problems than it solves, this will not happen.

However, the tremendous power of Fourth Industrial Revolution technologies forces us to address questions beyond efficiency and the provision of material wealth. As more ideas move from science fiction to science fact, we are faced with new questions. In a world of abundance, where we may have the technical ability to provide for all – what kind of society do we want? The question is both local, but also global – can the next wave of globalization be different?

Question 2: Which shared capabilities need to be built in a digital society?

Any new technologies must be coupled with societal adaptation – new societal capabilities – to successfully manage and use the new tools. These technologies are no different.

There is no shortage of attention, energy or initiatives to tackle these challenges. However, while the landscape of activity is rich, it is highly fragmented. It is fragmented both in terms of the definitions of the problems being tackled and the disparate array of institutions, processes and communities where those discussions are taking place. Today, we lack the shared goals and language that we take for granted in other domains.

Question 3: How can we collaborate effectively and at scale to achieve our shared goals?

This document is based on discussions that take these questions as a starting point. The discussions have been undertaken and led by a group of leaders from business, civil society, academia, government and international organizations from around the world, and supported by a group of 20 experts from a variety of domains. Each brings to bear different perspectives and broad networks of practitioners. The report also draws insights and inspiration from a range of communities who are actively working on all of the issues explored below – an extended community of over 1,000 individuals globally, from the Jordanian Women's Empowerment Group to Digital Ambassadors in Rwanda.

We hope that the resulting perspectives and references will be helpful in our collective efforts to address the questions above. They are shared in the spirit of open collaboration to be freely used, adapted, iterated and improved over time.

An inclusive, trustworthy and sustainable digital future

The global nature of the digital environment brings with it a rich cultural and normative diversity, with different types of stakeholders having different, often competing, interests. Nevertheless, through our dialogues, all parties agreed on three core and interdependent concepts about what we want our future digital environment to look like.

First, our digital future must be **inclusive**. Inclusion does not just refer to internet access and accessibility, but also includes participating in the social and economic benefits (outputs) and in opportunities to shape how technologies impact our lives. The benefits accruing from technology are exponential, and closing the digital divide will become increasingly difficult. We risk embedding structural inequality into our social and economic systems, condemning many to intergenerational exclusion.

Second, **trust** is the foundation for any and all interactions. Without trust, we will not provide our information, exchange goods or services or act upon the information given. In a digital context, trust is created through effective and enforceable privacy, security, accountability, transparency and participatory practices. Increasingly, as more business and government activity is mediated online, online trust and societal trust levels correlate ever more strongly.

Finally, we need our digital world to be **sustainable** – in societal, economic and environmental terms. This entails not just business models that are economically viable, but business practices that are socially sustainable. We need viable investment models for innovation and shared infrastructure. If returns on capital continue to systematically outstrip returns on labour and other factors, the increasing concentration of wealth and subsequent wealth divide is not socially sustainable. While we are used to thinking of cyberspace as entirely virtual, the energy requirements and material/waste management of the physical infrastructure are subject to planetary boundaries.

(The first) six shared goals

In order to realize this vision, there are a number of shared capabilities where, as a global community, we will succeed or fail together. Expressing these as *shared goals* allows us to encourage, align and accelerate a wide range of distributed activities. Shared goals provide strategic direction and common purpose that can channel the tremendous amounts of energy, investments, innovation and collaboration already taking place.

Today, some of these capabilities are easier to articulate in terms of quantifiable goals than others – for example, internet access. However, defining more precisely what “good” looks like and what metrics would be relevant are part of the common work agenda in topics such as digital identity.

Our discussions revealed six initial areas where shared goals would be beneficial to ensure an inclusive, trusted and sustainable digital future.

The six areas provide a structure for this document and create a framework for future dialogue and collaboration on shaping the digital economy and society. There are significant opportunities and major risks: much of the debate is too one-sided – either over-optimistic or over-pessimistic – and lacks precision on time frames. A core premise behind this document is the need for a narrative that explains digital opportunities and risks for stakeholders and citizens.

1. **Leave no person behind:** ensuring high-quality internet access and adoption for all.
2. **Empower users through good digital identities:** ensuring that everyone can participate in the digital society through identity and access mechanisms that enable the user.
3. **Make business work for people:** helping companies navigate digital disruption and evolve to new, responsible business models and practices.

4. **Keep everyone safe and secure:** shaping norms and practices that enable a technology-dependent environment that is secure and resilient.
5. **Build new rules for a new game:** developing new, flexible, outcome-based and participatory governance mechanisms to complement traditional policy and regulation.
6. **Break through the data barrier:** developing innovations that allow us to benefit from data while protecting the legitimate interests of all stakeholders.

Shaping the future together

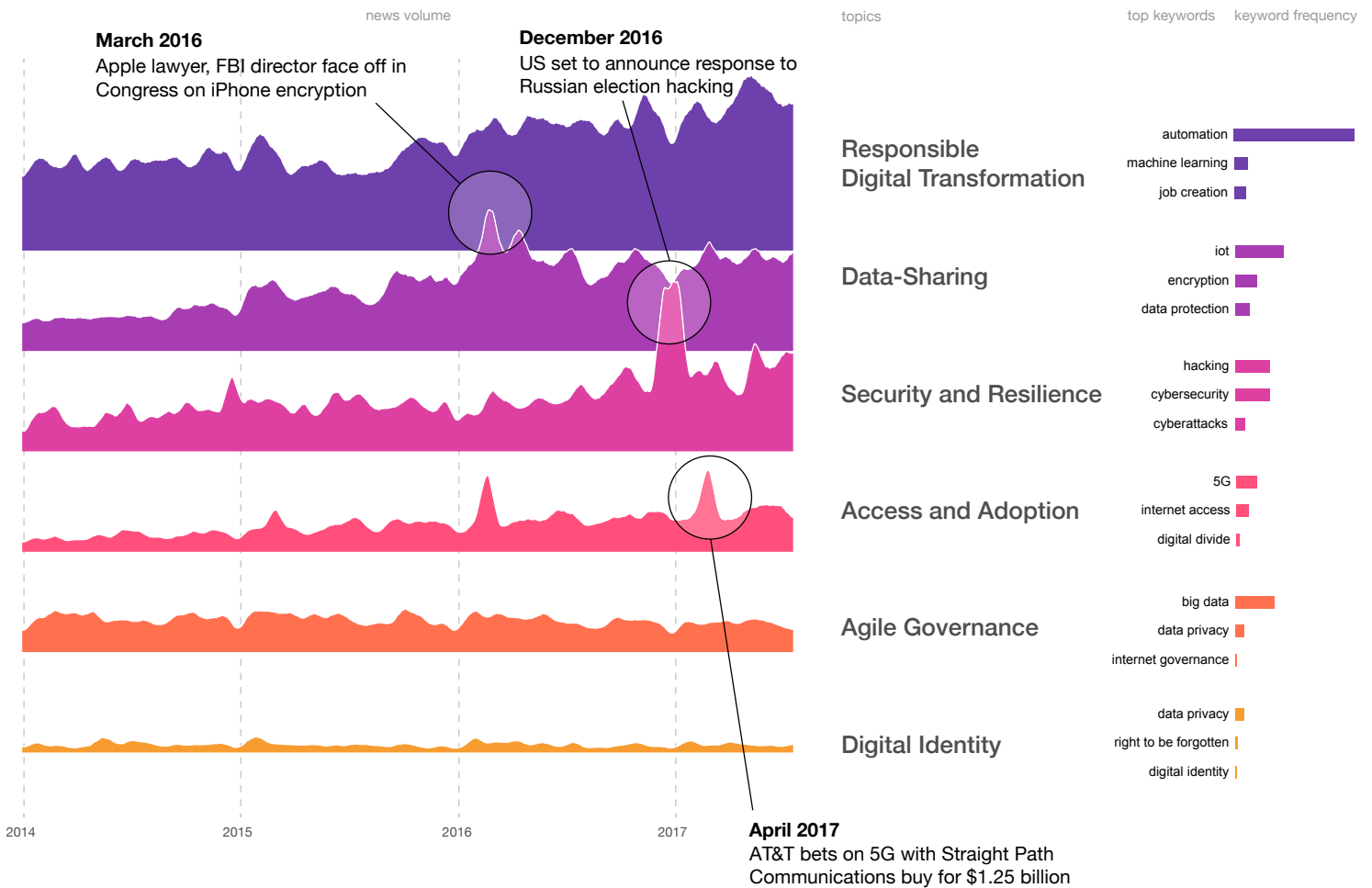
Many institutions, fora, initiatives and communities are already tackling these issues and more – building collaboration, dialogue, innovation and partnerships. Nevertheless, many feel today that the landscape is difficult to navigate.

Identifying and aligning shared goals can transform how we see these efforts. Shared goals allow us to move from fragmentation, confusion and a perception of overlapping work to a network of ecosystems and communities, which all make unique and complementary contributions that collectively advance our efforts.

Progress to develop these shared capabilities will benefit from the plurality of communities, perspectives, expertise and solutions that these networks represent. We can support, amplify and accelerate existing efforts, and identify true gaps where we need to inspire new action.

In any plurality, there are and will be differences. Finding ways to respect and navigate these differences is one aspect of the tasks that will result in continued dialogue and cooperation. However, there are broad and diverse areas of common interest. On these, our task is to accelerate effective collaboration and progress to ensure that our digital world benefits not just us – who contribute and read these words – but everyone.

Figure 1: Growing news volume on digital priorities (2014–2018)



Source: Thomson Reuters Labs

The path ahead

A number of significant events and efforts are already being planned for the year ahead, through international fora and civil society. For example:

- G20/B20 Summit, 28–29 June 2019, Japan
- Internet Governance Forum, 25–29 November 2019, Berlin, Germany
- Report from the UN High Level Panel on Digital Cooperation, expected in 2019
- World Internet Conference – Wuzhen Summit, Wuzhen, China, 2019
- G7 Innovation Ministers' Statement on Artificial Intelligence, including the upcoming multistakeholder forum

Each of these will be a critical stepping stone for aligning and encouraging action on shared goals for collaboration, which in turn can provide a thread between these and other fora.

2019 will teach us a lot about the emerging architecture of our new digital society. Some examples of areas where we are likely to learn more over the next 12 months include.

- Progress of 5G network trials in China, South Korea and the USA
- Progress of national digital identity implementations in China, Africa and India
- Next phase of measures for Japan's Society 5.0
- Progress of the Contract for the Web campaign
- Development of network of Centres for the Fourth Industrial Revolution
- Follow up to 2018 Paris Call for Trust and Security in Cyberspace
- GDPR-like adoption of data policies across countries

How our shared conversation evolves in terms of certain other issues and developments will also influence how the world will look in 12 months. For example, some topics worth tracking might include:

- Responses to the milestone of half the world being connected to the internet and news of internet growth slowing down

- The emergence of new partnerships for investing in shared infrastructure for the Fourth Industrial Revolution
- Public trust in tech and the emergence of methods of new, responsible digital business practices in the industry (e.g. privacy or security by design, ethical AI or ethical use of tech)
- Innovations on exploiting big data while protecting privacy
- Growth and use of metrics to measure progress in the digital economy

The individual actions of every organization will shape our shared digital future. *Priorities for collaboration* are shared alongside each of the six shared goals highlighted above. In short, however, there are two overarching priorities:

- For government and business: make inclusive, trustworthy, sustainable digitalization an overarching goal, beyond technology or innovation teams/ministries. This will avoid misaligned policies and incentives
- For all organizations and individuals: learn more about what efforts are ongoing to achieve the goals that matter most and define what your contribution will be

Throughout this paper, we highlight some of the leading initiatives that are underway against each of the six goals, in the hope that these initiatives could be further supported or emulated to advance our collective progress, as well as some useful informational assets or toolkits. These and other assets can be found online [here](#). If you think something is missing, please let us know [here](#).

Shared Goal 1: Leave No Person Behind



Destination: Every person has access to and can use the internet

Thirty years after the invention of the world wide web, internet connectivity has finally reached 50% of the world's population. However, recent data shows an alarming slowdown in the rate of internet access growth. As the foundation for individuals and nations to participate meaningfully in the 21st century, and the promise of exploiting technology to accelerate progress to achieving the SDGs, "universal and affordable digital infrastructure for all" is a goal we all have a stake in.

- Alarming slowdown in opportunities to participate in digital society: internet user growth has slowed from 17% in 2007¹ to 5.5% in 2018²
- In 2018, internet connectivity finally reached over half the world's population³
- Basic access just one "digital divide": others include quality, generations of technology, age, gender, affordability and geography
- Just 1% of multilateral development banks (MDBs) investment commitments goes to the information and communications technology (ICT) sector⁴

Issue overview

While the pace of technological development, adoption and transformation is accelerating for those who are part of the digital world, multiple trends show an alarming slowdown in expanding basic opportunities to participate.

Although enormous progress has been made to date, we are still a long way from ensuring universal access to internet services.

Why does it matter?

Digital connectivity is foundational to meaningful social and economic participation of individuals and countries in the 21st century. Unequal access to the internet increasingly means unequal access to opportunities, jobs or ability to deal with unexpected events.

Connectivity ensures access not only to basic services, but to the range of benefits that technologies bring. As multiple technologies rapidly achieve adoption and create positive feedback loops of benefits for those who participate, the access divide grows wider over time. Today's digital divide becomes tomorrow's AI divide or biotechnology divide. The gaps get ever harder to close, and large numbers of people are condemned to structural and intergenerational exclusion. In the most extreme scenario, the feedback loops on information technology and genetic engineering/biotechnology results in literally two increasingly divergent classes of human beings.⁵

Break it down – understanding the problem

Mind the gap

Global averages are driven by wide differences between continents and countries: the International Telecommunications Union (ITU) estimates the number of internet users by region varies from 22% in Africa to 44% in Asia Pacific, 66% in the Americas and 80% in Europe. The SDGs called for universal broadband access for all Least Developed Countries (LDCs) by 2020; by current growth rates, less than one-quarter of the nearly 1 billion people in LDCs⁶ will be connected by then. Outside the OECD, most small businesses remain offline, holding back innovation, entrepreneurship and the development of digital economies.

Multiple divides

There are multiple gaps that need to be addressed. Demographic differences reveal wide variance within individual countries – driven by income levels, age, gender or whether people live in cities or rural areas, as evidenced for instance by the [digital divide in Africa](#).

There are also wide variations in affordability – more than 2 billion people live in a country where 1GB of mobile data is priced above the affordable threshold of 2% or less of average monthly income.

Language and relevant content is critical, too – there is a big disparity in the languages most used on the web and in the world.⁷

Looking forward, the quality of access will be increasingly critical. In a mobile context, advanced countries will drive the next range of innovations and positive network effects through the adoption of 5G – as opposed to adoption rates in least developed countries.

The numbers don't add up

There are a number of critical economic challenges. The investment case for providing high-quality access to affluent and densely populated urban environments in developed economies is clearly different from the investment case for rural coverage in a low-income country, or a sparsely populated island-archipelago nation.

Furthermore, many incentives among different stakeholders are not aligned. Governments must manage competing pressures. A government may want to increase access, spur innovation and prepare their country for the future – but also face immediate fiscal pressures in a context where their economy is not highly diversified across many sectors. The role of digital connectivity in enabling economic activity across multiple sectors is not always understood or demonstrable. Even where it is, short-term revenue needs (e.g. driven by international loan repayments) can drive taxation and other policies that hinder the very growth, digital development and creation of new sectors and new jobs that they need. This, in turn, makes investment cases even more difficult or risky for businesses, governments and investors.

These dynamics suggest that enhanced collaboration and new forms of cooperation between the multiple stakeholders – including tech and non-tech companies, ICT ministries, finance ministries, investors and international financial organizations – may allow all stakeholders to better align the incentives to achieve their individual goals.

2018–2019 context

In terms of measurable results, as highlighted above, current trends indicate a slowdown in access growth.

From a commercial perspective, an increasingly wide range of models and approaches are being tried. There has been an expansion of ICT infrastructure providers, with an increase in companies selling everything from digital services to physical products, often co-financing infrastructure with mobile network operators (MNOs) in order to better reach the end user. A number of new disruptive players are emerging in the market – notably Facebook’s Aquila, X’s Loon and OneWeb. These new entrants typically do not provide services directly to individuals but partner with mobile operators. New innovative Wi-Fi business models are emerging, as well as new partnership models with traditional players.

Bottom-up and social innovations can also be seen – developing new approaches to tackling not just business models but other challenges. Organizations such as the [Internet Society](#) support communities around the world. The [1WorldConnected](#) initiative tracks more than 700 projects globally that are tackling the range of barriers highlighted above.

From a policy and regulatory perspective, the 2018 Affordability Report reveals that while policies around the regulatory environment, broadband strategy, infrastructure sharing and spectrum management “improved marginally”, universal and public access scores went down (the first time any scores have fallen).

Between 2012 and 2016, MDBs committed a cumulative \$525 billion to fund development projects in low-to middle-income countries worldwide. Just 1% of these project funds went towards ICT projects.

What’s next?

Priorities for collaboration

Building trust, understanding and collaboration for investment: Facilitate dialogue and collaboration to understand shared goals and constraints, establish common direction and explore new financing models

- Smart fiscal policy: Several countries have “connectivity taxes” on mobile and fixed internet connections. These taxes drive up costs for consumers, which can make the internet unaffordable for many families, as well as for investors

- Effective spectrum allocation: Emphasis should be on policies that support transparent, accountable, timely and efficient allocation of spectrum
- Adopting or revising national broadband plans: Ensure national plans are based on leading thinking and include realistic stretch goals
- Making sustainable digitalization an overarching goal for the government: Responsibility for this should lie beyond the telecom/ICT ministries to avoid policy misalignment
- Unlocking the potential of universal service and access funds (USAFs): Identify and address the barriers and challenges in the effective development and use of USAFs
- Incorporating diversity objectives in strategy and investments: Include specific goals and approaches to tackle language, gender, disability and geographic divides, among others
- Platforms for scaling leading practices and bottom-up innovation: Build national and local multistakeholder platforms to encourage, identify and scale bottom-up innovation

Open questions

- What are the important factors that drive successful roll-out and adoption of the internet?⁸
- How can we better measure the impact of connectivity on economic and societal outcomes?
- What policy best practices address the digital divide?

Shaping the future together

Initiatives

- [Smart Africa](#) – An alliance of African countries, international organizations and the private sector to implement the SMART Africa Manifesto
- [Internet for All Initiative](#) – A World Economic Forum initiative to bring together the public and private sectors to extend internet access to everyone on the planet
- [People-Centered Digital Future](#) – Event organized by Constellation Research to discuss the community norms, human rights and social contracts required in this exponential digital era
- The [Broadband Commission for Sustainable Development](#) was established by the ITU and UNESCO to boost the importance of broadband on the international policy agenda.

- The [Alliance for Affordable Internet \(A4AI\)](#) is a global coalition working to drive down the cost of internet access in low- and middle-income countries.
- [Internet Governance Forum](#), a global multistakeholder platform that facilitates the discussion of public policy issues pertaining to the internet
- [Microsoft Airband Initiative](#), that seeks to bring affordable broadband access to everyone
- [Inclusive Digital Economy \(IDE\) Hub](#), created by the government of Indonesia to accelerate the adoption of digital technology to reduce economic and social disparities
- The Broadband Commission's [The State of Broadband](#) is an annual report on progress against global targets
- [GSMA State of Connectivity Index](#) measures the performance of 163 countries against the vital enablers of mobile internet adoption
- The Alliance for Affordable Internet's [2018 Affordability Report](#) assesses the policy and regulatory progress made by 61 low- and middle-income countries and finds that, despite growing global attention on the importance of affordable internet access for all, policies are failing to advance at the pace needed to do so

Assets

- The Global e-Sustainability Initiative (GeSI)'s [Digital Access Index](#) measures the digital industry's contribution to achieving the SDGs
- Alliance for Affordable Internet (A4AI)'s [Mobile Broadband Data Costs](#) looks at the access and affordability of mobile services around the world
- The European Commission's [Digital Economy and Society Index](#) is a composite index that summarizes relevant indicators on Europe's digital performance and tracks the evolution of EU member states' digital competitiveness
- World Wide Web Foundation and Alliance for Affordable Internet's [Closing the Investment Gap: How Multilateral Development Banks Can Contribute to Digital Inclusion](#)
- [Inclusive Internet Index](#), commissioned by Facebook and conducted by the Economist Intelligence Unit, to measure the extent to which the internet is accessible, affordable and allows for meaningful usage by all

Developments to watch

- National digital plans to address the digital divide around the world
- Creative digital infrastructure financing models, especially from the private sector

Shaping the Future: Securing development gains from the digital transformations

With the dramatically reduced costs of collecting, storing and processing data, and greatly enhanced computing power, digitalization is transforming most economic activities. It is transforming value chains, skill requirements, production and trade patterns, and thus requires adaptations of legal and regulatory frameworks. This has major implications for virtually all SDGs, presenting significant opportunities as well as challenges for developing countries. Although the speed of digital transformation differs from country to country, all will need to adapt.

The far-reaching implications of digital transformations are well recognized among advanced economies. The OECD's Going Digital project, launched in early 2017, addresses the need for new or adapted policies due to digitalization in areas as diverse as competition, consumer protection, industry, innovation and entrepreneurship, insurance and pensions, financial markets, fiscal affairs, science and technology, statistics, education, employment, social affairs, public governance and trade. A similar approach is also needed with regards to development assistance strategies.

Securing the benefits from digital transformation is not automatic. For many countries, the path into the digital economy is challenging. The UN Conference on Trade and Development (UNCTAD)'s assessments of the eTrade readiness of the least-developed countries have shown that policy actions are needed in a range of areas, from the improvement of payment-solutions infrastructure to skills development and enhanced financing opportunities for digital entrepreneurs. The large divides in the digital readiness of countries coupled with the rapid pace of change risks widening the inequality gap.

The international community must rise to the challenge and do so fast. Current efforts to support developing countries seeking to integrate into the digital economy are inadequate. Although each government must take the lead in preparing for the digital era, the complexity of policy challenges and the need for speed in the process make external assistance very important.

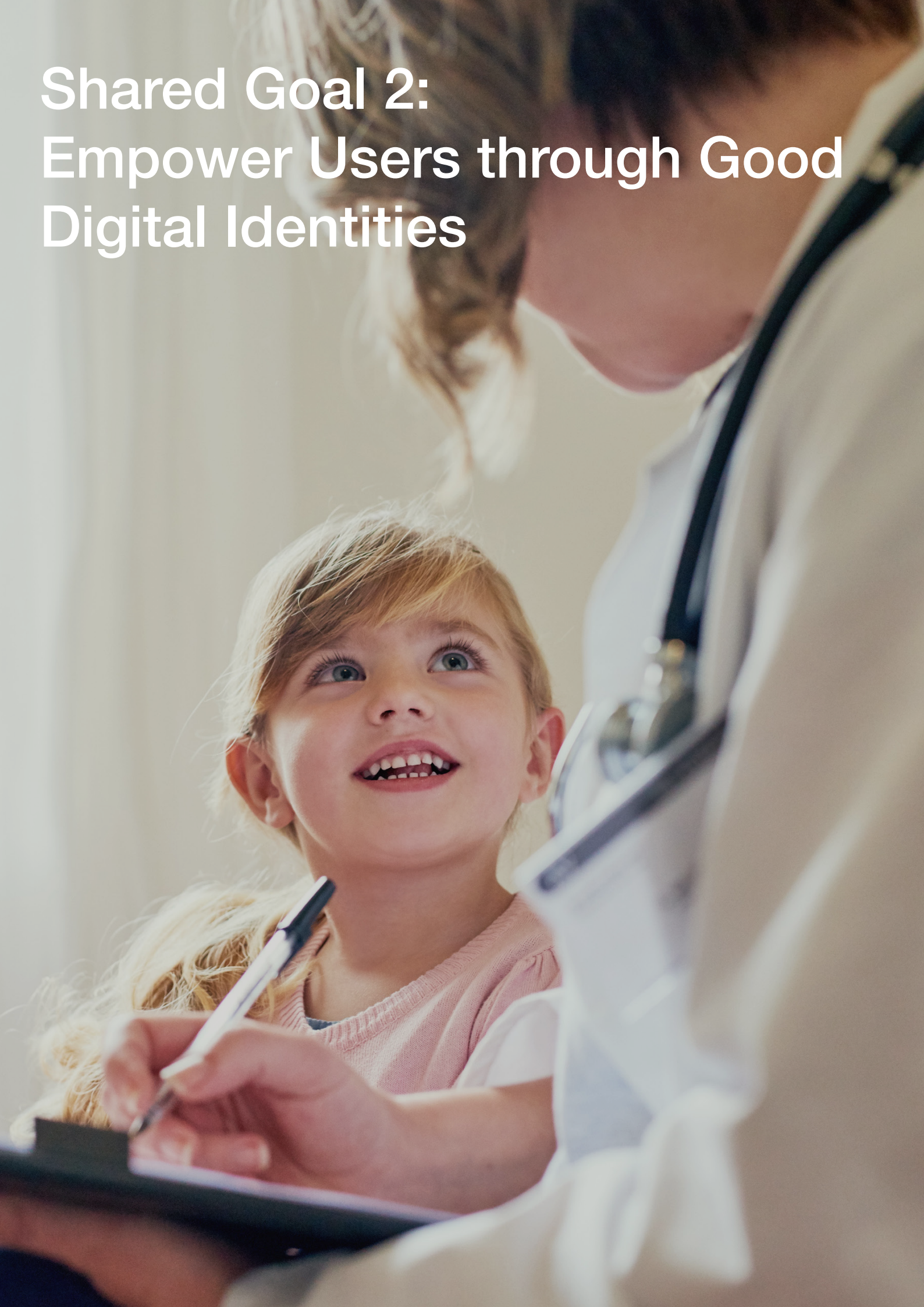
The latest data suggests that only 1% of all Aid for Trade funding is devoted to ICT, down from 3% a decade earlier.⁹ Of the meagre 1% of multinational development bank commitments that go to ICT projects, very little goes towards policy development.

In order to do more, and do it better, effective collaboration among all relevant players is necessary.

Such initiatives need to be complemented by more development funding and enhanced readiness among various donors to address the development implications of digitalization. Few donor agencies have comprehensive digital-for-development strategies. For example, in 2017, the Donor Committee on Enterprise Development found that less than a third of its member agencies had published plans to harness new technologies for economic development in low-income countries. Common reasons given included a lack of in-house expertise and the cross-cutting nature of digital transformations.

The future is digital. We need to make sure people and businesses in developing countries are not being left behind.

Shared Goal 2: Empower Users through Good Digital Identities



Destination: Every person can access digital services through identities that are secure, effective, useful, usable and offer real choice

How individuals are represented in society has been the bedrock for defining the rights, freedoms and responsibilities of individuals and the organizations to which they relate. Our identity today is increasingly digital, distributed and used to decide what information, services or products we access. By 2020, the average internet user will have over 200 online accounts. At the same time, 1 billion people have no formal identity, excluding them from even basic services and participation in society.

- By 2020, the average internet user will have over 200 online accounts¹⁰
- At the same time, 1 billion people have no formal identity, excluding them from even basic services and participation in society¹¹
- By 2022, 150 million people will have blockchain-based digital identities¹²
- Identity verification as a service is estimated to grow to a \$16 billion–\$20 billion market by 2022¹³

Issue overview

Proving one's identity is an essential part of our everyday lives. It is a prerequisite to vote, bank, buy, rent, travel and access healthcare and other social services.

In an analogue world, we rely on documents issued by trusted authorities, such as passports or driving licences. Trust is established through personal relationships or letters of introduction. In a digital world, our ability to prove our identity and establish trust will continue to determine our opportunities. However, our identities are evolving into a more complex construct – a web of personal information provided, collected and shared across multiple people, devices and entities. We increasingly use ride-sharing networks to move, e-commerce websites and payment platforms to buy or pay, social media logins to access services, and are exploring new tools such as virtual reality (VR), AI and the internet of things (IoT).

The challenge is to help people access opportunities while ensuring that visibility does not infringe their freedoms or cause them harm. However, to date there is no common view on what “good” digital identity looks like.

Why does it matter?

Use of digital identifiers will rise, along with the volume of personally identifiable information on people in the digital sphere.

If designed for a user-centric future, these efforts will translate into easy, convenient, seamless access to a range of services and value for users. Growing concerns on

privacy and security of personal data will likely trigger further technology and policy innovations and developments. Privacy-by-design, user consent and innovations that balance convenience with security will be a standard feature of future implementations. For businesses, upholding such practices will emerge as a source of consumer trust, competitive differentiation and market advantage. There will be increased adoption of open standards and decentralized architectures that offer greater user control in a way that intuitively mirrors transactions in a physical world: examples include Sovrin ledger and BlockCerts.

On the other hand, if disparate goals and a lack of economic incentives hamper shared understanding and collaboration, we risk a future where people will pay a high price for their digital visibility. In one scenario, a fragmented range of isolated identity systems with differing and incomprehensible standards, accuracy, privacy controls and security levels will make it hard for us to do anything online, holding us back from enjoying all of the benefits of a truly digital economy. This could create new forms of exclusion and discrimination, isolated data, and data monetization/business models that exacerbate existing divides or create new ones. In another scenario, poorly designed digital identity systems provide the perfect toolkit for a totalitarian state.

Break it down – understanding the problem

A big opportunity, a big challenge

Many of the existing social and economic divides have parallels in the gap in access to identities. According to the World Bank, close to 40% of the eligible population in low-income countries (LICs) do not have a reliable identity.¹⁴ Coverage gaps in middle-income countries (MICs) are much smaller, with less than 10% of the population lacking an identity. Similarly, women are at greater risk of not having an identity, thereby exacerbating pre-existing gender gaps. Some 45% of women in LICs do not have an identity, as opposed to 30% of men. In this context, technology offers a tremendous opportunity to provide identity to those who don't have it.

What is ‘good digital identity’?

Beyond providing identities, developing a system for digital identities requires defining what features a “good” digital identity should possess. There are trade-offs – between convenience, security and privacy of users and the state's need to keep citizens secure and respect their privacy. There is fragmentation and a lack of standardization – technology choices and governance frameworks are being figured out industry by industry, country by country. There are competing incentives: business models that are reliant on personal data monetization and the user's need to be in control of it.

What good identity looks like in practice is a challenging question, but there are a few core features: verification (such as passwords or biometric proofs), inclusion, utility and ease of use, user control, privacy and security.

2018–2019 context

Since 2016, a number of disparate digital identity systems began to converge – from financial services, other industry players, humanitarian development agencies and NGOs, sovereign and federated identity communities, the blockchain community and, of course, governments.

Currently there are 161 digital identity programmes run by governments globally. On 26 September, the supreme court of India upheld the constitutional validity of the country's Aadhaar government identity programme, against long-standing challenges and concerns. However, the ruling struck down several provisions, including those linking a citizen's Aadhaar ID to bank accounts, mobile phones and school admissions.

A range of efforts that will employ digital technologies to provide displaced and other vulnerable people with identities is gaining significant momentum – enabling access to healthcare, basic services and, in the case of displaced populations, potentially enabling family reunions.

Over 50 organizations made a commitment to enhanced cooperation in January 2018; in September, the Platform for Digital Identity was launched to provide an open network of practitioners with opportunities to identify and collaborate on common priorities.

What's next?

Priorities for collaboration

The following are priorities for near-term public private cooperation to shape positive-outcome practices and solutions for digital identity:

- **Define what “good” looks like:** Based on leading practices and research across multiple identity domains, enhance consensus on the core attributes of “good digital identity”
- **Promoting common digital identity standards:** Develop functional or capability-based standards for voluntary adoption
- **Building awareness and capacity:** On inherent vulnerabilities, inability to detect coercion, unintended consequences; knowledge exchange across and between practitioners, policy
- **Supporting and amplifying technology innovations:** Surfacing and supporting experimentation that enables privacy, security, interoperability, user control; extending innovations to a wider range of use-cases; role for funders, policy-makers and system designers in doing this
- **Developing policy toolkits:** Fit-for-purpose governance and accountability mechanisms – for systems (liability, redressal), countries (legal frameworks, independent oversight), and on a global scale

- **Platforms for learning and action:** At all levels, improving ongoing practice through design and implementation that engages all stakeholders, for instance, on country-level programmes, and learning networks to disseminate and scale leading practices

Open questions

- What constitutes “good identity in a digital world”?
- What are the right metrics to measure progress?
- What services should a good digital identity support?

Shaping the future together

Initiatives

- The [Electronic Identification, Authentication and Trust Services](#) (eIDAS) are a set of standards for electronic identification for online transactions in the European Union
- The [Identification for Development](#) (ID4D) is a World Bank initiative to help countries develop inclusive, robust and responsible digital identification systems
- [ID2020](#) is an alliance committed to improving lives through digital identity
- [Mission Billion](#) is an initiative by the World Bank to spur innovative ideas and solutions to provide a reliable form of identification to over a billion people who do not currently have it
- [Platform for Good Digital Identity](#) is an initiative by the World Economic Forum to bring existing and new digital identity solutions that are inclusive, trustworthy, safe and sustainable
- [Good identity dialogues](#) led by the Omidyar Network aim to spur discussion on innovative solutions for digital identities
- The [Identity for Good](#) accelerator from Evernym and Sovrin Foundation aims to provide tools and technology to organizations offering services reliant on digital identities
- The [Open Identity Exchange](#) is a technology-agnostic, non-profit trade organization consisting of leaders from competing business sectors focused on building the volume and velocity of trusted transactions online
- T-Auth, a collaboration between mobile operators in South Korea and e-IDAS regulators in the EU, is an example of efforts to standardize and deliver greater value to users. User consultations, as performed in British Columbia and Belgium, are instructive processes.

Assets

- The World Economic Forum’s [Identity in a Digital World: A New Chapter in the Social Contract](#) provides an overview of the various models of digital ID currently being pursued around the world
- The GSMA’s report [Regulatory and Policy Trends Impacting Digital Identity and the Role of Mobile](#) looks at the landscape of policies in regards to digital identity around the world and their impact on achieving SDG outcomes
- The GSMA’s report [Digital Identities: Advancing Digital Societies in Asia Pacific](#) highlights the role that mobile operators and regulators must play in using digital identities for development.
- The World Bank’s findings from the [Identification for Development \(ID4D\)](#) initiative
- [Digital Identity – A UBS Group Innovation White Paper](#) provides an overview of the current digital-identity space
- [Canada’s Digital ID Future – A Federated Approach](#) is a white paper on Canada’s approach to digital ID

Developments to watch

- Aadhaar implementation in India following restrictions set by the country’s supreme court, and the country’s [personal data protection bill](#) under discussion
- Economic Commission of Africa (ECA) and African Union Commission (AUC) to [accelerate regional progress on digital identities](#)
- Digital Identity and Authorization Council of Canada’s (DIACC) [Pan Canadian Trust Framework](#) under development
- China’s national Identity programme and partnerships with Alibaba’s Alipay and Tencent’s WeChat
- Progress of ongoing pilots in decentralized digital identity systems (such as those undertaken by the City of Antwerp, government of Malta, British Columbia, World Food Programme)

Shaping the Future: Data economics

Numerous analogies have emerged in recent years that try to capture the unique and ubiquitous nature of data and its role in the seemingly unlimited opportunities for the creation of new value. In May 2017, the Economist pronounced data as the newly crowned most valuable resource, not oil.¹⁵ In March 2018, Forbes said data was not the new oil but something completely different. If so, what?¹⁶

How we think about data from an economic point of view is unclear, and yet it will have significant implications for how we use data to improve lives, innovate, tackle grand challenges and balance the interests of individuals and society.

In traditional economics, three “factors of production” are the ingredients that go into creating value in society: capital, labour and land. Where does data fit in? We can observe arguments for each.

Data is the new oil/gold/currency (capital)

The most common analogy or assumption is the idea that data is a new asset. Whether it is something to be collected, accumulated, mined, traded or exploited, the general assumption is that ownership or control of data bestows economic wealth on the holder.

However, analogies with other products or commodities break down quickly. Data is being created all the time, and the more there is, the more valuable it becomes. It can be used by multiple people in multiple locations for different values simultaneously. Perhaps, some suggest, it is less like oil and more like renewable energy sources such as wind, waves or sunlight?

Data commons

A common alternative way to think about data is as a “commons”, that is, a resource that many different parties can share (a category of “land”). In the past, the village green, where anyone could graze their sheep, was the village commons; today, the environment or the oceans are examples of commons. The framing shifts from data ownership to shared permissions or shared rights. The idea of a data commons creates many opportunities for us to make greater use of data and increase innovation.

The idea of a data commons has been popular with academics and civil society for some time. And others are also taking this seriously. For instance, Philips is developing open-source software to enable healthcare researchers to access clinical information such as vital signs, lab results and diagnoses from its telehealth program.¹⁷ The IMF's own data strategy is based on building a global data commons among all of its members.¹⁸

However, thinking of data as a commons also presents its own challenges. The “tragedy of the commons” refers to the problem that, in such settings, there are more incentives to extract the benefits than invest in the resource. Everyone puts all of their sheep in the commons until all of the grass is gone; the air and oceans become polluted; and some are already sounding alarms on the tragedy of the healthcare data commons. Furthermore, unlike natural commons, data is not something already freely available in the world. Significant investment is required – on infrastructure, devices, applications – to create data. Producing sustainable business and investment models to realize data commons at scale would require cross-sectoral innovation and collaboration.

Data as labour

Perhaps most surprisingly, an argument has emerged that the most effective way to treat data is as labour. The idea was introduced in a 2018 American Economic Association paper,¹⁹ in which the authors highlight that the current exchange of free services for data may not be the only arrangement possible. As we interact in a digital environment, we are creating the data – that is, creating the value, in our shared networks. Such an approach recognizes the value that individuals create through their interactions, rather than position the services as “free”. We are creating value all of the time, and proponents posit that this could provide “a way to provide income and a new source of meaning to people's lives in a world where many traditional occupations no longer exist”.²⁰

While some companies are researching this, it is not currently the predominant view. This approach focuses primarily on personal data.

How should we think about data?

Canada's National Data Strategy estimates “the likely market value of data in the trillions of dollars at the dawn of the data-driven-economy era”. However, it observes, “data is nowhere to be seen in traditional national economic accounts, international trade statistics or the quantitative cost-benefit analysis of government policies”.

How we think about data matters for individual expectations, how business create new services and seek to monetize them and for macro policy-making. It is possible – likely, even – that there is no single answer here, and that different approaches may be appropriate in different circumstances. Further research is required to support a more informed public debate about the options, implications and opportunities ahead.

Shared Goal 3: Make Business Work for People



Destination: Digital businesses create sustainable value for all stakeholders

Digital technologies are transforming every sector, creating new value pools and offering improved societal outcomes – from human health to the environment. Without public trust, these opportunities cannot materialize. Companies face two challenges – creating new business models and ensuring they secure their licence to operate in the digital economy.

- By 2022, 60% of global GDP will be digitized²¹
- In 2018, over \$1.2 trillion will be spent by companies on digital transformation efforts²²
- 57% of people are uncomfortable with how companies use their information²³
- 74% of people expect CEOs to explain what their companies have done to help society, and 64% want CEOs to take the lead on change²⁴
- From January 2016 to June 2018, cryptomining²⁵ consumed more energy than mineral mining to produce an equivalent market value²⁶

Issue overview

Responding to digital disruption is now an existential question for companies across the world; but successful transformation is not easy. This year, over \$1.2 trillion will be spent by companies on digital transformation efforts and only 1% of these efforts will actually achieve their expectations.²⁷

According to the Edelman Trust Barometer, trust in all technology-based sectors has declined, with concerns over data privacy and security a vital factor. Beyond privacy and security concerns, broader ethical questions about the way organizations use digital technology threaten to erode trust in those institutions.

Some 60–70% of new value will be based on data-driven digitally enabled networks and platforms. But, with most digital assets in the hands of the private sector, the aggregate behaviour of the business community shapes the new digital social contract that will emerge in the coming years

Why does it matter?

In the future, establishing new norms of ethical behaviour with digital technology while reaching higher levels of customer trust will be critical in successful digital transformation. A few possible futures await.

Blowback: A backlash against the tech sector builds and extends to all sectors aiming to digitize. A lack of shared understanding leads to poor practices, loss of public trust and a swathe of fragmented regulations. Simultaneously, disruption continues, and disruptors

do not want to be associated with incumbents who have lost their licence to operate. A sustained period of market volatility further increases returns to capital and concentration of wealth.

Leadership: Business takes a leadership role in shaping the transformation of society, partnering across industries, with government, civil society and innovators to develop norms and practices that enhance trust. Communities of practice continuously spread and enhance know-how. Businesses exploit the disruptive pressure to redefine their core value proposition to align their purpose with a broader societal purpose as a competitive advantage to engage consumers and talent.

Break it down – understanding the problem

Disruption

Across all sectors, digital transformation is driving companies and whole sectors to re-evaluate their core value proposition and business models. Technology, innovation and new entrants are transforming the strategic landscape for all industries. Recent levels of disruption in media, entertainment, communications and retail are highlighting the susceptibility to the emerging disruptions of the healthcare, insurance, banking, utilities, energy and automotive sectors. The media sector learned many years ago that people no longer need a newspaper to get news; we're now learning that we don't need to own vehicles to get around or deal with banks for banking services.

Technology, responsibility and trust

Using new technologies and data brings new risks and responsibilities. Many business models to date rely on exploiting user data in ways that the public is now beginning to question. Poor practices corrode trust and are damaging to all. Social media, radio frequency identification (RFID) tags and user-generated websites such as TripAdvisor have all been instrumental in increasing the transparency of businesses and overcoming information asymmetries. But with most digital assets in the hands of the private sector, the behaviour of each business shapes the new digital social contract that will emerge in the coming years.

Beyond privacy and security concerns, broader ethical questions about the way organizations use digital technology threaten to erode trust in those institutions. There is great uncertainty about the overall impact of digital transformation on jobs, with additional concerns about its impact on wages and working conditions.²⁸ For companies, risks include liability and regulatory issues, direct losses and reputational damage leading to commercial loss.

In June, Microsoft employees wrote to CEO Satya Nadella demanding the company cancel a \$19.4 million contract with the US Immigration and Customs Enforcement (ICE) agency. Earlier, a petition signed by 4,000 Google employees sought “a clear policy stating that neither Google nor its contractors will ever build warfare technology”. And, separately, Amazon employees wrote to CEO Jeff Bezos, aiming to stop the company from selling facial recognition services to law enforcement agencies.²⁹

Platforms and networks

Platforms and collaborative networks are at the heart of the new digital economy, with 60–70% of new value created in the next ten years expected to be based on data-driven digitally enabled networks and platforms.³⁰ This includes not only social media, but also platform environments that enable industries, supply chains, employment, financial services and health markets – to name just a few. The rise of platforms poses a range of trade-off questions that challenge our traditional business and policy understanding. For example, e-commerce platforms allow micro-entrepreneurship and lower barriers to entry for small businesses. However, network effects, which occur when a product or service gains additional value for each user as more people use it, drive winner-take-all dynamics that challenge pre-digital concepts of monopoly. The move to platforms is likely to accelerate. To date, platforms have enabled exponential reach, smarter allocation of resources and the ability to harness the power of communities to transform markets for selling goods; the \$10 trillion services markets may be next.³¹

New technology architecture

New technology architectures for computing and communications will enable the next wave in the innovation of ubiquitous intelligence and integrated solutions. The value from these solutions will sit at the intersection of traditional sectors – for example, integrated environmental monitoring, energy and transport systems for cities. This will require collaboration across industrial and policy domains. A shared challenge is how the right partnerships and networks are created – across traditional sectors, with innovators and policy-makers.

Planetary boundaries of the digital environment

We are used to thinking of cyberspace as existing in a non-physical domain. While it's true that the internet allows for exponential growth of data, information, ideas and knowledge, there are real-world physical foundations. There are several areas in which we must manage the impact of these foundations on the environment, including data centres, electronic waste and the significant energy needs of blockchain.

2018–2019 context

There is now broad acceptance that a range of technologies, individually and collectively, are game changers for business,³² and 34.7% of FTSE 100 companies now have a technologist as part of their executive leadership team, up from 24.5% in 2016.³³

Furthermore, there is growing recognition of the role of business as a leader in building trust. In a global sense, business as an institution is trusted to a greater degree than governments or the media.³⁴ However, while tech entered 2018 as the most trusted sector,³⁵ high-profile news stories such as the Cambridge Analytica case have dominated the public conversation since then. As a result, trust in all technology-based sectors has declined, with concerns over data privacy and security an important factor.³⁶ Employees of several tech companies have called upon their leadership to uphold values not just in terms of how tech is developed, but how it is used. There is now broad debate about the responsibilities of tech companies.

As over 90% of all enterprises will be “digital-native” in the coming years,³⁷ questions of the responsibility and technology must be addressed across all sectors. Trust is driven by multiple factors, including the nature of products and services, how companies handle personal information, the security of data records and the 50 billion devices that will be connected to the internet in the coming years, as well as other factors such as transparency and access to due process. Beyond actions taken within individual companies, business has the opportunity, agility and, increasingly, the commercial interest to take a leading role in contributing to shared social outcomes through technical and voluntary normative standards and through enhanced collaboration with the public sector and civil society.

What's next?

Priorities for collaboration

- **Encouraging a network for responsible business leadership:** Individual businesses are already taking a leadership role on individual topics such as data protection and workforce reskilling, promoting a growing network of informed, responsible leaders who can chart sustainable paths for their organizations
- **Developing tools and guides on transformation:** As an opportunity to redefine purpose for both societal good and competitive advantage such as incorporating good digital citizenship into business practices
- **Empowering boards and companies' teams:** With an understanding of, and tools to manage, the implications of tech for their business opportunities and risks
- **Private-public cooperation to develop shared strategies for industry transformation:** Business networks and governments in several countries are collaborating on building shared roadmaps for the transformation of industries.

- **Private-public collaboration on important digital topics:** Create programmes on relevant topics – in particular, a) transformation of the economy, b) platforms, c) new technologies and d) next-generation architectures – for ongoing dialogue and shared problem-solving between all relevant stakeholders, including enterprises, SMEs, start-ups, municipal and national governments, and civil society
- [How to Supercharge Your National Digital Transformation – five lessons from the Boston Consulting Group](#)
- [Collaboration Between Start-ups and Corporates: A practical guide for mutual understanding – a white paper by the World Economic Forum](#)
- [The Power of Trust and Values in the Fourth Industrial Revolution – a perspective from the World Economic Forum and Salesforce](#)

Open questions

- What are the parameters of a new digital social contract for business?
- Where can business contribute most in the next two years to encourage a more inclusive, trustworthy and sustainable digital future?
- How can companies help customers and citizens realize the opportunities – and mitigate the risks – of the digital economy?
- [How Brands Can Foster Trusted Customer Relationships – Salesforce](#)

Developments to watch

- Corporate practices promoting transparency in AI decision-making
- The emergence of B2B platforms drawing on the internet of things
- The expansion of platforms as the overriding new business model

Shaping the future together

Initiatives

- [Blueprint for Better Business](#) challenges companies to be a force for good and contribute to a better society
- [The Digital Champions Network](#) asks business to commit to priorities and actions that ensure an inclusive digital revolution
- [SMARTer2030 Business Playbook](#) provides support to business leaders with ideas to enable the sustainability benefits of technology
- [Digital Economy Framework for Action](#) is the Singapore government's strategy to become the world's leading digital economy
- Japan: Society 5.0 (See Box 5)

Assets

- [A New Social Contract for the Digital Age](#) by T20 Argentina Task Force on the Future of Work and Education for the Digital Age
- International Data Corporation's (IDC) [predictions for the global IT industry](#) in 2019
- [The Case for Digital Reinvention](#) by McKinsey & Company
- [The Slow Pace of Digital Transformation](#) by Forbes
- [The Digital Enterprise: Moving from Experimentation to Transformation](#) by the World Economic Forum
- [Values, Ethics and Innovation: Rethinking Technological Development in the Fourth Industrial Revolution – a white paper by the World Economic Forum](#)

Shaping the Future: China

In China, 2018 marked a major milestone in terms of the internet: its internet users passed 800 million, making it the country with the largest internet population in the world.³⁸ Chinese internet users are some of the most dynamic in the world: 98% are active on mobile, 92% use messaging apps and 650 million consume digital news online.³⁹

The rapid growth of the internet in China has changed the landscape of the economy and society. In 2017, digital on-demand car- and bike-sharing services in the country accounted for over 10 billion trips – two-thirds of all the on-demand trips taken around the world. The Chinese online e-commerce platform Taobao has over 600 million active daily users, making it 80% larger than Amazon.⁴⁰ The magnitude of its impact can be gauged by the growth of what are often called Taobao villages: communities where more than 10% of the population make a living by selling products and services online. In 2013, there were only about 20 such villages across China; today there are over 2,000. They account for over half a million online stores, \$19 billion in annual sales and 1.3 million new jobs created.

The scale of internet usage and its economic significance is best illustrated by what the Chinese call “Guangun Jie” or Singles’ Day. On 11 November every year, billions of Chinese at home and abroad participate in a 24-hour online shopping festival. It is a global affair with over 100,000 sellers from more than 200 countries getting involved, including some of the biggest international brands such as Apple, Burberry and Uniqlo. This year, on the tenth anniversary of the event, the Chinese online e-commerce giant Alibaba generated revenues of over \$30.8 billion in 24 hours, beating last year’s record of \$25.3 billion.⁴¹ Amazon generated \$4 billion in sales on Prime Day in July; Alibaba exceeded Amazon’s number within the first 15 minutes of its event.

The commercial impact is being complemented by the next wave of internet-infrastructure investment in China: 5G dramatically improves bandwidth, capacity and reliability of mobile broadband and opens up many new applications at scale, from high-definition video to smart clothing, telehealth and autonomous vehicles. It is the critical enabler to the roll-out of the internet of things (IoT). China is running a series of integrated 5G trials across 17 cities and expects to launch commercial services by late 2019 or early 2020, with plans to achieve 500 million 5G subscribers by 2025.⁴² The country will remain a centre of attention in 2019 as 5G pilots move forward into commercialization. The success of this transition will be a major indicator of China’s ability to be a technology innovator and leader in 5G applications and services.

Shared Goal 4: Keep Everyone Safe and Secure



Destination: Everyone's identity, assets, reputation and life are protected from cyber-risks through trusted and secure technologies, businesses and institutions along with a culture of cybersecurity and cyber-resilience

A safe and secure digital environment is a global public good. Everyone has a role to play in contributing positively to this environment. Progress has been made, but the challenge becomes more difficult with the explosion of IoT and a complex geopolitical backdrop. A world where all individuals have the capabilities to ensure their own security is a world where cyber-risks can be more effectively mitigated and managed.

- 74% of business can expect to be hacked this year⁴³
- The 2017 WannaCry attack affected 150 countries and institutions⁴⁴
- Over 4.5 billion records were compromised by malicious actors in the first half of 2018, up from 2.7 billion records for *all* of 2017⁴⁵
- Cyberattacks result in annual losses of over \$400 billion to the global economy⁴⁶
- By 2022, 50% of security alerts will be handled by AI automation⁴⁷

Issue overview

Cyberthreats are one of the primary challenges to ensuring we fully harness the benefits of the digital economy. Cyberattacks result in an annual loss of over \$400 billion to the global economy. The average cost of a data breach is \$3.62 million.⁴⁸

In the first half of 2018, more than 4.5 billion data records were compromised by malicious actors. This translates to over a million records lost or stolen *every hour*. Beyond data theft or loss, inadequate security puts the integrity of data into question as malicious actors with network access can insert or remove relevant data used for decision-making and industrial processes.

Although criminal activities form the vast majority of cyberattacks, there is a growing trend in nation state intrusions onto critical networks. Such intrusions by states erode both trust and sovereign authority. They also focus the immense resources of states in order to build tools that eventually wind up in criminal hands, exacerbating an already significant threat to businesses and individuals. Finally, these activities significantly threaten innovation itself by depriving peaceful actors of a trusted and dynamic platform for the development of new business and social models.

Given these issues, and the inability of any one nation or company to solve them alone, it is vital to consider security as a global public good and thus act in concert to better ensure safe digital networks. Global cooperation and commitments are needed.

Why does it matter?

Digital connectivity plays a pivotal role in unlocking innovation and prosperity around the world; security provides the foundation for the trust and stability necessary for this to occur. However, the increasing number of cyber-risks presents a major obstacle to our continued and collective path to progress. Even beyond the economic implications (e.g. on intellectual property or financial stability), better security is necessary in order to protect the integrity of a wide range of societal values, such as basic rights, privacy and democratic processes.

Break it down – understanding the problem

Reduce global cyberattacks, contain current and future cyberattacks and deter cybercrime.

Reduce, contain, deter

From a threat perspective, the issue is deceptively simple. There is a need to reduce the number of cyberattacks, contain the severity and reach of current and future cyberattacks and deter future attacks by heightening the risks associated with such activity.

A leadership issue

Those at the forefront of digital-security thinking view cyber-resilience as more a matter of strategy and culture than tactics. Being resilient requires those at the highest levels of companies, organizations or governments to recognize the importance of avoiding and proactively mitigating risks. While it is everyone's responsibility to cooperate in order to ensure greater cyber-resilience, leaders who set the strategy for an organization are ultimately responsible, and have increasingly been held accountable, for including cyber-resilience in their organizational strategy. For businesses, this means cyberstrategy must be determined at the oversight board level, and must be embraced by the entire organization.

Collaboration is critical

Speaking solely about cybersecurity is insufficient if the challenges of digitalization are to be effectively met. Protection is important, but organizations must also develop strategies to ensure durable networks and take advantage of the opportunities that digitalization can bring. While there are many broader definitions of cybersecurity, there is a difference between cybersecurity and the more strategic, long-term thinking that cyber-resilience should evoke. Additionally, since vulnerability in one area can compromise the entire network, resilience requires a conversation focused on systems rather than individual organizations. New models of cooperation at all levels – industry, national, regional and global – are required to shape shared responses.

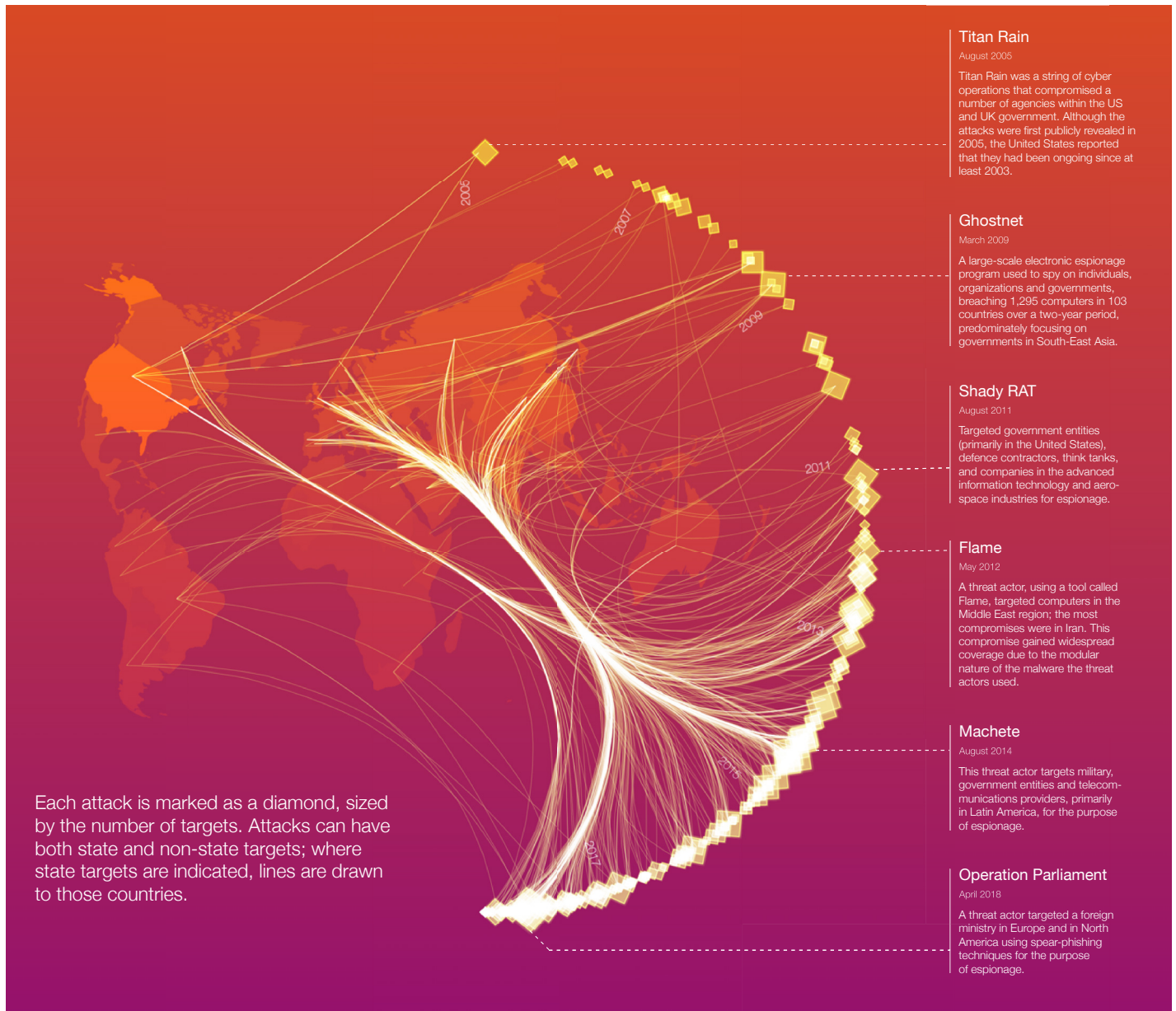
2018–2019 context

Broader decline in trust between large powers is affecting trust in cyberspace, making cooperation more difficult.

The next year will witness significant positive steps towards developing solutions to shared security challenges and coping with the evolution of new threats. These threats may well take the form of new illegal business models and the

refinement of crime-as-a-service, as well as the spread of such malicious actions from the developed world to newly digitized economies elsewhere. New technologies continue to come online, providing an increased attack surface (as is the case of 5G-enabled connected devices) and new tools for malicious actions (such as adversarial AI). Practices that encourage security-by-design or security-by-default are likely to emerge as industry standards in response to increased threats.

Figure 2: Rising incidence and impact of global state-attributed cyberattacks



Source: Thomson Reuters Labs

What's next?

Priorities for collaboration

Multistakeholder partnership will be a vital component in resolving many of the challenges listed above. This collaboration will be crucial if the largest challenges to trust and security are to be effectively met in the near future. While there are likely to continue to be opportunities for collaboration, there are several priority areas:

- **Building human capital:** There is a significant gap between the need for cybersecurity professionals and the number of individuals trained and ready to enter the profession. Several nations and companies are working to provide educational opportunities and increased access to these vital roles
- **Building understanding at leadership level:** In government ministries, departments and regulatory agencies as well as in corporate boardrooms, understanding of cybersecurity risks is lacking. Organizations such as the World Economic Forum's Centre for Cybersecurity are building capabilities for these important decision-makers
- **Addressing confusion and fragmentation:** Regulation has been inadequate in addressing evolving threats to networks and the components of critical infrastructure that rely on those networks. Continued work must be undertaken to ensure that regulation encourages both transparency and security
- **Encouraging technical innovation:** Internet architecture is not designed for security. New standards for security are beginning to be developed. These efforts must accelerate and adapt to new technologies in order to continue to have salutary effects
- **Mitigation strategies:** In order to ensure that the engines of innovation continue to survive and thrive, security and resilience call for new risk-mitigation strategies and tools. Insurance companies are leading these efforts and will continue to have a vital role to play in the future.
- **Intelligence sharing:** Especially between computer emergency response teams (CERTs) and law enforcement, and between national law enforcement agencies
- **Global capacity-building and training programs:** To produce the next generation of cybersecurity professionals
- **National and corporate strategies:** Cybersecurity as a core part of national and corporate strategies

Open questions

- How do we build greater trust and collaboration between business and government to address cyber-risks?
- How do we accelerate the building of cybersecurity skills among professionals and users?
- How do we measure the real and potential costs of cyberattacks using common metrics?

Shaping the future together

Initiatives

- [Centre for Cybersecurity](#), World Economic Forum, launched January 2018
- [Global Cyber Alliance](#), organization aimed at implementing concrete cybersecurity measures globally
- [Cyber Threat Alliance](#), launched as an independent organization in 2017 to share advanced threat data
- [Cybersecurity Tech Accord](#), public commitment among more than 60 global companies to protect and support civilians online and to improve the security, stability and resilience of cyberspace
- [Charter of Trust](#), industry-led effort that aims to set minimum general standards for cybersecurity in keeping with the requirements of state-of-the-art technology

Assets

- [Responsible, Safe and Secure AI](#), Lisbon Council (October 2018)
- [State of Cybersecurity Report 2018 by Wipro](#)
- [Digital and Risk: A New Posture for Cyber Risk in a Networked World](#) by McKinsey & Company
- [The State of Cybersecurity Report](#) by ACC Foundation
- [Cyber Resilience Playbook for Public-Private Collaboration](#) by the World Economic Forum

Developments to watch

- [Paris Call for Trust and Security](#) – the first government-endorsed global effort on cybersecurity that recognizes the crucial role the private sector plays in protecting the important global public goods of trust and security in cyberspace
- [Interpol Global Complex for Innovation](#) – research and development facility for the identification of crimes and criminals, innovative training, operational support and partnerships

Shaping the Future: Digital ASEAN

ASEAN is the fastest-growing internet market in the world. With 125,000 new users coming on to the internet every day,⁴⁹ the ASEAN digital economy is projected to grow significantly, adding an estimated \$1 trillion to regional GDP over the next ten years.⁵⁰

However, many significant roadblocks stand in the way of realizing this potential. For most ASEAN countries, these include, among other things: inadequate digital infrastructure; restrictions on cross-border flow of data; absence of harmonized rules and regulations on e-commerce, including questions about data protection; blockages at customs; burdensome business-licensing processes and absence of digital payment solutions; shortage of digital human capital; absence of regional e-payment systems and regional digital-identity frameworks; weak resilience against cyberattacks; lack of empirical evidence to inform ASEAN digital policy.

ASEAN has laid out important policy measures and frameworks – including the AEC Blueprint 2025, Masterplan on ASEAN Connectivity 2025 and the e-ASEAN Framework Agreement – to address these roadblocks. However, meeting these ambitious goals will demand detailed research, visionary policy-making, and substantial buy-in from regional stakeholders.

In response to this opportunity, a multistakeholder group of Forum members and partners launched the Digital ASEAN programme to develop a sustainable, inclusive and trustworthy regional digital economy. The programme provides a platform for a wide range of stakeholders to identify and address roadblocks to ensure the digital economy becomes a force for the region's sustainability and prosperity. The Digital ASEAN programme comprises of the following three broad areas:

1. Towards a digital single market
 - Enabling e-commerce
 - Cross-border data flows
2. Building and enabling digital ecosystems
 - Digital entrepreneurship
 - Digital human capital
 - Digital identity
 - Cyber-resilience
 - Better research for evidence-based digital policy
3. Infrastructure and digital access
 - Digital infrastructure
 - Digital literacy

A community of interested parties in ASEAN, collectively convened and managed by the World Economic Forum, will decide which of these areas are of greatest priority. The Board of Advisors includes 15 individuals who are ASEAN ministers of digital economy, ICT and commerce, the ASEAN secretary-general, business leaders and thought leaders from academia, and the Forum's ASEAN Regional Business Council, a group of 70 companies that provides additional support and guidance. Each chosen area will have its own multistakeholder working group and will seek to accelerate and amplify existing leading activities.

Shared Goal 5: Build new rules for a new game



Destination: We have an effective set of rules and rule-making tools for the Fourth Industrial Revolution that are agile, inclusive and multistakeholder-ready as needed

Policy-makers are challenged to protect individuals while enabling innovation. Technologies create new opportunities that require new rules; the explosion of many technologies is creating lots of new questions. The role of governments in establishing a national strategic direction and priorities is critical. However, the globally connected nature of digital technologies makes many issues difficult to address at an international or even national level. The speed of change outstrips traditional policy, regulation and governance processes.

- In Sep 2018, China announced that it will invest \$14.6 billion in the digital economy over the next five years,⁵¹ and in Jun 2018, Europe committed €9.2 billion (\$10.4bn) to the first ever Digital Future Program⁵²
- According to a global survey conducted by Dentsu Aegis, only 45% of people believe that the positive impact of the evolving digital economy outweigh the negative⁵³
- According to the same survey, 43% of respondents believed that technology has made society more unequal and 55% felt that not enough is being done to ensure technology benefits everyone⁵⁴

Issue overview

The institutions that have traditionally had the responsibility of shaping the societal impacts of new technology are struggling to keep up with its rapid change and exponential impact. At the same time, a sharp decline in confidence is occurring around the world as trust in mainstream institutions is at its lowest point in five years.⁵⁵ There is an urgent need for a faster, more agile approach to governing emerging technologies and the business models and social interaction structures they enable.

A shared understanding of acceptable behaviours is the foundation of trust in society. Whether through shared values, rule of law or understanding the colour-coding of traffic lights, governance allows us to act and pursue our goals with confidence. The architecture and nature of traditional governance mechanisms are inherently challenged to respond to digital technologies and the internet due to *structural* and *rate of change* mismatches.

These pressures require an evolution of our institutional architecture – towards adaptive, human-centred, inclusive and sustainable governance. Beyond policy and regulation, other instruments – such as contract law, voluntary standards, codes of practice, industry self-regulation and technology innovation – can provide assurance and “rules of the road”.

Why does it matter?

Using traditional policy-making tools alone, governments will struggle to keep pace with innovation, create the right enabling environments for innovations that cut across traditionally isolated sectors, position their countries for competitiveness or develop common frameworks with other governments to ensure the continued exchange of commerce, knowledge and understanding that are the foundations for peace. The implications of these shortcomings would constrain their ability to protect consumers, drive innovation and growth, and provide security to citizens.

Unilateral decision-making that does not understand and include input from all relevant stakeholders is more likely to be met with resistance and thus falter.

Break it down – understanding the problem

Traditional rule-making occurs primarily within national contexts, divided among clear vertical ministries (e.g. health, transport etc.), with clear devolution of authority from national to regional, municipal and local governments. The rate of technology innovation can outpace a government's ability to develop new rules. Beyond the pace of change, it is also deeply challenging to understand or predict the complex disruptive implications of new technologies. As such, governments are rapidly developing new strategies and using existing international fora. In some cases, these efforts are already being supplemented through deeper cooperation with the internet and the business communities, offering the opportunity for faster, more inclusive trust-building.

A strategic priority for all stakeholders

Since 2016, a growing number of **national governments** have established national strategies, including strategic direction, priorities and investments. A variety of different approaches and models are being implemented. China has developed a multipronged approach, driving the progress of internet access, e-commerce and digital economy participation and leadership in AI. It has also sought international cooperation through the digital “silk road” and the World Internet Conference – Wuzhen Summit. Singapore has undertaken a major analysis of the digital transformation of its industries and established industry action plans and a national skills agenda based on that data. Digital India has been a core focus of that country's leadership, while the Thai cabinet approved a law establishing the Digital Economy and Society Council under the Digital Economy and Society Ministry. Strategic overviews have been undertaken by the UK, Denmark and Sweden, among many others. Switzerland created a Digital Transformation Advisory Council to support a business-government exchange. India and Japan have announced the establishment of Centres for the Fourth Industrial Revolution, as part of a global network of innovation hubs to develop agile governance protocols for digital and other Fourth Industrial Revolution technologies.

At the **international level**, the digital economy has now been established as a vital pillar, with strategic initiatives being developed by a range of different organizations and institutions. Examples of these include the G20/B20 Summit, Internet Governance Forum, World Internet Conference – Wuzhen Summit, UN High Level Panel on Digital Cooperation and G7 Innovation Ministers’ statement on Artificial Intelligence. Digital topics are now a regular feature in trade fora, [eTrade for All](#) being one example of ongoing collaboration and learning. On other issues requiring global cooperation, each of these institutions and processes make complementary contributions to collective understanding and action. Each organization has made tremendous progress in encouraging and establishing structured dialogue and cooperative processes among its constituents. Nevertheless, given that many of these digital dialogues are relatively recent – as are the topics they are dealing with – there is still some progress to be made in establishing shared frameworks and policy priorities across the multiple processes.

Industry-led and other approaches

Industry-based governance approaches are widely used in a range of different settings, offering a variety of alternative instruments and benefits. Examples include industry standards, such as the ISO (International Organization for Standardization) series, common transparency or governance practices, standards certifications and marks, or more formalized self-governance. For example, the International Swaps and Derivatives Association, where market participants voluntarily participate not only in a shared set of rules, but also in binding adjudication processes and decisions. Such mechanisms can provide fast and context-based rule-making, monitoring, enforcement and remediation processes, which can evolve over time.

- **Industry and market mechanisms:** These can take many forms, from setting market conditions, such as market-entry standards, product requirements and standard contract terms, to social obligations, such as environmental controls, safety regulations or advertising and labelling requirements
- **Super regulators:** Rules and regulations are supplied by competitive private regulators that are overseen, as necessary, by public regulators. For example, the EU’s data protection law on the right to be forgotten gives EU residents the right to ask technology platforms to remove certain personal links from their search engine results
- **Setting ethical standards:** In the absence of an organization with sufficient credibility to set new technology standards, industry leaders have been calling for the adoption of ethical principles that guide research and industry activities, such as the [Partnership for AI](#) or the [Asilomar AI principles](#)
- **Creating transparency and trust in technology innovation:** Algorithms and data can be seen as

important sources of competitive advantage, but the development of open IT infrastructure and protocols provide a vital tool for establishing governance principles as these are perceived as open, vendor-neutral IT standards and certifications

Civil society and the technical community

Since their inception, the development of the internet and the world wide web has been shaped by a **rich range of civil society and technical bodies**, such as ICANN, W3C, IETF and ISOC, to name just a few. Many of these organizations and the processes that facilitate ongoing development are highly open and participatory, often driven or enabled by an open network of volunteers. This unique model of shared global ownership and open resources, processes and standards has made the internet what it is today. The internet ecosystem represents a tremendous set of resources, participatory mechanisms and capacity for technical solution development that governments and business could engage with more fully in the pursuit of shared goals. Technical bodies are already taking the lead on standardization of new technologies, for instance, the IEEE P7000 programme for AI.

Technology-based innovation

As tools, technologies themselves are rarely “the answer”. However, new technologies (including new architectures and protocols) can change what is possible. The hype around blockchain, or distributed ledger technologies (DLT) more generally, is based on the fact that it offers a game-changing possibility: the ability to provide assurance and trust across a system without a centralized authority. Whether the system is one of financial exchange, voting or land registry of contracts, this represents a powerful alternative to the models of centralized authority that have been used throughout history. DLTs effectively encode and automate the “rules of the game” and ensure they are tamper-proof. Nevertheless, the rules of the game still need to be set.

2018–2019 context

Issues regarding the digital economy and society rose on the agenda for almost every region and policy domain in 2018, but some topics emerged as broader trends. The implementation of [Europe’s General Data Protection Regulation](#) (GDPR) in May 2018 has been pivotal in shifting and expanding the debate on data protection and privacy (see Shared Goal 6). Ongoing developments such as the [Aadhaar](#) case have highlighted the foundational nature of digital identity (see Shared Goal 2). There has been a high level of concern about the problems caused by malicious actors, including cybersecurity (see Shared Goal 4) and the spread of misinformation.

These topics are all expected to continue to grow in importance in the year ahead, with others likely to join them. Since the milestone has been reached of 50% of the world’s population using the internet in 2018, we will probably see increasing focus on internet access, and efforts at rolling out

5G will command attention. There is growing recognition of the potential risk of digital addiction and related harms to the mental and emotional health of adults and children.

Attention is also returning to the imperative to find new ways to collaborate. On 5 November, Tim Berners-Lee launched a campaign to create a new “Contract for the Web”. On 12 November, President Emmanuel Macron of France launched the Paris Call for Trust and Security in Cyberspace. In contrast to calls for new global entities that were sometimes made in the past, supporters of the call “affirm our willingness to work together” through existing fora and processes, and agree to reconvene at the Internet Governance Forum in Berlin in 2019.

What's next?

Priorities for collaboration

- **Accelerating global capacity for inclusive agile-governance development:** Establishing innovative governance protocols and instruments. A number of actions can be launched to ensure better adoption of agile-governance mechanisms
- **Policy labs:** Many new approaches to policy-making have emerged from the creation of protected spaces within government with an explicit mandate to experiment with new methods of policy development by using agile principles – often referred to as policy or governance labs
- **Regulatory sandboxes:** These are safe spaces for companies to test innovative products, services and business models without needing to overcome the normal regulatory and financial hurdles (i.e. licensing) of engaging in the activities in question. Governments use these sandboxes to encourage innovation through the adoption of flexible regulatory frameworks and processes
- **Increasing agility through the use of technology:** Introducing emerging technologies to existing governance processes can enable more agile, distributed and transparent processes. Blockchain technology is currently being tested for various purposes and processes. One is to enable citizens to decide the extent to which their private data is shared with public and private institutions every time they access the technology
- **Promoting governance innovation:** Integrating processes aligned with agile governance principles can allow for the spread and scale of innovations
- **Crowdsourcing policy-making:** In an effort to stop declining public trust in governments and enable a more inclusive and participatory rule-making process, some legislators are introducing the idea of crowdsourcing law-making
- **Promoting collaboration between regulators and innovators:** An example would be the Innovation Deal

initiative by the European Commission, which helps innovators to address legislative obstacles by shortening the time between the idea stage and bringing the innovation to market

- **Sustaining progress:** Use multiple existing fora, institutions and processes to create sustained progress against a shared set of frameworks and goals.

Open questions

- What are the best examples of new digital rules working in practice?
- How do we [measure the digital economy](#)? What should we be tracking and how?

Shaping the future together

Initiatives

- [Centre for the Fourth Industrial Revolution](#), launched by the World Economic Forum in 2017 to advance multi-stakeholder cooperation and policy frameworks that accelerate benefits of technology
- [Internet Governance Forum](#), a platform for discussions on policies and practices relating to the internet
- [IEEE P7000](#) established a process model by which engineers and technologists can address ethical considerations throughout the various stages of system initiation, analysis and design
- [The Council of Europe in Artificial Intelligence](#) investigates how to regulate the development of AI
- [Contract for the Web](#) by Tim Berners-Lee puts down a set of principles to defend a free and open internet
- [Trade and Development Report 2018](#) by UNCTAD describes how the digital world is opening up new growth opportunities for developing countries
- [UN Secretary General's High Level Panel on Digital Cooperation](#) aims to strengthen cooperation in the digital space among governments, the private sector, civil society, international organizations and academia.
- [World Internet Conference – Wuzhen Summit](#) is an annual meeting organized by the Chinese government and jointly held by the United Nations Department of Economic and Social Affairs, the World Intellectual Property Organization, the International Telecommunication Union, the World Economic Forum and Global System for Mobile Communications Association
- [Going Digital](#) is OECD's project to build a coherent policy approach to bring about stronger and more inclusive growth from the digital revolution.

- [eTrade for All](#) is a platform developed by UNCTAD for inclusive e-commerce and development
- [Berkman Klein Center](#) is a centre for internet and society at Harvard
- [GovLab](#) deepens our understanding of how to govern more effectively and legitimately through technology
- The Oxford Internet Institute is multidisciplinary research and teaching department of the University of Oxford, dedicated to the social science of the internet
- [The MIT Media Lab](#) is MIT's anti-disciplinary research community designed to connect technology back to the social and the human
- [The Case #ForTheWeb](#) is a World Wide Web Foundation publication outlining areas for priority action to connect everyone to a web that works for people

Assets

- [Rethinking Policy in a Digital World](#) by Centre for International Governance Innovation
- [Strategy for Denmark's Digital Growth](#) by Denmark's Ministry of Industry, Business and Financial Affairs
- [The e-Government Survey 2018](#) by the United Nations
- [Digital Policy Playbook](#) – World Economic Forum white paper on approaches to national digital governance
- [Digital Economy Outlook](#) – OECD
- [Review of Digital Strategy of Sweden](#) – OECD

Developments to watch

- ICANN64 – Fellowship Program and event in Kobe, Japan (March 2019)
- G20 Digital Economy Task Force

Shaping the Future: Society 5.0 - Japan's initiative for co-creating the future

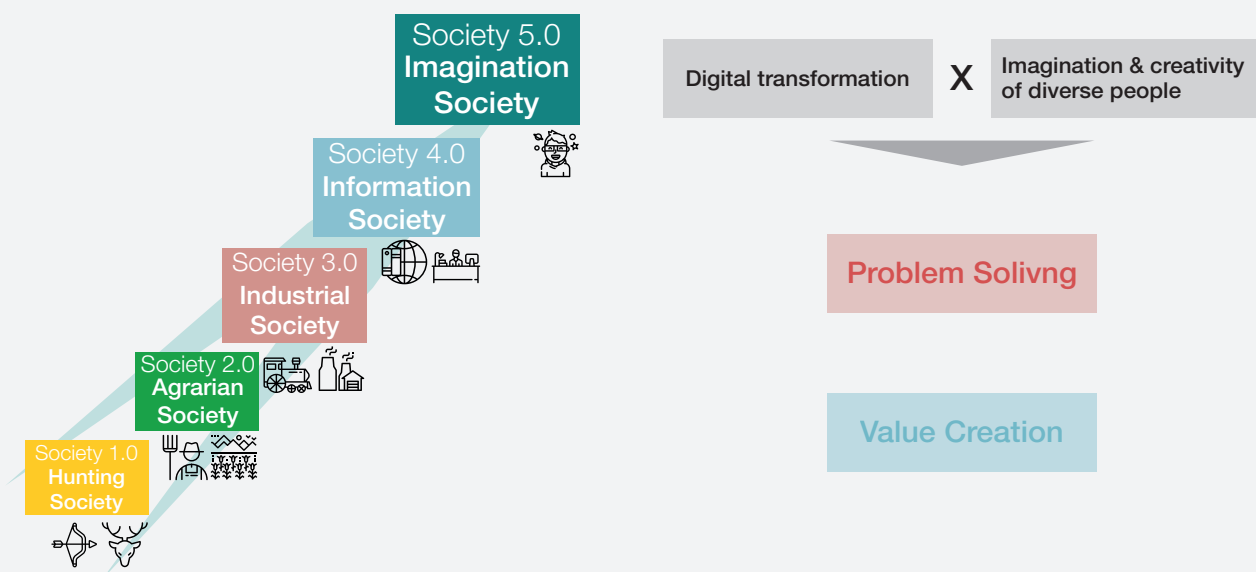
Change caused by digital transformation

The world is now facing a great tide of change. The trend of digital transformation cannot be stopped and is drastically changing aspects of society including private lives, public administration, industrial structure and employment. There are countless alternatives for directions in which society will be advanced by technological development. While technologies could bring about merits such as higher standards of living and better convenience, they could have negative effects such as impact on employment, growing disparity and maldistribution of wealth and information. It is up to us in which direction we choose to go. We must consider what kind of society we wish to create rather than trying to foresee the kind of society it will be.

What Society 5.0 is

Therefore, Japan will take initiative in guiding the world to a brighter future by showing an ideal concept of the next society, named as Society 5.0.¹ In its latest report issued in November 2018,² Keidanren (Japan Business Federation) has redefined Society 5.0 as "Imagination Society". People are expected to exercise rich imaginations to identify a variety of needs and challenges scattered throughout society and scenarios to solve them, as well as creativity to realize such solutions making use of digital technologies and data. Society 5.0 will be an Imagination Society, where digital transformation combines with the imagination and creativity of diverse people to bring about "problem solving" and "value creation" that lead us to sustainable development. It is a concept that can contribute to the achievement of the Sustainable Development Goals (SDGs) adopted by the United Nation.

This is Society 5.0 (Imagination Society)



Source: Keidanren

What Society 5.0 brings about

In Society 5.0 people will be liberated from various constraints that could not be overcome up to Society 4.0 and will obtain the freedom to pursue diverse lifestyles and values.

People will be liberated from focus on efficiency, and place emphasis on satisfying individual needs, solving problems and creating values.

People will be able to live, learn and work, free from suppression on individuality, such as discrimination by gender, race, nationality, etc. and alienation by ways of thinking and values.

¹ The 5th stage of human society following Hunting, Agrarian, Industrial and Information Societies. It was officially presented for the first time in the 5th Science and Technology Basic Plan in January 2016.

² Keidanren, "Society 5.0 - Co-creating the future -" (November 5, 2018) <http://www.keidanren.or.jp/en/policy/2018/095.html>

People will be liberated from disparity caused by the concentration of wealth and information, and anyone will be able to get opportunities to play a part anytime, anywhere.

People will be liberated from anxiety about terrorism, disasters and cyber-attacks, and live with security with the strengthened safety nets for unemployment and poverty.

People are liberated from resources and environmental constraints, and can live sustainable lives in any region.

In short, we will make Society 5.0 a society in which anyone can create values anytime, anywhere, with security and in harmony with nature.



Source: Keidanren

Blueprints of Society 5.0

In the report, Keidanren has described specific pictures of Society 5.0 picking up some of the most important areas.³

Taking healthcare as an example, we will provide personalized and preventive care by collecting and analyzing individual health and medical data over lifetime so that people can live longer with good health. If Japan is successful in creating such a healthcare system, it can be applied to other countries that are facing ageing society in the near future, thus contribute to the achievement of the 3rd goal of the SDGs.

Keidanren is urging the government to establish infrastructure for linkage of health and medical data and make it available for various actors to provide better healthcare services. At the same time it continues dialogue with academic and medical society to break down sectionalism and build partnership for a comprehensive healthcare system.

Keidanren is working together with the government and other stakeholders on corporate and labor policy reform, human resource development, establishment of data policy, enhancement of research and development, governmental reform, etc. for the realization of Society 5.0. It wishes to share the goal with its partners in the world and co-create the future.

Learn more: <http://www.keidanren.or.jp/en/policy/2018/095.html>

³ Smart cities, energy, disaster response, healthcare, agriculture, logistics, manufacturing and services, finance and public services

Shared Goal 6: Break through the data barrier



Destination: Common practices, tools and resources that allow us to benefit from data while protecting the interests of all stakeholders

Many of the exciting opportunities to exploit technology and deliver better social and economic outcomes assume that we are able to use and share data. In practice, today there are a range of commercial, liability and regulatory barriers to using and sharing data, much of them driven by the wish to protect individuals and concerns on privacy risks.

- According to UNCTAD, value-added services related to the IoT grew from around \$50 billion in 2012 to approximately \$120 billion in 2018⁵⁶
- There will be over 20 billion connected devices globally by 2020⁵⁷
- Around 12% of international trade in goods has been estimated to occur through global e-commerce platforms such as Alibaba and Amazon⁵⁸
- The international dimension of information flows has increased global GDP by approximately 10%, equivalent to a value of \$7.8 trillion in 2014⁵⁹
- According to Forbes, 71% of enterprises globally predict their investments in data and analytics will accelerate in the next three years and beyond⁶⁰
- By 2022, 50% of servers will encrypt data at rest and in motion⁶¹

Issue overview

Data can provide us with the insight and intelligence to pursue almost any goal. We are witnessing a revolution in the way we collect, manage and share insights.

The value of data accrues as it accumulates, and even apparently unrelated datasets can deliver new insights. Combining multiple health data sources can yield new understandings in precision medicine or preventative health, delivering new value to patients and paving the way for health companies to transform from an unsustainable paradigm of health treatment to a sustainable model – and market – based on healthy lives for all. Sharing information on cyberthreats and vulnerabilities can keep companies and governments ahead in the ongoing battle of cyber-resilience. The increased frequency of drought is one of the biggest causes of new refugees; combining long-range weather forecasting of droughts with information about farms, locations and crops could help governments and insurance companies deliver early assistance to farmers and prevent populations being displaced.

However, these opportunities must be balanced with several other important goals – not least of which is the protection of individuals' privacy and allowing users to be able to make informed decisions on how information about them is used.

Why does it matter?

It is easy to imagine divergent possible futures for our collective ability to manage and use data.

In one scenario, our practices for data management are defined primarily through ineffective regulation and a series of high-profile litigation cases, many of which devolve into a media circus and/or political grandstanding. Advances are slow – defined by what can't be done and the cost of getting things wrong. Corporate transformation programmes fail at scale, wasting billions of dollars, and dry up as risk appetites decline. Collaborative platforms are too costly or complex to work, so more services are concentrated within "walled-garden" models, further strengthening the winner-takes-all dynamic and sparking more conflict with regulators globally. Service providers are eventually broken up to operate in highly regulated, globally fragmented markets.

Alternatively, we can develop a suite of practices, tools and resources that allow us to benefit from data-sharing while protecting the interests of all stakeholders. These are available and continuously iterated through open-source platforms and multistakeholder practitioner communities. We shift from a combative discourse on data ownership to a collaborative paradigm on shared data permissions, with effective tools to put these into practice. There will be communities of data practice that are active in different commercial and non-commercial domains.

Break it down – understanding the problem

Despite clear incentives and good intentions, many great ideas struggle to get beyond the idea or pilot stage. There are several challenges to overcome (e.g. business and partnership models, see Shared Goal 3). However, one critical set of barriers are the commercial, legal, regulatory, reputational and liability issues that organizations may face

- **Commercial:** Companies do not wish to have their proprietary or commercially sensitive information exposed
- **Legal:** In many cases, organizations will be prevented by law, and organizations that operate in multiple jurisdictions will likely have to contend with a variety of different legal environments
- **Regulatory:** Many industries are even more strictly regulated, particularly those involved in the provision of a public good or that serve the national interest, and may face hefty fines. Complications can arise if a situation involves sharing data across multiple sectors governed by different regulators
- **Reputational:** Aside from legal issues, companies are now highly sensitized to the reputational damage that may result from a lack of care over personal data
- **Liability:** Aggrieved parties can litigate for damages. In the absence of mature rules and case law, this will be a particularly acute risk in common-law jurisdictions

These challenges arise in the context of the massive expansion in the amount of data being generated, collected and monetized. There will be over 20 billion connected devices in the world by 2020. According to UNCTAD, value-added services related to the IoT reached \$120 billion in 2018. The cloud computing industry had a global market worth between \$107 billion and \$127 billion in 2017. Around 12% of international trade in goods has been estimated to occur through global e-commerce platforms such as Alibaba and Amazon. Companies are ramping up their investments in this domain: according to Forbes, 71% of enterprises globally predict their investments in data and analytics will accelerate in the next three years and beyond.

Issues around data can involve balancing multiple legitimate values at once – any combination of privacy, national security, criminal justice, civil liberties, innovation, consumer protection, anti-trust and national economic interests can be at stake in any one situation.⁶²

It is worth noting also that many benefits can be gained from organizations using their own data to drive improved services or new innovations. However, without effective ways to employ and share data for a variety of purposes, we will impose high opportunity costs in terms of positive societal outcomes and economic innovation.

Trust must be encouraged for data to be used effectively in regards to innovation. Overall, trust is at a low ebb in most countries surveyed. There are six dimensions of trust that need to be addressed in any effective data policy: security, accountability, transparency, auditability, fairness and ethics.

Some suggest the Fair Information Practice Principles (FIPPS) remain conceptually relevant as a foundation for trust, while recognizing that they would need to be adapted to the rapid technological change of the Fourth Industrial Revolution and to reflect the needs of different parts of the world.

2018–2019 context

After a two-year lead time, the implementation of the General Data Protection Regulation (GDPR) in Europe on 25 May 2018 was a pivotal moment in the history of data policy globally. GDPR has been seminal in aiming to support the user and contains a number of strong provisions to this end. It requires companies that handle personal data to design and build systems that protect that data, ensure the informed consent of the user and allow users to request a portable copy of their data. The regulation applies to all organizations that process information on citizens inside the European Economic Area (EEA). Additionally, companies are required to report breaches within 72 hours, under threat of maximum penalties of €20 million (\$22.6m) or up to 4% of global turnover, whichever is greater. The approach is being actively modelled in other countries. The regulation had an immediate impact, with the UK's Information Commissioners Officer seeing a four-fold increase in self-reported breaches from April to June.

There are some open questions on how to operationalize or enforce specific provisions, particularly in the context of newer technologies and in the details of how they will be applied. Some of these questions will be addressed through the early high-profile case of Facebook's breach of 50 million records, which it self-reported to the Irish Data Protection Commission (IDPC) on 28 September.

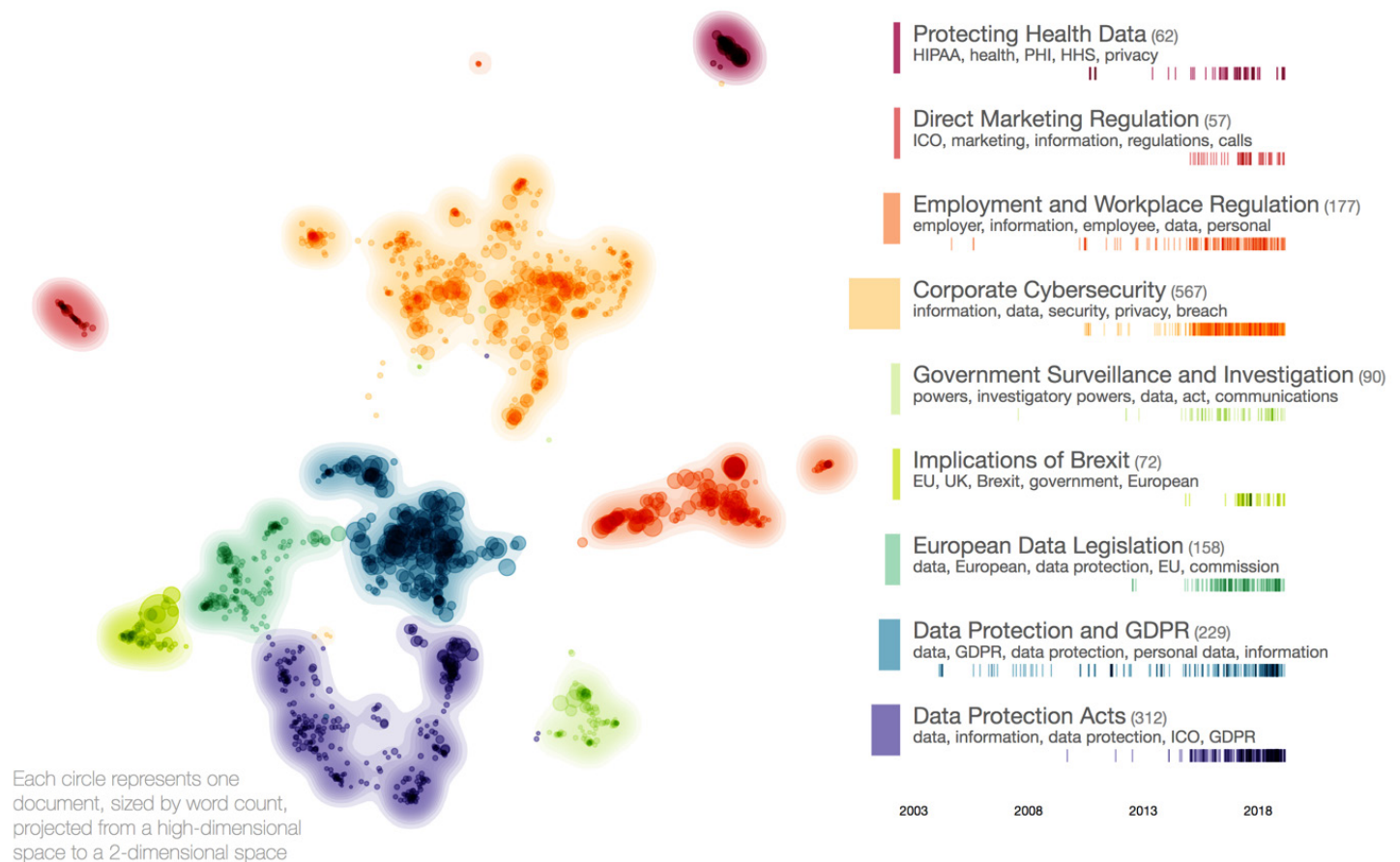
Empowerment of user control over their data is a broad trend. Other countries are observing and considering which elements of the regulation may be relevant to their context. Several industry leaders have expressed support in establishing legislative frameworks, including both Apple CEO Tim Cook and Google CEO Sundar Pichai.

A range of other approaches are being developed through government, business and civil society communities. Canada launched national digital and data consultations, a process that includes openly available materials for anyone to run workshops on important questions and provide input.

However, policy is not the only way to support and protect users. A range of other approaches are being developed that employ technical, legal or other mechanisms to share and use not just personal data, but also industrial or other types of data.

In September, Tim Berners-Lee announced [Solid](#), a project based out of MIT that uses existing web protocols to re-engineer user control over their data. Solid provides a platform that allows users to separate data from apps and keep their personal data in "pods" – allowing them to determine which pieces of information can be seen by whom. The Open Algorithm (OPAL) platform initiative offers a way to use private data held by a range of different companies to track societal or development progress by offering audited algorithms that sit within the firewalls of partner companies – currently being used on anonymized mobile operator data in Colombia and Senegal. Microsoft is developing homomorphic encryption technology, which gives people the ability to send data to their AI engines to analyse – keeping the data encrypted not just in transit but through the processing as well. Other innovations on establishing repositories of open legal clauses and model contracts to improve the efficiencies of creating transparent data-sharing agreements and open-source algorithm hubs are being explored. For example, the Japanese government has developed "contract guidance" to support industries in the formulation of private contractual relationships – for instance, on "data utilization rights" and "utilization of AI and data".

Figure 3: Discourse on Data and Privacy in Legal Journals



Source: Thomson Reuters Labs

What's next?

Priorities for collaboration

- **Exploiting interest in development, health, environment and humanitarian sectors:** To make a step change in tackling big issues as testing grounds for leading innovation models and practices
 - **Rapid prototype of these leading models:** In minimum viable products (MVPs); develop range and pipeline of proof-of-concept pilots
 - **Exploring development of a common and consistent risk-based framework:** To help policy-makers identify and understand objective privacy risks to individuals
 - **Creating and sharing legal agreement templates:** For the development of future data collaboration efforts
 - **Analysis of relevance of FIPPs:** To current context and across different cultural and jurisdictional contexts
 - **Supporting policy-makers with insights and tools:** That enable outcome-based policy approaches with measurable results rather than rigid compliance checklists
- **Develop suite of technical, legal and market approaches:** For example,
 - “Virtual Data Escrow” : a multisided event-driven contract between multiple parties that takes the form “if event x happens, we authorize the use of data y by agency z for purpose___”. This allows legal negotiations, clarifying questions with regulators and necessary consent from users to be completed in advance, so that once the data-sharing is needed, it can kick in immediately
 - Standard contracts : standard contract template for industrial data-sharing developed as model language by Japan’s Ministry of Economy, Trade and Industry (METI)
 - Open Algorithm : a GitHub for algorithms
 - Using homomorphic encryption for private computers
 - Developing meaningful consent for individuals
 - **Tools to allow companies to make good decisions:** (as discussed in Shared Goal 3)

Open questions

- What is the shared taxonomy of data impacts (both benefits and harms) on which outcome-based data-policy frameworks such as GDPR can align for interoperability across jurisdictions?
- How do we balance the gains from the economic potential of data with respecting privacy, security and innovation?
- How do we protect vulnerable populations from data misuse?

Shaping the future together

Initiatives

- [The Humanitarian Data Exchange \(HDX\)](#) – an open platform for sharing crisis data across organizations. Managed by the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA), the goal of HDX is to make humanitarian data easy to find and use for analysis
- [Solid](#) – created by Tim Berners-Lee, the inventor of the world wide web; its mission is to reshape the web as we know it
- Government of Canada's [National Digital and Data Consultations](#)
- [United Nations Global Pulse](#) for harnessing big data for development and humanitarian action
- [Epidemics Readiness Accelerator](#) addresses pressing challenges associated with public-private cooperation for effective global response to outbreaks
- [The OPAL Platform](#) aims to unlock the potential of private data for public good in a privacy-conscious, scalable, socially and economically sustainable manner
- The GovLab's [Data Collaboratives](#) for creating public value by exchanging data
- [Rights-based and Tech-driven: open data, freedom of information, and the future of government transparency](#) by Beth Simone Noveck, Director of the Governance Lab
- [Working Group on Epidemics Preparedness](#), exploring simple and cost efficient informational communication technologies to prevent spread of global epidemics.

Assets

- [Global State of Enterprise Analytics by Forbes](#)
- [Data Protection Regulations and International Data Flows Report by UNCTAD](#)
- [The Rise of General Data Protection Regulation \(GDPR\) report by EY](#)

Developments to watch

- Irish Data Protection Commission's investigation examining Facebook's compliance with its obligation under the General Data Protection Regulation (GDPR)
- Policy developments similar to GDPR initiated in other countries such as South Korea, India, Israel and Brazil
- Model AI Governance Framework in Singapore
- The Implementation of the Cape Town Global Action Plan for Sustainable Development Data

Shaping the Future: Growing technology demands on our planet – the tide turns

Today's greenhouse gas levels are the highest for over 800,000 years,⁶³ beyond long-term cyclical changes and averaging 405.5 parts per million in 2017.⁶⁴ Global warming is leading to a rise in sea levels, rising about 1.1 mm annually.⁶⁵ The oceans are also absorbing greenhouse gases, resulting in acidification and warming, which are leading to unprecedented damage to sea life and corals. Around 91% of the world's people live in places that fail to meet World Health Organization air-quality guidelines.⁶⁶ Even a 1.5% increase in global temperature could result in significant parts of New York City or Shanghai being **submerged in water**,⁶⁷ while declining biodiversity and fishery stocks threaten food supplies. Depletion of forestry, fishing and freshwater stocks; toxins in rivers and soils; overflowing levels of waste on land and in oceans; and loss of biodiversity and habitats are further urgent challenges not just to the cleanliness of our environment but to our health and survival.

The Fourth Industrial Revolution – and the societal changes it triggers – presents a unique opportunity to change this trajectory by transforming how we manage our shared global environment.

The use of advanced sensors and digital platforms could dramatically improve the accuracy and independence of carbon emissions monitoring, creating an entirely new level of accountability and driving a new wave of climate action. Digital technologies such as high-speed 5G and mesh networks connecting diverse advanced sensor platforms can enable managers to better monitor fish stocks and catches, track individual fishing boats and spot illegal fishing (an annual theft of around \$23 billion globally).⁶⁸ Meanwhile, innovations such as blockchain-enabled carbon micro-trading, intelligent distributed energy systems and AI-powered platforms to improve disaster response and planning could further improve our ability to reduce and adapt to climate change.

Technologies can also transform consumption patterns. Ride-sharing and other sharing platforms can reduce the number of cars on the road or the consumption of other goods. Advances in blockchain technology can help consumers track the journey of commodities through the entire supply chain, revolutionizing systems of certification and traceability. The industrial internet of things (IIoT), edge computing and next-generation networks can transform our energy systems.

These opportunities open up their own questions. Many are based on better transparency and intelligence, enabled by ubiquitous sensors, communication networks and information. However, the appropriate governance and economic models of these shared assets are in themselves unresolved questions.

In the case of geographic data, for example – which could be used for a variety of purposes such as land management, property rights, commercial purposes, drought prediction, prevention of, or preparation for, displaced populations and others – who “owns” the data itself? Should the data captured by drones or satellites be owned by the company that launched the satellite, the one that manufactured the sensors, the one that controls the database, the owner of the phone app on which the user accesses the information, the government agency that part-funded the venture or the farmers who launched the drone above their land? How can we ensure that such data is secure and not subject to hacking and change by particular interests? Who should even host the data, or see it, or be able to use it? Should the data be a public good or should companies be able to commercialize it freely, or both?

How should this digital environment be paid for? By whom and under what models? In regions where high population density is not already driving 5G-network deployment, how will the required investments be constructed? Equally, what is the sustainable funding mechanism for these opportunities? Can we find blended models that provide free access to information for public research but charge for commercial innovation, which could both provide returns on investments as well as contribute solutions?

Conclusion: The work starts today

The purpose of this document is to shape an agenda to move towards a more inclusive, trustworthy and sustainable digital future, but it is only a starting point. The reality is that no one set of actors can progress this digital agenda alone. It requires a collective response from policy-makers, business and citizens. This document contains examples of some of the many positive digital initiatives being undertaken today, but it does not claim to be comprehensive. We know many different initiatives related to the digital economy are underway across the world, and the hope is that this document will provide a common frame around which initiatives can focus and become mutually reinforcing.

So where do we go from here? It is critical to develop a roadmap that will increase the opportunities and minimize the risks. At a foundational level, this document points to the importance of inclusion and the need to address the digital divide. While there is a very real need to accelerate digital access to the half of the world's population who are not connected, we also recognize the interconnectedness of these issues and the fact that the digital divide goes far beyond access. It encompasses digital literacy, the role of digital identity and, ultimately, the understanding of the winners and losers in this new digital context – and the growing need to work harder to develop a new social contract that articulates how all classes of society benefit from the digital economy.

The need to shape our digital future is urgent. We also know that the landscape is changing quickly, and it is important that we spend time on tomorrow's issues instead of focusing on yesterday's problems alone. Each section in the document has framed a number of open questions that can form the basis of conversations and dialogues in different forums during the course of 2019. Our intent is that these insights will provide the basis of a second document on our digital future to be produced in the last quarter of 2019

Online platform for global collaboration

As the platform for public-private cooperation, the World Economic Forum provides a space for diverse leaders to set the agenda and develop initiatives to help shape the digital future. The Forum has created an independent online platform that can act as a window into shaping the digital future. In this document, we worked to set an outline and encourage individuals and organizations around the world to contribute to shaping the digital future. The Forum's digital platform is a mechanism that can support and accelerate these opportunities. We hope that the sponsors of the ongoing pilots and experiments in the digital space, whether it be policy-oriented, business transformation or societal, will be prompted to share insights and lessons learned through this [online tool](#). But it will be useful only if individuals and organizations use it as a reference source and network from now on. There are three questions to you individually as a

conclusion to this document. Our digital future is about us individually; each of us has a stake in the digital economy. We hope you can contribute to our worldwide platform:

- a. What knowledge can you add to the platform?
- b. What initiatives do you think will be important in 2019 to shaping the digital agenda?
- c. Will you join the discussion and add your views on the open questions?

Contributors

System Initiative on Digital Economy and Society: Stewardship Board Members

- **James C. Smith**, President and Chief Executive Officer, Thomson Reuters (Stewardship Board Co-Chair)
- **Lynn St Amour**, Chair, Multistakeholder Advisory Group, UN Internet Governance Forum (IGF) (Stewardship Board Co-Chair)
- **Navdeep Bains**, Minister of Innovation, Science and Economic Development Innovation, Science and Economic Development Canada
- **Tim Berners-Lee**, Professor of Engineering, MIT Computer Science and Artificial Intelligence Laboratory (CSAIL)
- **Carl Bildt**, Co-Chair, European Council on Foreign Relations (ECFR)
- **Omar bin Sultan Al Olama**, Minister of State for Artificial Intelligence, Office of the Prime Minister of the United Arab Emirates
- **Dorothee Bär**, State Minister for Digital Affairs, Federal Chancellery of Germany
- **Mariya Gabriel**, Commissioner for Digital Economy and Society, European Commission
- **Al Gore**, Vice-President of the United States (1993–2001); Chairman and Co-Founder, Generation Investment Management LLP
- **Mats Granryd**, Director-General, GSMA
- **Mario Greco**, Chief Executive Officer, Zurich Insurance Company Ltd
- **Paul Kagame**, President of the Republic of Rwanda, Office of the President of Rwanda
- **Doris Leuthard**, Federal Councillor for the Environment, Transport, Energy and Communications, Federal Department of the Environment, Transport, Energy and Communications (DETEC)
- **Maurice Lévy**, Chairman of the Supervisory Board, Publicis Groupe
- **Luis Alberto Moreno**, President, The Inter-American Development Bank
- **Hiroaki Nakanishi**, Executive Chairman, Hitachi Ltd
- **Pierre Nanterme**, Chairman and Chief Executive Officer, Accenture
- **Ravi Shankar Prasad**, Minister of Law and Justice and Electronics and Information Technology, Ministry of Law and Justice of India
- **Matthew Prince**, Co-Founder and Chief Executive Officer, Cloudflare Inc.
- **Jüri Ratas**, Prime Minister of Estonia, Office of the Prime Minister of Estonia
- **Kenneth Roth**, Executive Director, Human Rights Watch
- **Rudiantara**, Minister of Communication and Information Technology, Ministry of Communication and Information Technology of Indonesia
- **Bradford L. Smith**, President and Chief Legal Officer, Microsoft Corp.
- **Jes Staley**, Group Chief Executive Officer, Barclays
- **Rajeev Suri**, President and Chief Executive Officer, Nokia Corporation
- **Gillian Tans**, President and Chief Executive Officer, Booking.com BV
- **Lauren Woodman**, Chief Executive Officer, NetHope Inc.
- **Houlin Zhao**, Secretary-General, International Telecommunication Union (ITU)
- **Jonathan Zittrain**, George Bemis Professor of International Law and Professor of Computer Science, Harvard University

Special thanks to members of the [Global Future Council on Digital Economy and Society 2016–2018](#), members from the 2018–2019 term and other contributors: James Chin Moody, Aniqā Sandhu, Azeem Azhar, C V Madhukar, Dave Weller, Deemah Al Yahya, Eileen Donahoe, Mohammad Al Zarooni, Mona Vernon, Richard “Dick” Daniels, Torbjorn Fredriksson, Winston Ma Wenyan.

We thank a number of organizations and individuals participating in the activities of the Forum's System Initiative on Digital Economy and Society, a number of teams at the Forum supporting this initiative and colleagues especially at our two centres: Centre for the Fourth Industrial Revolution and the Global Cyber Security Centre.

Endnotes

- 1 <https://news.itu.int/broadband-sustainable-development/> (link as of 05/12/18)
- 2 <https://broadbandcommission.org/publications/Pages/SOB-2018.aspx> (link as of 30/11/18).
- 3 <https://www.itu.int/en/ITU-D/Statistics/Pages/events/wtis2018/default.aspx> (link as of 05/12/18)
- 4 <http://a4ai.org/wp-content/uploads/2018/04/MDB-Investments-in-the-ICT-Sector.pdf> (link as of 30/11/18).
- 5 Sapiens: A Brief History of Humankind, Yuval Noah Hariri, 2014
- 6 <https://news.itu.int/broadband-sustainable-development/> (link as of 05/12/18)
- 7 <https://mashable.com/2015/12/12/english-strangling-internet-languages/#ZW9iwGSfLEqN> (link as of 30/11/18).
- 8 <https://www.weforum.org/agenda/2018/08/we-cant-tell-if-were-closing-the-digital-divide-without-more-data> (link as of 30/11/18).
- 9 https://www.wto.org/english/res_e/booksp_e/aid4trade17_chap11_e.pdf
- 10 <https://blog.dashlane.com/infographic-online-overload-its-worse-than-you-thought/> (link as of 30/11/18).
- 11 <https://www.worldbank.org/en/news/press-release/2017/10/12/11-billion-invisible-people-without-id-are-priority-for-new-high-level-advisory-council-on-identification-for-development> (link as of 05/12/18)
- 12 <https://www.idc.com/getdoc.jsp?containerId=US44070617> (link as of 05/12/18)
- 13 <https://fuelbymckinsey.com/article/the-next-20-billion-digital-market-id-verification-as-a-service> (link as of 05/12/18)
- 14 <http://pubdocs.worldbank.org/en/953621531854471275/ID4D-FININDEX-Note-Release2018.pdf> (link as of 05/12/18)
- 15 <https://www.economist.com/leaders/2017/05/06/the-worlds-most-valuable-resource-is-no-longer-oil-but-data> (link as of 05/12/18)
- 16 <https://www.forbes.com/sites/bernardmarr/2018/03/05/heres-why-data-is-not-the-new-oil/> (link as of 05/12/18)
- 17 <http://www.ehealthnews.eu/philips/5674-government-and-philips-consortium-co-invest-in-digital-pathology-and-ai-innovation-to-improve-cancer-care-in-the-uk> (link as of 05/12/18)
- 18 <https://www.imf.org/en/Publications/Policy-Papers/Issues/2018/03/20/pp020918imf-executive-board-supports-new-strategy-for-data-and-statistics-in-the-digital-age> (link as of 05/12/18)
- 19 <https://www.aeaweb.org/articles?id=10.1257/pandp.20181003> (link as of 05/12/18)
- 20 <https://www.brookings.edu/blog/techtank/2018/02/21/should-we-treat-data-as-labor-lets-open-up-the-discussion/> (link as of 05/12/18)
- 21 <https://www.idc.com/getdoc.jsp?containerId=prUS44417618> (link as of 05/12/18)
- 22 <https://www.idc.com/getdoc.jsp?containerId=prUS43381817> (link as of 05/12/18)
- 23 <https://www.salesforce.com/research/customer-trust/> (link as of 05/12/18)
- 24 <https://www.edelman.com/post/trust-barometer-expectations-for-ceos> (link as of 05/12/18)
- 25 <https://cointelegraph.com/news/study-crypto-mining-consumes-more-energy-than-mineral-mining> (link as of 05/12/18)
- 26 <https://www.nature.com/articles/s41893-018-0152-7> (link as of 30/11/18).
- 27 <https://www.weforum.org/reports/the-digital-enterprise-moving-from-experimentation-to-transformation> (link as of 05/12/18)
- 28 <https://www.weforum.org/reports/the-future-of-jobs-report-2018> (link as of 05/12/18)
- 29 <https://techonomy.com/2018/11/can-companies-good/> (link as of 05/12/18)
- 30 <http://reports.weforum.org/digital-transformation/platform-economy/> (link as of 05/12/18)
- 31 <https://andrewchen.co/how-marketplaces-will-reinvent-the-service-economy/> (link as of 05/12/18)
- 32 <https://www.weforum.org/agenda/2018/09/top-10-emerging-technologies-of-2018/> (link as of 05/12/18)
- 33 <https://www.information-age.com/technologists-ftse-boardrooms-123471595/> (link as of 30/11/18).
- 34 <https://www.edelman.com/trust-barometer> (link as of 05/12/18)

- 35 [ibid.](#)
- 36 [ibid.](#)
- 37 <https://www.idc.com/getdoc.jsp?containerId=prUS43185317> (link as of 05/12/18)
- 38 <https://techcrunch.com/2018/08/21/china-reaches-800-million-internet-users> (link as of 05/12/18)
- 39 <https://www.statista.com/chart/15202/the-number-of-internet-users-in-china/> (link as of 05/12/18)
- 40 https://www.ted.com/talks/gary_liu_the_rapid_growth_of_the_chinese_internet_and_where_it_s_headed (link as of 05/12/18)
- 41 <https://www.scmp.com/tech/enterprises/article/2172523/alibabas-singles-day-sales-hit-1-bln-yuan-less-60-seconds> (link as of 05/12/18)
- 42 <https://www.scmp.com/tech/enterprises/article/2168665/made-china-2025-5g-offers-worlds-biggest-mobile-market-chance-seize> (link as of 05/12/18)
- 43 <https://www.gov.uk/government/news/government-urges-business-to-take-action-as-cost-of-cyber-security-breaches-doubles> (link as of 05/12/18)
- 44 <https://www.reuters.com/article/us-cyber-attack-europol/cyber-attack-hits-200000-in-at-least-150-countries-europol-idUSKCN18A0FX> (link as of 05/12/18)
- 45 <https://www.gemalto.com/press/pages/data-breaches-compromised-4-5-billion-records-in-first-half-of-2018.aspx> (link as of 05/12/18)
- 46 <https://www.cnbc.com/2017/02/07/cybercrime-costs-the-global-economy-450-billion-ceo.html> (link as of 05/12/18)
- 47 <https://www.forbes.com/sites/louiscolumnbus/2018/11/04/idc-top-10-predictions-for-worldwide-it-2019/#41fbc0387b96>
- 48 <https://www.ibm.com/security/data-breach>
- 49 <https://www.thailand-business-news.com/asean/70452-digital-asean-adds-125000-new-internet-users-every-day.html>
- 50 <https://www.bloomberg.com/news/articles/2018-09-03/bain-sees-1-trillion-boost-to-asean-gdp-from-digital-economy>
- 51 http://www.xinhuanet.com/english/2018-09/19/c_137478730.htm
- 52 http://www.europa.eu/rapid/press-release_IP-18-4043_en.pdf
- 53 <https://medium.com/dentsu-aegis-network/three-ways-to-improve-trust-in-the-digital-economy-94ca0bb27b29>
- 54 https://dan.hu/wp-content/uploads/2018/03/DAN_Digital-Society-Index-2018.pdf
- 55 <https://www.edelman.com/trust-barometer>
- 56 https://unctad.org/en/PublicationsLibrary/dtlstict2016d1_en.pdf (link as of 05/12/18)
- 57 https://www.gartner.com/imagesrv/books/iot/iotEbook_digital.pdf (link as of 05/12/18)
- 58 <https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/digital-globalization-the-new-era-of-global-flows> (link as of 05/12/18)
- 59 <https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/digital-globalization-the-new-era-of-global-flows> (link as of 05/12/18)
- 60 <https://www.forbes.com/sites/louiscolumnbus/2018/08/08/global-state-of-enterprise-analytics-2018/#70f1a8296361> (link as of 05/12/18)
- 61 <https://www.idc.com/research/viewtoc.jsp?containerId=US44403818> (link as of 05/12/18)
- 62 The FBI-Apple encryption dispute saw a case where privacy came into conflict with criminal justice goals. The debate bled into government surveillance issues and the conflict between national security and civil liberties. Data localization requirements can be presented in terms of privacy or national security, but can draw suspicions of protectionism.
- 63 <https://pursuit.unimelb.edu.au/articles/key-greenhouse-gases-higher-than-any-time-over-last-800-000-years>
- 64 <https://www.newscientist.com/article/2186326-climate-crisis-as-greenhouse-gas-levels-reach-record-highs/>
- 65 https://www.washingtonpost.com/news/energy-environment/wp/2017/05/22/scientists-say-the-rate-of-sea-level-rise-has-nearly-tripled-since-1990/?utm_term=.20449e2f0dc2
- 66 [http://www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health](http://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health)
- 67 <https://www.theguardian.com/environment/2016/jun/16/what-would-a-global-warming-increase-of-15c-be-like>
- 68 <https://news.un.org/en/audio/2017/05/628392>



COMMITTED TO
IMPROVING THE STATE
OF THE WORLD

The World Economic Forum, committed to improving the state of the world, is the International Organization for Public-Private Cooperation.

The Forum engages the foremost political, business and other leaders of society to shape global, regional and industry agendas.

World Economic Forum
91–93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland

Tel.: +41 (0) 22 869 1212
Fax: +41 (0) 22 786 2744

contact@weforum.org
www.weforum.org